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What Type of Training Predicts Adherence to CBT-I Among Professionals Specializing in the Treatment of Insomnia?

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WHAT TYPE OF TRAINING PREDICTS ADHERENCE TO CBT-I AMONG PROFESSIONALS SPECIALIZING IN THE TREATMENT OF INSOMNIA?

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Dissertation Approval

This is to certify that the thesis presented to us by Mark D. DelGuercio on the 16th day of April 2018 in partial fulfillment of the requirements for the degree of Doctor of Psychology, has been examined and is acceptable in both scholarship and literary quality.

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Abstract

This study explored the relationship between certain educational and professional variables that influence the adherence to empirically supported practices in cognitive-behavioral therapy for insomnia (CBT-I). The variables of interest included the practitioner's level of training as measured by the number of hours of advanced training in CBT-I, the total number of hours practicing CBT-I out of the total annual clinical practice hours, and the total number of years practicing CBT-I. The final variable of interest was treatment preference and practice knowledge. The study used a one-time, cross-sectional, web-based survey. The participants consisted of 165 mental health and medical professionals of various disciplines who were trained in CBT-I. The results suggested that individuals with more training were significantly more likely to apply CBT-I. Practitioners with more training had a higher percentage of CBT-I on their caseloads than those with less training. The total number of training hours did not significantly predict adherence, with all practitioners scoring similarly.

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Chapter 1: Introduction

Statement of the Problem

Each year, millions of individuals in the United States report sleeplessness (Moloney, Konrad, & Zimmer, 2011). Between the years of 1993 and 2007, cases of insomnia were reported to be as high 5.7 million in the United States (Moloney et al., 2011). Insomnia impacts life domains, including virtually every single aspect of physical health and mental health (Kryger & Roth, 2017). Work productivity is particularly impacted by insomnia, with complaints of insomnia being the most common reason for missing work (Leigh, 1991). The net cost of absenteeism includes lost revenue and increased costs for medical treatments. The annual estimated cost of treating insomnia is between 30 and 35 million dollars, with some reports as high as 170 million dollars (Wickwire, 2015).

Some individuals may regard medication as the most—or only—effective treatment for insomnia. Prescription medications written for insomnia increased 21 times faster than reported sleeplessness complaints and 5 times faster than newly diagnosed cases of insomnia between the years 1993 and 2007 (Moloney et al., 2011). The statistics suggest that an emphasis is placed on prescription medication when treating insomnia among the public and medical professionals (Moloney et al., 2011). As an example, in 2003, the majority of the money spent to treat insomnia among Medicaid recipients in the state of West Virginia was used for medication, with as much as 88% of prescription drug treatment involving Zolpidem and Trazodone, and 84% of total dollars spent on insomnia prescriptions going to Zolpidem (Roy & Smith, 2010). This information is important

because it suggests that a large number of individuals experiencing symptoms of insomnia are being treated with pharmacological interventions.

Despite high rates of pharmacological treatment for insomnia, there are effective interventions that do not require medication (Wilson & Nutt, 2014). For example, the success of cognitive and behavioral interventions for insomnia is as high as 80% (Morin, 2005). Evidence shows that cognitive-behavioral interventions can be more effective (Homsey & O'Connell, 2012), longer lasting (Riemann & Perlis, 2009), and more cost effective than pharmacological interventions alone (Tannenbaum et al., 2015). Combining medication and cognitive-behavioral therapy (CBT) appears to maximize the effects of both and expedites the time to positive outcomes when treating insomnia (Milby et al., 1993). Research shows that the inclusion of cognitive-behavioral interventions for insomnia also increases the durability of treatment (McClusky, Milby, Switzer, Williams, & Wooten, 1991). The question remains, however: Are mental health and medical practitioners using evidence-based interventions, which are considered best practice, in the treatment of insomnia?

To answer any question related to proper application of evidence-based treatment, an exploration of the variables that determine therapeutic outcomes is necessary. Research indicates that formal education and the use of structured questionnaires increase the accuracy of diagnosing insomnia (Backhaus et al., 2002). This information is particularly relevant because increased diagnostic accuracy has been shown to have a positive correlation with treatment outcomes across diagnoses (Jensen-Doss & Weisz, 2008). Although diagnostic accuracy does not seem to change significantly based solely on the number of years of experience (Spengler & Pilipis, 2015), treatment outcomes

have been shown to be influenced by the level of experience and the therapist's level of education, with more experienced graduate level practitioners achieving higher patient adherence and global performance rates than those achieved by lower level practitioners (Stein & Lambert, 1995). This information might indicate that patients who see more experienced practitioners tend to receive more effective treatment. Research also shows that experience applying CBT increases the effectiveness of therapeutic interventions, as evidenced by a reduction in unwanted symptoms (Forand, Evans, Haglin, & Fishman, 2011). In summary, the literature indicates that a practitioner's training, experience, and knowledge influence the application of evidence-based treatment and outcome; however, many practitioners report a lack of training in cognitive-behavioral interventions for insomnia (Meltzer, Phillips, & Mindell, 2009). The research regarding the efficacy of CBT for insomnia (CBT-I) demonstrates how effective it is in reducing symptoms of insomnia. Nevertheless, the topic of how practitioners apply CBT-I has not been researched extensively.

CBT-I is a therapeutic modality designed to use cognitive and behavioral methods to reduce variance in circadian rhythm and use homeostatic mechanisms to assist people in attaining more consistent and restorative sleep (Wilson & Nutt, 2014). Even brief CBT-I patient workshops are highly effective in reducing insomnia (Swift et al., 2012). Nonpharmacological behavioral interventions employed in CBT-I include sleep restriction, stimulus control, and sleep hygiene. Stimulus control utilizes behavioral techniques to intentionally manipulate paired stimuli that are associated with the onset of sleep (Bootzin, 1973; Bootzin & Rider, 1997). Sleep restriction involves reducing naps, delaying bedtime, or advancing bedtime in order to normalize sleep wake patterns

(Spielman, Saskin, & Thorpy, 1987). Both sleep restriction and stimulus control have been researched extensively and determined to be efficacious (Kierlin, 2008). In addition, sleep hygiene, which often involves instructions for patients to use elements of both stimulus control and sleep restriction, is reported by individuals in treatment to be more effective than medication (Homsey & O'Connell, 2012).

In CBT-I, cognitive intervention strategies are employed in addition to behavioral interventions, because negative thought patterns are associated with a higher risk of developing and maintaining insomnia. Negative thoughts that occur prior to sleep onset or during the course of the day are associated with higher rates of insomnia symptoms. CBT-I focuses on challenging distortions in thinking in order to reduce anxiety and promote restorative sleep (Baker, Baldwin, & Garner, 2015).

When implemented effectively, these behavioral and cognitive techniques decrease insomnia symptoms. Despite the clear efficacy of nonpharmacological interventions, many medical and mental health professionals do not receive education on sleep disorders and behavioral sleep medicine. The lack of formal education reduces therapeutic options and impacts the frequency with which practitioners apply empirically supported interventions for insomnia.

Graduate education in sleep disorders and evidence-based behavioral interventions for insomnia is limited (Moline & Zendell, 1993). Including training in behavioral sleep medicine across disciplines could increase the effectiveness of diagnosis and treatment of sleep disorders such as insomnia. The research shows a discrepancy between student professions and specialties. Specifically, 32% of doctoral level psychology students reported that they received education on sleep medicine in 1993

compared to 58% of medical students in family practice, 65% of medical students studying pediatrics, and 87% of medical students studying neurology (Moline & Zendell, 1993). In 1998, a poll was taken of all American Psychological Association psychology programs in the United States. The results showed that 81% of the psychology programs had no training in behavioral sleep medicine. Fourteen percent of the programs offered minimal training in behavioral sleep medicine and, of those programs, 5% had systematic training (Lichstein et al., 1998). By 2009, 31% of the training programs in the United States offered formal training for sleep disorders. Of these, only 16% had faculty trained in sleep medicine (Meltzer et al., 2009). Research indicates that receiving formal, structured training in CBT-I increases practitioners' self-efficacy delivering CBT-I and also improves their attitudes regarding the perceived efficacy of CBT-I (Manber et al., 2013).

Purpose of the Study

The purpose of this study was to explore whether, and to what degree, the application of CBT-I differs depending on the practitioner's level of education, clinical specialty, and experience. In addition, this study explored clinician-related variables that influence the practice preferences, practice approach and knowledge, and practice density of CBT-I.

To date, few researchers have explored the way a practitioner's preferences and approach to practice impact the application of CBT-I. Knowing which training modalities and education-related variables influence the application of CBT-I would allow for a more efficient educational sequence in higher education. Such knowledge could also promote more efficient learning during postgraduate workshops. Moreover,

efficient clinical application of CBT-I could decrease the net cost of mental health and medical treatment of insomnia by making therapeutic interventions more time limited and effective.

Chapter 2: Literature Review

Insomnia

The fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-5*; American Psychiatric Association [APA], 2013) defines insomnia as "a dissatisfaction with sleep quantity or quality with complaints of difficulty initiating or maintaining sleep" (p. 362). Difficulty initiating or maintaining sleep must cause clinically significant distress or impairment in social, occupational, educational, behavioral, or other areas of life (APA, 2013). To diagnose difficulties, the impairment in sleep must be present for a minimum of 3 nights per week and last at least 3 months (APA, 2013). The Centers for Disease Control and Prevention (CDC; 2015) further specifies symptoms of early morning awakenings and an inability to go back to sleep once awakened. The symptoms of insomnia are diverse and can cause impairments in physical and mental health (Fortier-Brochu, Beaulieu-Bonneau, Ivers, & Morin, 2010; Gaultney, 2010; Lovato & Gradisar, 2014).

Common characteristics of insomnia include decreased or nonrestorative sleep (Pillai, Roth, & Drake, 2016). The *DSM-5* diagnostic criteria (APA, 2013), the tenth edition of the *International Statistical Classification of Diseases and Related Health Problems* (*ICD-10*; World Health Organization [WHO], 2010), and the second edition of the *International Classification of Sleep Disorders* (*ICSD-2;* American Academy of Sleep Medicine [AASM], 2001) have different criteria for diagnosing symptoms of insomnia (Gupta et al., 2014). A major difference between the *DSM-5*, *ICD-10*, and *ICSD-2* is that symptoms are arranged according to etiology in the *ICD-10* and *ICSD-2*, whereas in the *DSM-5*, all types of insomnia are categorized together (Gupta et al., 2014).

Further, the *DSM-5* diagnostic criteria allow for the recognition of insomnia as an independent diagnosis (Gupta et al., 2014). In contrast, the *ICD-10* and the *ICSD-2* categorize the etiology according to organic or nonorganic insomnia, which are also referred to as primary insomnia versus secondary insomnia, respectively (Pallesen, Nordhus, Havik, & Nielsen, 2001). Organic refers to a biological cause of insomnia. Nonorganic refers to psychological or environmental causes of insomnia. In summary, three diagnostic sets of criteria are used for studying, assessing, and treating the same disorder. The differences in diagnostic criteria is particularly relevant because accurate assessment and diagnosis can increase the efficiency of selecting appropriate therapeutic interventions (Jensen-Doss & Weisz, 2008). Although agreement on symptom classification is preferred, the consensus appears to be mixed on what those symptoms are when diagnosing insomnia. Debate in the field of psychology also surrounds specific subtypes of insomnia (Gupta et al., 2014).

Two proposed categories for diagnostic subtypes of insomnia include a category that is based on physiological hyperarousal and another that is associated with emotional, cognitive, and cortical arousal (Gupta et al., 2014). Edinger et al. (2011) explored the reliability and validity of existing diagnostic subtypes of insomnia in the *DSM-IV-TR* (APA, 2000) and the *ICSD-2*. The categories with the best validity in the *DSM-IV-TR* were insomnia related to another mental disorder, insomnia resulting from a general medical condition, breathing-related sleep disorder, and circadian-rhythm sleep disorder. The categories with the most validity in the *ICSD-2* included insomnia related to a mental disorder, insomnia related to a medical condition, obstructive sleep apnea, restless legs

syndrome, idiopathic insomnia, and circadian-rhythm sleep disorder-delayed sleep phase type (Edinger et al., 2011).

Although unanimous agreement between the *DSM-5, ICSD-2*, and *ICD-10* has not yet been achieved, many of these symptoms are common among different populations in the United States, and high rates of insomnia have also been noted among other countries (Soldatos, Allaert, Ohta, & Dikeos, 2005). Owing to the frequency of insomnia occurring in various populations globally, one could hypothesize that it may share a common etiology or etiologies worldwide.

Prevalence. Prevalence describes the proportion of individuals in a given population who have a particular condition at a given time, whereas rates describe the frequency with which those conditions occur in a specific sample. Although the rates of insomnia are different among studies, insomnia occurs in many populations globally. In one study, Brazil, South Africa, and Belgium reported the highest rates of insomnia: 79.8%, 45.3%, and 36.0%, respectively (Soldatos et al., 2005). These percentages represent acute insomnia symptoms as measured by the Athens Insomnia Scale (AIS). The term *acute* refers to one time point over the course of a lifetime as opposed to lifetime prevalence. Other research assessing acute symptoms of insomnia over a 12-month period found that the highest rates of "sleeping problems" occur in the United States, followed by Western Europe and Japan, with 56%, 31%, and 23% of participants respectively reporting sleep problems (Léger, Poursain, Neubauer, & Uchiyama, 2008).

In the United States, the rates of insomnia by ethnicity are 10% among Caucasians, 7% among Hispanics, 4% among Asians, and 3% among African Americans (Morin & Jarrin, 2013). Su, Huang, and Chou (2004) reported that 6% of Taiwanese

adults over the age of 65 years experienced insomnia for at least 1 month and that 17.7% met criteria for insomnia symptoms over the course of their lifetimes. Similar rates of diagnosis were found in Canada, with 25.3% of individuals surveyed reporting a dissatisfaction with their sleep, 29.9% reporting some symptoms of insomnia, and 9.5% meeting criteria for insomnia (Morin, LeBlanc, Daley, Gregoire, & Mérrette, 2006).

The reason the rates of insomnia differ between samples and geographic locations is unknown. One explanation could be the different measurements used by different researchers. Some experiments relied on *DSM-IV-TR* diagnostic criteria, whereas others based their findings on alternative measurements, such as the AIS or Epworth Sleepiness Scale (ESS). *DSM-IV-TR* and *ICD-10* diagnostic criteria are considered more precise and stringent, as they measure frequency and severity, in contrast with other, more liberal measures that do not account for frequency and severity (Morin et al. 2006).

Although the numbers may vary depending on demographic information or physical location, sufficient evidence shows that the impact of insomnia can be severe in a variety of domains, regardless of geographic location (Soldatos et al., 2005) or ethnicity (Morin & Jarrin, 2013). Evidence also shows that particular personality traits may predispose individuals to develop insomnia (Vincent & Walker, 2000).

Risk factors. Risk factors for insomnia include sleep reactivity, stress reactivity, and neuroticism. Sleep reactivity is defined as a greater sleep difficulty following a challenging event (Vargas, Friedman, & Drake, 2015). Sleep reactivity relates to the way individuals process events in their lives and can be conceptualized as a higher baseline response to stress, leading to a higher tendency to develop insomnia (Harvey, Gehrman,

& Espie, 2014). Similar to sleep reactivity, stress reactivity, which is a higher baseline response to stressful life events, is also associated with a higher rate of neuroticism (Harvey, Gehrman, et al., 2014). The personality trait of neuroticism is associated with increased rates of insomnia (Levin, Bertelson, & Lacks, 1984; Vincent & Walker, 2001.

Trauma is also associated with higher risk for developing insomnia (Sinha, 2016). Trauma is believed to increase the risk of insomnia both biologically and psychologically. The experience of stress increases the sensitivity and arousal of the nervous system that leads to hyperarousal. Hyperarousal decreases an individual's ability to fall asleep (Fernandez-Mendoza et al., 2016; Sinha, 2016).

Having a variable work schedule results in abnormal and inconsistent sleep patterns that are correlated with a higher likelihood of developing insomnia. Two different phenotypes of insomnia are proposed to develop from shift work: sleepy insomnia and alert insomnia. In regard to symptom presentations, individuals with sleepy insomnia are tired but cannot sleep, whereas individuals with alert insomnia are more cognitively aroused and cannot sleep. Research demonstrates that the sleepy type of insomnia is explained by circadian misalignment and alert insomnia can be precipitated by shift work (Gumenyuk, Belcher, Drake & Roth, 2015). Not getting adequate sleep or getting sleep that is nonrestorative can impact physical health.

Biological Perspectives on Sleep-Wake Cycle Regulation

Insomnia can be caused by biological, psychological, and environmental factors (Peters, 2014). Furthermore, variables that are endogenous and exogenous can influence neurotransmitter production. The internal and external processes are categorized into two groups: the circadian alerting system and the homeostatic sleep drive (Peters, 2014).

Circadian rhythms. The circadian alerting system refers to external stimuli, internal cognitions, or behaviors that influence biological functioning (Richardson, Gradisar, & Barbero-, 2015). The suprachiasmatic nucleus of the hypothalamus is the locus of the brain that is most responsible for the cycles of wakefulness and sleep (Lieberman, Neubauer, & Dutch, 2007). The suprachiasmatic nucleus responds to the external stimuli of light and dark and is involved in hormone and neurotransmitter production which, in turn, promotes or inhibits sleep. The serotonergic, noradrenergic, cholinergic, and hypocretin systems are the specific neurotransmitter systems that influence the sleep-wake cycle (Luppi & Fort, 2011).

Hormones also play a large part in the regulation of sleep. Irregularities in hormone production can lead to variances in sleep-wake cycles, and variances in sleep-wake cycles can also lead to a hormone imbalance (Morgan & Tsai, 2016). Melatonin is a critical hormone in sleep-wake cycles; melatonin production increases immediately prior to the onset of somnolence (Golombek, Pandi-Perumal, Brown, & Cardinali, 2015). Other important hormones include prolactin, gonadrotropic hormones, leptin, and ghrelin. A full description of each hormone and its function as it relates to sleep is beyond the scope of this literature review (see Morgan & Tsai, 2016).

The circadian alerting system explains how the environment can influence sleep-wake cycles and subjective feeling of fatigue. Elements of the environment and day-to-day routines that are of great importance include physical activity, amount and intensity of light, and habituation to stimuli in the environment (Kryger, Thomas, & Dement, 2011).

Cognitive, behavioral, and environmental variables may lead to increased cognitive and physiological arousal, as well as dysfunctional beliefs that may interfere with naturally occurring rhythms of the body that promote sleep onset and maintenance. An example of cognitions that may impair sleep are those related to excessive worry. Moreover, one environmental variable that may interfere with sleep is excessive environmental stimulation such as playing an action-oriented videogame or watching a highly emotionally arousing movie. Therefore, biological, psychological, and environmental variables must be taken into account when considering the causes, assessment, and treatment of insomnia.

In summary, the body has a naturally occurring cycle of sleep and waking that is referred to as the circadian rhythm, which is regulated by the suprachiasmatic nucleus. The circadian rhythm can be disrupted by biological processes occurring in the body as well as external stimuli in the environment. Direct correlates that relate to the functioning of the suprachiasmatic nucleus may include traumatic brain injuries and other neurocognitive disorders (Lieberman et al., 2007). Also, something as simple as light, along with cognition and behavior, can disrupt all varieties of normal functioning, including sleep.

Homeostasis. The theory of homeostatic sleep drive is based on observations indicating that virtually all living organisms seem to demonstrate a distinct natural balance between diurnal and nocturnal activity or, minimally, as in simpler organisms, periods of activity and quiescence. In higher level organisms, this balance manifests clearly as sleep and wakefulness. When the balance is upset, a sleep debt accumulates, thereby offsetting the natural rhythm of sleep and wakefulness. *Sleep debt* is a term that

is used to describe an imbalance between an organism's naturally occurring sleep-wake cycles. The word *debt* indicates an imbalance that can be attributed, in large part, to the neurotransmitters, adenosine, and adrenaline. Long-term sleep debt can negatively impact the functioning of the brain and directly impact other hormones, neurotransmitters, and many other processes that influence alertness and somnolence (Kim et al., 2015). Conversely, sleeping too much can also throw off the endogenous sleep-wake cycles (Kryger et al., 2011). The variance in organisms' sleep schedules is particularly relevant to insomnia. For example, daytime napping can reduce sleep debt and offset naturally occurring sleep-wake cycles. A variable work schedule, jet lag, or any change in a naturally occurring or habituated sleep-wake schedule, could also interfere with homeostasis. Thus, evidence-based interventions, such as sleep restriction, have been developed to help reestablish these natural rhythms (Kryger et al., 2011).

In summary, the body has an endogenous regulation of wake and sleep. The balance between wakefulness and sleep is susceptible to changes based on an individual's schedule. If changes occur in the form of more or less sleep, the natural balance is offset. If sleep is lost, a person's body will naturally attempt to make up that sleep by sleeping more following the change in schedule. If a person is sleeping too much, such as in the case of daytime naps, his or her body will regulate the overall sleep total by reducing the need for sleep, which could result in insomnia.

Models of Insomnia

A number of different models describe the development, etiology, and persistence of insomnia symptoms. The different models place emphasis on the strength of biological, psychological, and sociological variables and their influence on insomnia.

The first model that will be discussed is the stimulus control model. The stimulus control model, suggests that biological organisms respond to their environments by way of cues that come to elicit or evoke particular responses through classical and operant conditioning, respectively. Classical and operant conditioning can elicit specific physiological, behavioral, emotional, and cognitive responses. In treatment, particular stimuli and physical elements in the environment can be altered selectively to promote or inhibit sleep. Examples of stimulus control include selectively altering the amount of bright light or selectively reducing strenuous activity in proximity to bedtime (Turner & Ascher,1979; Zwart & Lisman, 1979).

The Speilman model, often referred to as the 3P model, proposes that insomnia can be explained by understanding relevant predisposing, precipitating, and perpetuating factors. The Spielman model can be likened to the diathesis-stress model, in which an organism has a natural predisposition for developing specific symptoms. The environment and context, such as the onset of a stressor (e.g., losing a job, bereavement, jet lag) may increase the likelihood that specific genetic predispositions will manifest into the development of unwanted symptomatology (Perlis, Corbitt, & Kloss, 2014).

The neurocogonitive model suggests that sleep is influenced by various categories of arousal. These include cortical, cognitive, and somatic arousal. This model is unique in that it places a stronger emphasis on the biochemical functioning of the brain than do other models. Essentially, this model asserts that the brain experiences hyperarousal that conflicts with the normal mesograde amnesia of sleep (Kryger et al., 2011).

The psychobiological inhibition model is similar to the neurocognitive model in that it emphasizes the biological functioning of the human brain and the influence the

brain and neurotransmitters have on sleep; however, this model differs from the neurocognitive model in that it places less of an emphasis on hyperarousal. Instead, the psychobiological inhibition model attributes the symptoms of insomnia to a failure of the brain to inhibit wakefulness, suggesting that the symptoms of insomnia may be the result of the dysregulation of the brain's natural sleep processes. When the brain is supposed to be gradually gearing down in order to achieve restful and restorative sleep, it is failing to do so at the cellular level (Kryger et al., 2011).

The drosophila model places an emphasis on genetics. This model suggests that the mechanisms of sleep are at least partially susceptible to genetic influence, as evidenced by higher rates of insomnia occurring in the children of mothers and fathers who have insomnia. The specific mechanisms described in the drosophila model are the fight-or-flight response, the plasticity of sleep homeostasis, and circadian processes. Evidence to support the individual mechanisms and their relatedness to symptoms of insomnia were tested using animal models. Outcomes of these studies indicated that the mechanisms of sleep could be influenced over successive generations in a way that leads to increased variance in endogenous circadian rhythms (Seugnet et al., 2009).

The cage exchange model is another sleep paradigm. The development of this model used rats to investigate the effects of stress on sleep and the central and autonomic nervous systems. In these studies, rats transferred from one cage to a separate cage, the latter of which had been soiled previously by another male rat. Because rats are highly territorial, this transfer elicited a fight-or-flight response. As a result, each cage exchanged rat showed increased activity in the cerebral cortex, limbic system, locus coeruleus, tuberomammillary nucleus, and overall autonomic system. The activation of

these portions of the brain is believed to contribute sleep impairment and result in increased sleep variance (Cano, Mochizuki, & Saper, 2008).

Each of these models illustrates differing focuses on the roles of the biology, psychology, environment, and social behavior on sleep. Each model may lead to a unique treatment perspective. For example, some medications target the neural mechanisms of insomnia and treat the symptoms from a biological perspective. Also, a series of treatments are available that approach the symptoms of insomnia from psychological and social perspectives.

Impact on Physical Health

Sleep deprivation can impact many important areas of life, as noted in the *DSM-5* (APA, 2013; Leigh, 1991; Wickwire, 2015). Common methods for researching the impact of insomnia rely on objective and subjective measurements. For example, the severity of sleep disturbance is measured by the number of hours slept, an objective measure, whereas participant-reported fatigue is a subjective unit of measurement.

In regard to fatigue, individuals who report higher levels of fatigue caused by insomnia also report greater impairment in health-related quality of life (Fortier-Brochu et al., 2010). According to Chen, Gelaye, and Williams (2014), quality of life was inversely related to the level of fatigue reported but not to the objective severity of sleep disturbance. Sleep disturbances and insomnia presenting as sleep onset latency, middle awakening, and early waking without the ability to fall asleep again, as well as daytime fatigue and sleepiness, are all correlated with low health-related quality of life (Chen, Gelaye, & Williams, 2014).

Insomnia is a risk factor for decreased immune functioning (Taylor, Lichstein, & Durrence, 2003). Decreased immune functioning impacts many areas of health, including cardiovascular disease (Taylor et al., 2003). According to the American Heart Association (2011), individuals who have trouble falling asleep have a 45% greater chance of experiencing a heart attacks, individuals who have problems staying asleep increase heart attack risk by 30%, and individuals who report not feeling refreshed by sleep have a 27% greater chance of a having a heart attack. Self-reported insomnia is also associated with rates of coronary heart disease (CHD; Zhuang et al., 2016). Increased insomnia rates are associated with higher rates of CHD in a population older than 65 years (Zhuang et al. 2016). Zhuang et al. (2016) found that of the 2,110 participants with CHD, 17.7% had occasional insomnia and 12.17% had frequent insomnia.

Another important variable linked to physical health is sleep duration. Sleep duration is an important component in the regulation of metabolism and endocrine functioning. Specifically, sleep deprivation is linked consistently with obesity (Chen, Beydoun, & Wang, 2008). Palm, Janson, and Lindberg (2015) found that overweight individuals experience more insomnia symptoms at baseline. Furthermore, obesity is commonly associated with diabetes, and decreased sleep duration, which is fewer than 6 consecutive hours of sleep, has been shown to increase the risk of developing Type 2 diabetes (Heianza et al., 2014). The impact of insomnia on weight gain and diabetes has been explored using animal models. One study demonstrated that increasing sleep through melatonergic manipulation decreased weight in rats and improved insulin sensitivity (She et al., 2009). This study demonstrated the differences between weight

gain and the progression of diabetes through the manipulation of sleep. By increasing sleep duration, the animal model suggested that both diabetes and weight gain may be mediated by sleep (She et al., 2009). Physical health is not the only area of health that is impacted negatively by insomnia; insomnia can impair functioning and mental health in other areas as well.

Recent literature demonstrates that sleep irregularities, and insomnia specifically, are associated with a higher risk for developing Alzheimer's Disease (AD; Cedernaes et al., 2017). AD develops as a result of a buildup of a substance called amyloid beta that, in excess, causes plaques and tangles to form in the neuronal architecture of the human brain. Research has demonstrated that the presence of amyloid beta decreases when individuals are asleep and that the act of sleeping may offer an important opportunity for the human body to remove excess amyloid beta in the brain. The human brain has cells, called glial cells, that are designed specifically to remove waste. Research shows that individuals who are not getting enough sleep are not affording the cellular mechanisms in the brain that are responsible for maintenance to function properly, thereby increasing the human body's susceptibility to damage through the development of amyloid beta and the plaques that form as a result of that substance (Cedernaes et al., 2017)

Impact on Adaptive Functioning and Mental Health

Insomnia has a deleterious impact on mental and emotional health. The domains of cognitive functioning impacted by sleep deprivation impair virtually all aspects of cognitive processing that are required for higher order thinking. The impairments in thinking are not isolated to logical function or abstract reasoning, but also impair other aspects of brain mechanics such as emotional processing.

Deficits in cognitive functioning. One domain of cognitive functioning that is impaired by insomnia is psychomotor vigilance (Belenky et al. 2003). Psychomotor vigilance is a measure of attention and response time. Evidence from sleep restriction studies has demonstrated that chronic sleep restriction results in decreased psychomotor vigilance. Psychomotor vigilance deficits can persist once normal sleep is restored in some cases (Belenky et al. 2003; Van Dongen, Maislin, Mullington, & Dinges, 2003). Furthermore, the impact of reduced sleep is dose dependent, meaning that the amount of sleep that is lost is correlated to the impact of the cognitive deficits in performance (Van Dongen et al., 2003).

Another domain of cognitive functioning that is impacted by insomnia is memory, specifically, declarative memory and procedural learning (Curcio, Ferrara, & De Gennaro, 2006). Insomnia in older adults has been linked to significantly lower performance in executive functioning, including verbal memory and working memory (Lo, Groeger, Cheng, Dijk, & Chee, 2016). These findings are congruent with Shekleton et al. (2014), who found that patients with insomnia exhibited statistically significant deficits in switching attention and working memory when compared with patients without insomnia. Also related to possible memory impairments, college students who reported symptoms of insomnia were more likely to have a GPA below a 2.0 (Gaultney, 2010). Impairments in brain functioning may not be limited to performance-related outcomes and could also impact emotional functioning.

Emotional impact. The relationship between insomnia and mental health appears to be bidirectional. For instance, longitudinal research has indicated that insomnia may contribute to the development of depressive symptoms (Okajima, Komada,

Nomura, Nakashima, & Inoue, 2012; Lovato & Gradisar, 2014). Conversely, depression may lead to the development of insomnia (Yon et al., 2014). Evidence to support the complicated relationship between depression and insomnia was elucidated in one study that examined the impact of therapeutic interventions, such as CBT, for depression and insomnia. Researchers showed that when depression was treated successfully, the symptoms of insomnia sometimes also remitted. Treatment of moderate levels of depression resulted in a decrease in insomnia symptoms. Individuals with higher levels of depression, however, did not show remission of insomnia, indicating that insomnia-specific interventions may need to be included in treatment regimens to effectively treat depression and comorbid symptoms, specifically in more severe cases (Yon et al., 2014).

Longitudinal evidence indicating that insomnia can precipitate depression arises from one such study investigating the development of depression from preexisting insomnia. Results indicated that the presence of insomnia might predict later depression (Okajima et al., 2012). Moreover, individuals who displayed persisting insomnia over a 5-year period were significantly more likely to develop symptoms of depression than individuals who experienced a single episode of insomnia (Suh et al., 2013). Similarly, individuals in a nonclinical sample who experienced insomnia as assessed by multiple episodes of insomnia over a 1-year period at baseline were significantly more likely than a nonclinical sample without insomnia to develop depression over the span of 7.5 years (Fernandez-Mendoza et al., 2015).

Insomnia has also been shown to increase with frequency when an individual is experiencing anxiety (Sadigh, Himmanen, & Scepansky, 2014). Among college students, the presence of state anxiety significantly predicted insomnia (Sadigh et al., 2014). A

strong correlation also appears to exist between sleep quality and sleep latency, both of which are symptoms of insomnia and affected by anxiety. Anxiety in the form of sleep-specific worry has been shown to predict sleep onset latency and overall sleep efficiency (O'Kearney & Pech, 2014).

In summary, insomnia is correlated with anxiety and mood disorders. Insomnia also takes a toll physically, mentally, and emotionally on individuals who suffer from it. Symptoms of insomnia have been shown to negatively impact work performance (Léger, Guilleminault, Bader, Lévy, & Paillard, 2002).

Financial cost. Insomnia has an impact on work performance, with insomnia being one of the most commonly cited reasons for absenteeism from work (Leigh, 1991). Individuals with insomnia are twice as likely to miss work than are individuals without insomnia (Leigh, 1991). According to Ozminkowski, Wang, and Walsh (2007), the indirect cost of absenteeism was approximately $1,253 greater for individuals with insomnia than for individuals not experiencing insomnia over a 6-month period. In the United Kingdom, the estimated yearly cost of absenteeism related to insomnia symptoms has been identified to be $86.24 greater per employee with insomnia per year, than per employee without insomnia. Furthermore, an estimated $260.97 has gone to salary replacement. Salary replacement is the price of reimbursing an employee for his or her sick leave when he or she is a salaried professional. Furthermore, up to $1,189.48 per sleep-deprived employee has been attributed to loss of productivity over the course of a year (Godet-Cayré et al., 2006). Nevertheless, missing work is not the only negative consequence of insomnia. Being tired on the job also results in a number of negative consequences. For instance, individuals who report symptoms of insomnia are more

likely to report workplace errors, difficulty concentrating, decreased productivity, and increased frequency of work-related accidents (Léger et al., 2002).

Insomnia also impacts the cost of medical care, which includes medical consultation, transportation to consultations, prescription medications, over-the-counter sleep products, and alcohol used to get to sleep (Daley, Morin, LeBlanc, Grégoire, & Savard , 2009). The estimated total of all of these different insomnia-related costs is 6.6 billion dollars annually in Canada (Daley et al., 2009). As an example, when broken down by category, the estimated cost of insomnia in Quebec alone is 191.2 million Canadian dollars for transportation, 36.6 million for consultation, 16.5 million for prescription medication, 18 million for over-the-counter sleep aids, and 339.8 million for alcohol used to help with sleep (Daley et al., 2009).

Costs aside, how and why individuals develop symptoms of insomnia may be as diverse as the presentation of insomnia symptoms. For instance, substances may impact physiology and increase insomnia symptoms.

Substance use disorders. Alcohol, tobacco, and caffeine impair one's ability to sleep. Adult populations with co-occurring alcohol dependence have higher rates of insomnia than individuals who are not dependent upon alcohol (Brower, 2015). Brower, Krentzman, and Elizabeth (2011) found that the frequency of alcohol consumption over a 6-month period significantly predicted the presence of insomnia symptoms, and that participants who abstained from alcohol or reduced alcohol to moderate levels achieved the largest reduction in insomnia symptoms when compared to individuals who did not reduce or abstain from alcohol.

Related to adult alcohol intake, specific behaviors increase the risk of insomnia. Adults who engage in binge drinking behaviors have increased chances of developing insomnia, with individuals who binge drink more than two days per week having a 64% greater chance of developing insomnia symptoms (Canham, Kaufmann, Mauro, Mojtabai, & Spira, 2015). Popovici and French (2013) found that the rate of insomnia in the form of trouble falling asleep among frequent alcohol users was 13% higher in women who binge drink and 10% higher in men. Both men and women who engaged in binge drinking behaviors reported higher rates of difficulty staying asleep, with women having 10% higher rates of trouble staying asleep than women who did not binge drink and men having 8% (Popovici & French, 2013).

Alcohol, tobacco, and caffeine are also associated with increased rates of insomnia symptoms in male adolescents ages 11 to 17 (Skarupke et al., 2015). Adolescent girls who frequently drink coffee and drink alcohol are also more likely to report symptoms of insomnia than girls who do not consume these substances (Skarupke et al., 2015). Similar findings related to caffeine consumption increasing the likelihood of insomnia have also been found in adults (Bonnet & Arand, 1992). Although the correlation between daily habits and sleep are fairly clear, other predisposing variables are less observable.

Genetics

Researchers continue to explore the heritability of insomnia. Palagini, Biber, and Riemann (2013) found that insomnia might be inherited, as reflected in self-report ratings from both family studies and twin studies. Insomnia is more common in individuals who have first-degree blood relatives who also have insomnia than in individuals who do not

have first-degree blood relatives with insomnia. Bastien and Morin (2000) reported that 35% of individuals who had family members who experienced insomnia also reported experiencing insomnia. Of these participants, 76% reported that their mothers also experienced insomnia. The rates of insomnia in biological relatives differ in clinical versus nonclinical populations. In both groups, however, individuals who have first-degree relatives with insomnia are more likely themselves to experience insomnia. In clinical populations, 43.3% of individuals reported having first-degree relatives with insomnia. The most frequently reported family member to also have insomnia was the mother (Dauvilliers et al., 2005). Research shows significantly higher rates of heritability in monozygotic twins than in dizygotic twins, with the likelihood of inheriting insomnia being between 34% and 45% in monozygotic twins (Hublin, Partinen, Koskenvuvo, & Kaprio, 2011). The studies referenced suggest that insomnia is highly dependent upon a genetic predisposition. Genetics can be said to relate to the natural unfolding of processes in the human body. In addition to genetics, aging should also be considered when discussing naturally occurring processes. Aging and the normal biological functions associated with aging have been shown to increase the chances of developing insomnia (Reeve & Bailes, 2010).

Aging

As age increases, middle-of-night awakenings increase, sleep becomes shallower, and variance in sleep phases increase during the night (Nau, McCrae, Cook, & Lichstein, 2005). Kim et al. (2013) found that the symptoms of insomnia differed as chronological age increased. Older individuals with insomnia have greater difficulty initiating sleep, have more early-morning awakenings, and have more difficulty maintaining sleep than

do middle-aged individuals (Kim et al., 2013). Although the objective measurements of sleep duration and sleep quality show that rates of insomnia increase with age, subjective reports indicate that insomnia is most reported between 18 to 24 years of age, increases again at 45 to 54 years of age, and subjectively declines into old age (Grandner et al., 2012). Objective increases in insomnia symptoms are attributable to a variety of causes. For example, Cribbet et al. (2014) determined that individuals with shorter telomere length (TL), which is an indication of cellular aging, reported higher rates of insomnia. This information shows that insomnia may be a natural result of decreased physical health. Conversely, Cribbet et al. also hypothesized that telomere damage may result from sleep deprivation. Increased physical pain, common with aging, may also be responsible for insomnia (Dzierzewski et al., 2010). Nocturia, or frequent urination, also impacts the amount and quality of sleep in older adults (Zeitzer, Bliwise, Hernadnez, Friedman, & Yesavage, 2013). Consequently, increased cellular aging, increased physical pain, and other naturally occurring processes attributable to aging have a negative impact on sleep. Other diagnoses also increase in prevalence with age, some of which are neurological disorders.

Neurological Disorders

Although an exhaustive review of the neurological conditions that can impact sleep is beyond the scope of this work, below are two conditions to serve as examples of neurological conditions that may impact sleep. Insomnia is more prevalent in individuals with certain neurological disorders than in individuals without such conditions. Specific disorders may influence sleep mechanisms in different ways. For instance, individuals diagnosed with Parkinson's disease (PD) are more likely to experience insomnia than

individuals without PD. PD interferes with sleep maintenance and consolidation but does not appear to impact sleep onset (Pietro-Luca et al., 2015). The impact of PD on sleep may be moderated partially by age, with individuals experiencing early-onset PD, aged 21 to 40 years, showing lower rates of insomnia than individuals with later-onset PD, aged older than 40 years (Mahale, Yadav, & Pal, 2015).

Additionally, individuals with traumatic brain injuries (TBIs) commonly experience dysregulation in their sleep-wake cycles. Individuals with more severe TBIs report higher rates of insomnia. Localization of the TBI is also important because of the functionality of different brain loci. Specifically, individuals with cerebral contusions report high rates of insomnia (Jain, Mittal, Sharma, Sharma, & Gupta, 2014). Animal experiments that intentionally manipulated the damage to various loci demonstrated the impact that brain damage and TBI can have on sleep. TBIs in mice illustrate that circadian rhythms are impacted by damage to the brain, delta wave activity is increased during wakefulness, and genes that influence sleep in the cerebral cortex are affected (Sabir et al., 2015).

The Importance of Assessment in CBT-I

Assessment is an integral part of CBT-I, generally conceptualized as occurring in two forms. One form is retrospective assessment, which measures past behaviors and symptoms that took place prior to the initial assessment and intake. The second type of assessment is prospective, which measures ongoing symptom severity and takes place throughout the assessment process (Perlis, Smith, Junquist, & Posner, 2008).

Because the present study intended to examine knowledge and practice density related to CBT-I, it is reasonable to ascertain whether the sample employed essential

assessment measures. The Epworth Sleepiness Scale (ESS) is one such widely-accepted measure. The ESS quantifies daytime sleepiness and is considered generally to be an accurate measure of the impact of insomnia and other conditions on daytime sleepiness (Sanford et al., 2006). Research shows that the ESS is able to measure a continuum of sleepiness (Sanford et al., 2006).

The ESS has been shown to have a high internal consistency (Miletin & Hanly, 2003), and it has also been shown to be valid and reliable with older adults from various ethnic demographics (Beaudreau et al., 2010). A literature review failed to find research examining how CBT-I practitioners use this measure to assess both the effectiveness of their therapeutic interventions and alert them to potentially hazardous sleepiness, such as while driving, operating machinery, or in other dangerous situations. By including this variable in the study, the investigators can more accurately assess the potential differences in how clinicians' training and levels of education may impact their utilization of this crucial, available assessment measure and their levels of adherence to the standardized protocol of CBT-I.

Evidence-Based Insomnia Interventions

Evidence based practice (EBP) and empirically supported treatments (ESTs) are necessary in providing patients with the most efficacious and effective care. EBP and ESTs rely on the latest clinical research and professional expertise. Psychologists and medical professionals are taught about EBP practice while in training so that their ongoing practices can reflect the most effective forms of patient care with the highest chance of success in reducing unwanted symptoms (Collins, Leffingwell, & Belar, 2007). Pharmacological interventions are one such EBP.

Psychopharmacological interventions. Prescription drugs are an effective method used to attain nearly immediate, salubrious changes in sleep patterns. Medications that are prescribed commonly to treat insomnia are referred to as sedatives and hypnotics. Benzodiazepines, such as Valium, are an example of a medication that induces sleep. In addition, medications that increase the availability of gamma-aminobutyric acid (GABA) in the human brain are prescribed (Kryger et al., 2011). The impact of more GABA in the human body is muscle relaxation, reduced anxiety, and sedation. Medications such as zopiclone, zolpidem, and zaleplon, commonly referred to as the *Z drugs*, gradually increase the availability of GABA rather than fast-acting medications, are viewed as less addictive, and, as such, are a more preferred method of pharmacological intervention (Wilson & Nutt, 2014).

Although a medication may be effective in the short-term, many drugs have side effects that can negatively impact an individual's health or react with other medications or alcohol (Wilson & Nutt, 2014). Moreover, case examples cite *Z drugs* as the precipitant to sleep walking, sleep driving, sleep eating, and sleep sex (Laliberte, 2016). Menzin, Lang, Levy, and Levy (2001) found that some types of medication used commonly to treat insomnia increase the chances of motor vehicle accidents. The impact of some types of sleep aids on alertness and coordination is not isolated to when a person is on the medication, meaning that effects may linger (Booth et al., 2016; Menzin et al., 2001).

If medications are effective, individuals may adopt beliefs and assumptions that medication is necessary to achieve sleep, increasing the chances of dependence. One study that explored the rate of dependency among individuals treated with hypnotics

found that as many as 7.9% of individuals developed dependency (Murakoshi, Takaesu, Komada, Ishikawa, & Inoue, 2015). Dependency may lead to long-term use and subsequent chemical changes in the brain that make achieving sleep difficult or impossible without the chemical agent that originally made the changes (Wilson & Nutt, 2014). Although there is evidence for the effectiveness of psychopharmacological interventions, there are attendant risks to such treatment. Fortunately, there is also strong evidence for the efficacy and effectiveness of both behavioral and cognitive-behavioral interventions for insomnia.

Nonpharmacological treatments. Cognitive, behavioral, and combined cognitive-behavioral therapies are categories of ESTs for insomnia. Common therapeutic interventions are based off of the understanding that the mechanisms controlling sleep are influenced by behavior, thoughts, and emotions. The interplay between thoughts, behaviors, and emotions is susceptible to change through intentional manipulation and targeted therapeutic interventions. Common therapeutic interventions that systematically target maladaptive patterns of thoughts, behaviors, and emotions are relaxation therapy, stimulus control therapy, sleep restriction therapy (SRT), and sleep hygiene education (Sharma & Andrade, 2012). For the purpose of this research study, an emphasis will be placed on sleep hygiene, stimulus control, sleep restriction, and CBT-I

Sleep hygiene. Although not an EBP in its own right, instruction in sleep hygiene has come to be a mainstay of insomnia treatment and borrows elements of the EBPs covered below. Sleep hygiene refers to a general set of lifestyle choices rather than a strict and regimented behavioral intervention. For example, sleep hygiene suggests

physical exercise that is timed to facilitate both general health and sleep. Specifically, exercise is endorsed, but generally not in close proximity to bedtime (Horne, 2014).

Other aspects of sleep hygiene include recommendations about the amount and timing of alcohol consumption, dietary awareness regarding sugar intake and caffeine consumption, proscription of napping, and awareness of environmental stimuli, such as noise and lighting (Horne, 2014).

Sleep hygiene recommends that individuals abstain from or dramatically limit alcohol because alcohol interferes with sleep. For example, the consumption of alcohol reduces the likelihood of rapid eye movement (REM) sleep, which is an important component of restorative sleep. Additionally, naps are not recommended because they may interfere with naturally occurring circadian rhythms and do not allow for the accumulation of sleep debt. To date, no known outcome studies address the efficacy of sleep hygiene.

Stimulus control. Stimulus control is an empirically proven therapeutic intervention for insomnia and can be used to control an organism's response to stimuli in the environment. An organism is said to exhibit stimulus discrimination if it responds differently to two or more stimuli (Domjan, 2010). As it pertains to sleep, a discriminative stimulus is relevant when "cues associated with falling asleep are separated from activities incompatible with sleeping" (Zwart & Lisman, 1979, p. 113). The process of learning and pairing stimuli in the environment with the biological rhythms of the human body (covert responses) is made possible by timing of specific overt behavioral responses. The behavioral interventions include lying down to sleep only when sleepy, getting out of bed if one is unable to fall asleep after 10 to 20 minutes,

reserving the bed only for sleep and sexual activities, and getting out of bed at the same time every day as prompted by an alarm (Bootzin, 1973; Bootzin & Rider, 1997). When applied consistently, the use of stimulus control may reduce symptoms of insomnia (Zwart & Lisman, 1979). Puder et al. (1983) demonstrated that stimulus control is particularly useful for reducing sleep latency, which is the time an individual requires to fall asleep after getting into bed. Individuals who employ the use of stimulus control for treating their insomnia symptoms may experience decreased sleep latency by as much as 50% (Puder, Lacks, Bertelson, & Storandt, 1983).

Other areas of research have focused on the effectiveness of stimulus control when compared with medication. Results show that medication and stimulus control are both useful for reducing an individual's insomnia. Nevertheless, there are some notable differences between the two. For example, the reductions in insomnia achieved through pharmacology do not persist after medication cessation. In contrast, the reductions in unwanted insomnia symptoms are maintained longer when stimulus control is employed in comparison to medication alone. Symptom reduction includes improvements in total sleep time, sleep efficiency, and sleep quality (Riedel et al., 1998).

Sleep restriction. Sleep restriction is an EBP that is used to normalize sleep patterns (Perlis et al., 2008). The amount of time an individual spends in bed is an important contributor to the variance in sleep and wakefulness. Sleep restriction functions by reducing the amount of sleep time in bed initially, followed by allowing sleep for an extended period of time in bed once sleep efficiency has improved (Spielman et al., 1987). The adjustment in sleep times and time spent in bed results in a decrease in the amount of time before falling asleep.

Sleep efficiency is assessed using a sleep diary data and the efficiency of one's sleep is measured weekly. Sleep efficiency is calculated by dividing the time a person goes to bed by the total hours her or she spends in bed multiplied by 100. The equation yields a reliable source of measuring sleep continuity. Sleep continuity refers to how well someone is sleeping. Upward titration of time spent in bed is done when a person achieves 90% sleep efficiency for a full week. Downward titration occurs when sleep efficiency is less than 85% (Perlis et al., 2008). This intervention recommends that daytime naps be avoided while more regimented wake time and sleep time are imposed. By adhering to this structure, the individual returns to an appropriate, endogenous sleep-wake pattern. The logic associated with this intervention is that it increases sleep debt (Falloon, Elley, Fernando, Lee, & Arroll, 2015).

SRT for the treatment of insomnia is effective in both inpatient and outpatient settings. Although the literature pertaining to inpatient treatment of insomnia with sleep restriction is limited with regard to inpatient psychiatric care, Morin, Kowatch, and O'Shanick (1990) demonstrated that it could be used to treat insomnia effectively in this setting. Morin et al.'s research demonstrated that reducing the amount of time spent in bed initially and allowing for more time in bed once asleep increased sleep duration from 2.5 to 6 hours per night in an individual with co-occurring insomnia and depression. The improved sleep time endured immediately following the patient's discharge and 4 months after the discharge. In an outpatient setting, stimulus control has been shown to increase sleep efficiency by 13%, with improvements up to 20% when sleep restriction is used in combination with increased physical activity (Wang, Yin, Li, Liang, & Wei, 2015).

Research demonstrates that simplified sleep restriction therapy is an effective intervention for reducing symptoms of insomnia in individuals with primary insomnia (Falloon et al., 2015). SRT has been shown to decrease insomnia symptoms within 3 weeks. Improvements include a decrease in sleepiness/fatigue and negative mood (Miller, Kyle, Marshall, & Espie, 2013).

Cognitive-Behavioral Therapy for Insomnia

CBT-I is an empirically validated treatment for insomnia that utilizes elements of stimulus control, sleep hygiene, and sleep restriction. In addition, CBT-I addresses dysfunctional thought patterns and behaviors that may contribute to symptoms of insomnia. These combined therapeutic interventions change an individual's cognitions regarding sleep and insomnia while simultaneously modifying maladaptive patterns of behavior, with the goal of promoting restorative sleep (Eidelman et al., 2016; Perlis et al., 2008). There is evidence that modifying dysfunctional beliefs about sleep can decrease symptoms of insomnia and improve outcomes for the behavioral interventions. Follow-up studies indicate that these results are maintained for at least 6 to 12 months after cessation of the therapeutic intervention (Eidelman et al., 2016). Even brief CBT-I workshops that last only 1 full day are highly effective in reducing symptoms of insomnia (Swift et al., 2012).

CBT-I has also been shown to be effective in treating comorbid disorders that are exacerbated by irregular sleep patterns. For example, CBT-I has been shown to reduce hypomania/mania in individuals with bipolar disorder by improving and normalizing sleep patterns (Harvey, Gehrman, et al., 2014). CBT-I is also highly effective in treating comorbid insomnia and insomnia associated with arthritis and coronary artery disease

(Rybarczyk, Mack, Harris, & Stepanski, 2011). Although CBT-I and each of the component pieces that comprise CBT-I have been shown to be efficacious, factors such as timing and the type of the therapeutic interventions employed may impact the amount of improvement to an individual's sleep.

Efficacy of CBT-I. When assessing long-term symptom remission, CBT-I has been proven to be a more efficacious therapeutic treatment modality for reducing symptoms of insomnia when compared to medication alone. Specifically, CBT-I is superior to benzodiazepines and non-benzodiazepine that include zopiclone, zolpidem, temazepam, and triazolam. There are mixed findings when comparing medication and CBT-I for short-term symptom reduction, with some evidence suggesting that medication is superior in the short-term and other evidence suggesting that CBT-I is superior (Mitchell, Gehrman, Perlis, & Umscheid, 2012). When compared to behavior therapy (BT) or cognitive therapy (CT) alone, CBT-I shows high treatment response rates, with rates as high as 67.4% and 67.3% showing positive responses in BT and CBT conditions, respectively (Harvey, Gehrman et al., 2014). Although the percentages between BT and CBT may be similar, individuals who receive CBT-I interventions retain better symptom remission rates for longer periods of time than CT or BT alone, according to follow-up data (Harvey, Gehrman, et al., 2014). The enduring benefits of CBT-I make the treatment a justifiable therapeutic intervention for insomnia.

Alternative methods of delivery for CBT-I have been proposed based on the success of individual CBT-I interventions and the limited availability of practitioners who are adequately trained to provide empirically supported interventions for insomnia (Koffel, Koffel, & Gehrman, 2015). One alternative delivery method for CBT-I is group

therapy (Koffel & Farrell-Carnahan, 2014; Koffel et al., 2015; Yamadera et al., 2013). Although group CBT-I has been shown to be efficacious (Koffel et al., 2015), other research suggests that individual CBT-I is more effective than group CBT-I (Yamadera et al., 2013). Yamadera et al. (2013) found that greater improvements occur in the areas of sleep onset latency, objective sleep efficacy, and overall sleep quality in individual CBT-I when compared to group CBT-I.

Other research compared group CBT-I to Internet-delivered CBT-I in an effort to increase the availability and dissemination of empirically based interventions for insomnia (Seyffert et al., 2016; Zachariae, Lyby, Ritterband, & O'Toole, 2016). Proponents of Internet-delivered CBT-I suggest that it is cost effective and easily accessible. Additional strengths of Internet-delivered CBT-I are that it could save time and be less intimidating than in person therapy (Voinescu, Szentagotai, & David, 2013). Weaknesses include the necessity for a computer and Internet access, lack of face-to-face contact, an inability to manage crises, and a general lack of data regarding effectiveness of Internet-delivered CBT-I for individuals with comorbidities (Voinescu et al., 2013). De Bruin, Oort, Bögels, and Meijer (2014) found group CBT-I and Internet-delivered CBT-I to be equally efficacious, showing significant improvements occurring with medium-to-large effect size for sleep onset latency, wake after sleep onset, and sleep efficiency. Internet-delivered CBT-I can be an effective treatment for adults and can significantly improve insomnia severity, sleep efficiency, subjective sleep quality, wake after sleep onset, sleep onset latency, total sleep time, and the number of nocturnal awakenings (Zachariae et al., 2016). Although CBT-I is a durable therapeutic modality and effectively reduces insomnia in a variety of ways, it appears to reduce symptoms

differently from medication alone. By influencing the natural mechanisms of sleep through behavioral and cognitive interventions, the biology that underlies sleep is changed to promote consistent and restorative sleep.

Timing and Effectiveness of Therapeutic Interventions for Insomnia

The rate at which gains are achieved by medication is different from the rate of symptom reduction attained by behavioral interventions. Another notable difference is in the relapse rate after treatment cessation. One study that focused on relapse rate for insomnia compared triazolam with behavioral interventions for insomnia. Results showed that symptom reduction occurred more quickly with medication, but symptoms returned to baseline after medication cessation. In contrast, the behavioral interventions took longer to reduce symptoms—as long as 2 weeks—but were maintained for longer periods of time after formal treatment (McClusky et al., 1991). One should note that behavioral interventions for insomnia require monitoring baseline symptoms and providing psychoeducation that explains the purpose of the therapeutic interventions. Both of the aforementioned elements of treatment could be contributing factors for why symptom reduction takes 2 weeks. Subsequent research has shown that the combination of medication and behavioral interventions produces better outcomes than medication or BT alone (Milby et al., 1993). Further evidence supporting the combined benefits of pharmacotherapy and relaxation or behavioral interventions was demonstrated by Rosen, Lewin, Goldberg, and Woofolk (2000). Researchers demonstrated similar findings to those of Milby and colleagues (1993), showing that the benefits could be measured differentially between behavioral interventions and pharmacotherapy combined versus BT alone. Results showed that pharmacotherapy and relaxation yielded improvements in

total sleep time, sleep efficiency, and wakefulness after sleep onset, whereas relaxation alone yielded improvement in only total sleep time (Rosen et al., 2000).

Objective improvements in sleep duration are influenced by the sequence with which medication and CBT-I are applied. Further, it is important to note is that the point in therapy during which participants experienced a reduction in symptoms relative to the therapeutic intervention differed. Results demonstrated that both CBT-I and pharmacological interventions decreased symptoms of insomnia, with a particular advantage for an overlap of medication and CBT-I. Research also showed that when medication and CBT-I were introduced early in treatment, improvements occurred more rapidly than when pharmacological interventions were introduced first, followed by cognitive-behavioral interventions. Thus, these findings imply that the timing and type of intervention selected by practitioners may impact the rate with which the individual experiences symptom relief. The selection of appropriate interventions may depend on a series of variables, including knowledge of relevant therapeutic interventions (Campbell et al., 2013), diagnostic accuracy (Jensen-Doss & Weisz, 2008), and level of training (Spengler & Pilipis, 2015).

Level of Training, Appropriate Diagnosis, and Treatment Planning

Research regarding the training of mental health providers has shown that the rate at which doctoral level psychology students received education on appropriate diagnosis and treatment planning regarding sleep disturbance was 32% in 1993. The same study found 58% of students studying family practice, 65% studying pediatrics, and 87% studying neurology in medical school were receiving education on sleep. Psychology was the second most infrequent of all the professional fields to receive sleep education,

second to the nursing profession, with a reported 19% of nursing programs in 1993 including education on sleep disorders and therapeutic interventions for sleep (Moline & Zendell, 1993).

In 1998, all American Psychological Association-accredited clinical psychology programs were surveyed regarding the extent to which sleep medicine was part of program development. Of 184 programs, a total of 132 schools responded. Responses showed that 81% of American Psychological Association-accredited schools had no training, 14% had minimal training, and 5% had systematic training available (Lichstein et al., 1998). More recent literature shows relatively little improvement in the education of psychology students. By 2009, 6% of psychology training programs offered formal didactic courses in sleep and 31% of training programs offered education on treating sleep disorders. Overall, training programs are understaffed in regard to professionals knowledgeable about sleep disorders, with 16% of the programs polled reporting that they have faculty trained in sleep medicine (Meltzer et al., 2009). Although sleep-related training for psychology students is limited, approximately 39% of training directors believe it should be a mandatory part of the curriculum (Meltzer et al., 2009). It should be noted that 53% of student participants found their programs' education on sleep, cognition's role in sleep, and sleep-related disorders to be effective, but 13% of those who reported their programs' sleep-related education was effective also reported that they felt incompetent to treat sleep disorders. This disparity is important to note because although students received education on sleep disorders, many felt unable to deliver treatment competently, thus implying a deficit between didactic knowledge and training and the ability to competently and confidently apply empirically based interventions for

insomnia. Research shows that even brief training can increase a practitioner's ability to assess the role of sleep in mental and physical health care and to apply therapeutic interventions for sleep disorders (Peachey & Zelman, 2012); however, the research pertaining to the application and competency of mental health practitioners' application of CBT-I is extremely limited.

Accurate diagnosis is an important part of selecting appropriate interventions and can increase the impact of selected interventions (Jensen-Doss & Weisz, 2008). The accuracy of a diagnosis and accurate selection of treatment areas are not significantly influenced by years of experience (Spengler & Pilipis, 2015). With that said, research shows that therapists with graduate degrees have significantly higher rates of global performance fidelity ratings and significantly higher adherence than individuals with bachelor's degrees (Campbell et al., 2013). Performance fidelity describes adherence to manualized treatment. Campbell et al. (2013) examined how clinicians' level of training impacted the treatment of drugs and alcohol. A performance fidelity rating system was composed of adherence delivery of specific treatment content, competence and skill, global empathy, behaviors that detract from general therapist skill and should not occur, and overall session performance (Campbell et al., 2013). An example of behaviors that should not occur during therapy is excessive self-disclosure. The results suggest that increased experience, operationalized as graduate degrees and above, related directly to more linear and more effective treatment. Data from a meta-analysis that explored the impact of therapists' training, experience, and therapy outcomes indicated that therapists with more training are less likely to have clients drop out of treatment in an outpatient setting (Stein & Lambert, 1995). To date, little research has examined the area of sleep

medicine and how training is provided. The research regarding how experience impacts the application of CBT is mixed. Evidence shows that more training in CBT increases a therapist's efficacy, but some research also states the opposite.

Level of training and the impact on CBT interventions. CBT-I practitioners and the broader subfield of sleep disorder researchers have long been interested in how to make training optimally efficient and effective. Variables of interest include level of education (e.g., practicum students, interns, and licensed professionals), the participant's level of education as measured by his or her year in a graduate program, the impact of supervision on CBT application, and client satisfaction in the form of outcome measures and reduction in unwanted symptomatology. The results show mixed findings on whether and how training and experience impact practitioner knowledge and competency when applying CBT to various disorders (Norton, Little, & Wetterneck, 2014; Nyman, Nafziger, & Smith, 2010). CBT is referenced rather than CBT-I because the literature related to a clinician's level of training is minimal. The researchers in the present study used the most relevant body of literature in order to show that there is a correlation between a clinician's therapeutic effectiveness and skill, and how they relate to the clinician's level of training and profession.

Research appears to support a difference in therapists' abilities to provide CBT interventions based on their years of experience and knowledge. In a study designed to assess the effectiveness of practitioners in training, researchers found that the trainees were effective but that their effectiveness was generally less than that of the comparison groups of practitioners. Groups, including doctoral externs, interns, and postdoctoral fellows, were compared according to their levels of training when treating major

depression, dysthymia (persisting depressive disorder), bipolar disorder I and II, mood disorder not otherwise specified (NOS), depressive disorder NOS, generalized anxiety disorder, agoraphobia, and obsessive-compulsive disorder (APA, 2000/2013). The improvements in symptoms were assessed using the Beck Depression Inventory and the Beck Anxiety Inventory. The results suggested that trainees may be effective but were less effective than their more experienced peers. The results indicated that there was a difference in clinician training and respective ability to treat symptoms with CBT (Forand et al., 2011). Another relevant study compared CBT competence and experience relative to a mental health practitioner's professional degree. The study compared clinicians' CBT skills before and after a 5-hour workshop in CBT skills. The study found a significant difference between professional degrees groups. Psychologists performed better than nurses and psychiatrists on all CBT-related measures. The CBT measures included supervisor rating and grades awarded on written assignments. The measurements pertained to case conceptualizations and how clinicians would treat presenting symptoms. Older individuals in this study performed significantly worse on training outcomes when compared to younger individuals (McManus, Westbrook, Vazques-Montes, Fennell, & Kennerley, 2010). Another study found that experienced CBT therapists had statistically higher patient improvement in regard to their symptom reduction, whereas less experienced practitioners had higher rates of deterioration than could be expected by chance alone (Branson, Shafran, & Myles, 2015). Huppert et al. (2001) also found that experience, in the form of number of years in the field, influenced outcome.

In contrast, Nyman et al. (2010) examined differences in practitioners' skills as they related to the application of CBT and found no differentiation among different levels of therapists when comparing application of CBT for anxiety, depression, suicidal ideation, self-esteem, and interpersonal conflict. When the different groups of practitioners were compared (i.e., practicum students, interns, and licensed practitioners), there were no significant differences between the three levels of education and the corresponding amount of symptom reduction among groups (Nyman et al., 2010). The study listed a variety of limitations that could have confounded the results and that may limit its generalizability. Specifically, the study did not describe the method of delivery for the cognitive-behavioral interventions, such as manualized versus non-manualized treatment. Distinguishing interventions is important because without a similar or identical treatment intervention, determining whether the clinician's skill, the type of intervention, or the experience is responsible for differences found is difficult.

In another study, Norton, Little, and Wetterneck (2014) found that patients who attended group-led CBT for anxiety disorders experienced equal amounts of symptom reduction in "senior therapists" and "junior therapists" group conditions. Researchers differentiated senior therapists' mean years of experience to 2.89 years and the average junior therapists' mean years of experience to 2.19 years. This difference in range of experience was small and could limit the effects of experience on the overall practitioner differences.

Influence of Practitioner Education and Training on Application of CBT-I

To date, only one study, conducted by the Department of Veteran Affairs (VA), has examined how CBT-I is taught to and applied by mental health and medical

practitioners. The participants were six cohorts of practitioners who were taught CBT-I using the VA CBT-I training program. The first six cohorts consisted of 135 psychologists, 50 clinical social workers, 11 nurses, 10 psychiatrists, and 1 individual who did not indicate his or her profession. The purpose of the study was to assess the VA's training methods and the clinicians' perceptions of self-efficacy delivering CBT-I, as well as their attitudes about delivering CBT-I (Manber et al., 2013). The VA study is directly applicable to the present study because it explored subjective attitudes toward applying CBT-I based on specific aspects of training, in this case the VA CBT-I training program. The study's demographics divided the cohort of practitioners into their respective professions. The professions were not compared in this study, but the present study intended to explore how a difference in professions and education levels may impact attitudes and knowledge about CBT-I. Of the practitioners assessed in the Manber et al. (2013) study, 74% had provided CBT-I within one month prior to the study. Results showed that practitioners who received formal training in CBT-I reported higher ratings of skill-specific self-efficacy and increased positive attitudes toward CBT-I than individuals who did not receive training (Manber et al., 2013). The results showed that the type of education and training impacts clinicians' attitudes and their perceived ability to apply CBT-I interventions. Similar to the VA study's objectives, the present study intended to explore how a difference in profession and education level may impact attitudes and practice related to CBT-I.

Internet-Based Questionnaires

Questionnaires are a commonly used method to obtain both subjective and objective information for the purpose of analysis. The present study utilized a one-time

web-based questionnaire. Research shows that, in most cases, web-based surveys achieve the same or very similar results as pen-and-paper questionnaires (De Beuckelaer & Lievens, 2009; Van de Looij-Jansen & Jan de Wilde, 2008). Van de Looiji-Jensen and Jan de Wilde (2008) referenced notable areas that are commonly thought to differ between web-based and pen-and-paper questionnaires. Some of the topics that a participant may feel less inclined to disclose in pen-and-paper questionnaires include alcohol use, marijuana use, vandalism, and stealing. Results from the experiment showed that there was one area that adolescents reported less frequently when completing pen-and-paper questionnaires: Adolescents show a difference in the frequency with which they report carrying a weapon, with more adolescents reporting carrying a weapon in web-based surveys than with pen-and-paper. These findings suggest that participants may feel more inclined to disclose information on web-based questionnaires.

Smith, King, Butow, and Oler (2013) also found advantages for web-based questionnaires, in that they were returned quicker and required fewer reminders than pen-and-paper questionnaires. The same study also found that more highly educated individuals favored the web-based questionnaires than the pen-and-paper questionnaires, which is particularly relevant for the present study because all participants had advanced degrees.

Chapter 3: Hypotheses

Research Question 1

Does specialized CBT-I training history predict reported adherence to the use of EBP?

Hypothesis 1. It was hypothesized that level of CBT-I training history would be a significant and positive predictor of reported adherence to the use of EBP. Training history was defined operationally as reported number of hours of CBT-I training (i.e., dedicated training time during graduate school, internship, or post-doctoral fellowship; continuing education units; and hours receiving supervision). For the purposes of this study, EBP was defined as a participant's percentage of accurate answers on a questionnaire that focuses specifically on common elements of CBT-I, and was based on the empirically derived protocols of Perlis, Manber, Morin, and Edinger (Edinger & Carney, 2015; Manber & Carney, 2015; Morin & Espie, 2003; Perlis et al., 2008).

Research Question 2

Does CBT-I training history predict reported practice density in CBT-I?

Hypothesis 2. It was hypothesized that CBT-I training history would be a significant and positive predictor of reported practice density. Training history was defined operationally in terms of number of hours of CBT-I training (i.e., dedicated training time during graduate school, internship, or post-doctoral fellowship; continuing education units; and hours receiving supervision). Practice density was defined operationally in terms of the number of years of CBT-I practice and percent of practice that is devoted to CBT-I.

Research Question 3

Do the various disciplines that conduct CBT-I differ with respect to CBT-I education, CBT-I training, practice density, and/or adherence to the use of EBP?

Hypothesis 3. It was hypothesized that there would be no group difference with respect CBT-I training, reported practice density, and/or reported adherence to the use of EBP. Practice density was defined operationally as the reported number of hours in the past year that a practitioner treated insomnia. Discipline was defined operationally by the therapist's professional license (i.e., BA, BS, MA, MS, RN, MSN, MSW, LCSW, NP, Psy.D., Ph.D., Do, MD, RST, Other).

Chapter 4: Method

Research Design

The study used a correlational research design to explore the relationship between a therapist's level of education, experience, application preferences for CBT-I, and knowledge of evidence-based CBT-I practice.

Participants

A total of 233 respondents began the questionnaire and 165 were included in the final analyses. The participants in this study consisted of mental health and medical practitioners who were trained in CBT-I. Combined, the practitioners were from 10 different countries. The countries of residence included the United States, Canada, Australia, Thailand, Brazil, New Zealand, England, Denmark, Italy, and Taiwan. The majority of participants were from the United States, making up 86.6% of the sample (143 participants). There were eight participants from Canada, seven from Australia, two from New Zealand, one from the United Kingdom, one from Brazil, one from Denmark, one from Italy, and one from Taiwan. The sample consisted mostly of Caucasian individuals (92.1%; 152 participants). Other races represented in the sample included Black (one participant), Asian (five participants), Latino (three participants), and Multi-Racial (four participants). The sample was 73% female, and the mean age of all participants was 47 years with a range of 28 to 82 years.

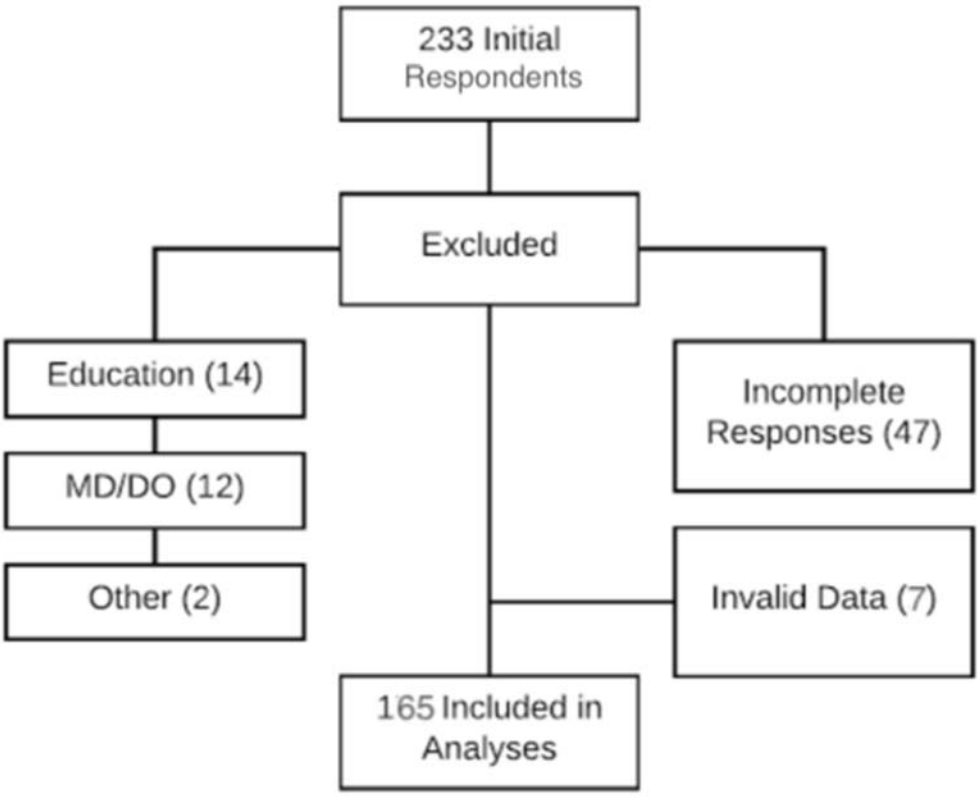
Inclusion criteria. In order to participate in this study, a person had to be considered a professional of who was trained in CBT-I, who had earned an academic degrees and had some level of training, though degree and training levels varied among participants. In order to ensure inclusion criteria was met, participants were recruited

from three separate CBT-I specialty listservs, including (BSMG-L; n ≈ 500), CBT-I Seminar Survivors (n ≈ 400), and the University of Pennsylvania Provider Directory (n ≈ 1,000 [worldwide]).

Exclusion criteria. Individuals were excluded from the study if they were not trained in CBT-I, did not hold academic degrees, or were not part of the listservs mentioned previously. Practitioners were also excluded from analysis if their responses were incomplete, because incomplete data misrepresented the variable or variables of interest. Initial respondents who were excluded from this study are illustrated in Figure 1.

Figure 1

Consort Diagram of Attrition



Measures

The researchers collaboratively developed a 56-item questionnaire based on the variables of interest. All testing instruments used were the result of collaboration with senior level recognized experts in field. The experts are doctoral level professors who have peer-reviewed publications, regularly lead training seminars, provide clinical practice in behavioral sleep medicine for insomnia, and conduct research at the University of Pennsylvania and the Philadelphia College of Osteopathic Medicine.

The questionnaire followed the following format: basic demographic information, information pertaining to education and training, behavioral sleep medicine practice preferences, and behavioral sleep medicine practice knowledge/approaches (See Appendix A).

Procedure

The current study was conducted using a one-time Internet-based questionnaire. The survey was distributed to three listservs that were composed of practitioners who have been trained in CBT-I. Permission was obtained from the listserv moderator to contact all members of the Internet mailing list. All practitioners were invited to participate voluntarily in the survey.

The Internet-based questionnaire was delivered through RedCap. The information was collected as an Internet survey that was sent to mental health and medical professionals who were known to be trained in or practicing evidence-based CBT-I treatment. Data derived from the questionnaire included demographic practitioner information, such as age, sex, country in which the professional practiced CBT-I, and the practitioner's ethnicity. The survey assessed the practitioner's professional demographics,

including his or her highest degree, type of professional license, number of years of practice, and average number of hours seeing patients per week. Practice approach/knowledge applying CBT-I were measured using questions that assessed the type of format (i.e., individual, couples, groups); the setting, such as outpatient or inpatient; the number of typical sessions; the ideal number of sessions; the frequency of sessions; and the components of the CBT-I protocol that were used according to necessity and importance.

Chapter 5: Results

Table 1

Full Sample Training and Variables of Interest: Mean, Standard Deviation, and Range

Variable	M	SD	Range
Training Hours	671.90	1298.7	4 - 6600
Adherence %	64.7	22.7	4.3 - 95.6
Practice %	35.3	32.4	0 - 100
Years Practicing	7.6	6.5	0 - 27

Table 2

Group Comparison of Training and Variables of Interest: Mean, Standard Deviation, and Range

Variable	M		SD		Range	
	Master's	Doctoral	Master's	Doctoral	Master's	Doctoral
Training Hours	304.8	821.2	833.2	1422.8	4-4020	6-6600
Adherence %	66.3	64.0	24.1	22.2	4.3-95.6	4.3-95.6
Practice %	24.3	39.9	31.9	31.7	0-100	0-100
Years Practicing	3.6	9.1	3.5	6.7	0-20	0-27

Linear regression was computed to test the first hypothesis, that the level of CBT-I training history would be a significant and positive predictor of reported adherence to the use of EBP (percentage of correct answers on the practice questionnaire). Additionally, to test the second hypothesis, linear regressions were computed to determine whether the total hours of advanced training in CBT-I predicted practice density (total annual CBT-I practice out of total practice hours) and the total number of years practicing CBT-I (lifetime total number of years practicing CBT-I). The intention of assessing practice density and years practicing was to determine how training history impacts the trajectory of professional development and the application of CBT-I among various mental health disciplines.

Finally, to test the third hypothesis, a series of t-tests examined group differences in CBT-I training, reported practice density, and reported adherence to the use of EBPs between master's and doctoral level practitioners. Due to statistically significant group differences between variables, specifically level of education, the sample as a whole was divided into relevant subgroupings. Linear regression was used to determine whether the total advanced training hours in CBT-I predicted adherence to empirically validated treatment (percentage of correct answers on the practice questionnaire) for both master's and doctoral level practitioners. Additionally, linear regressions were computed to determine whether the total hours of advanced training in CBT-I predict practice density (total annual CBT-I practice out of total practice hours) and the total number of years practicing CBT-I (lifetime total number of years practicing CBT-I) for both master's and doctoral level practitioners.

Statistical Analyses

The variables of interest were analyzed using JMP Statistical Software. A power analysis was computed for the regression analyses to determine how many participants were necessary. The effect size was set for medium effect size and the significance level was set for .05. The power level was set at .80, as is standard in the social sciences. The analyses determined that 85 participants were needed to perform regression analyses.

Demographic Analyses

The sample consisted of 165 participants, who were 73% female and 27% male. Participants' reported ethnicities included one Black, five Asian, 152 Caucasian, three Latino, and four Multi- Racial. The age range of the participants was 25 to 82 years. The mean age for the sample was 46.7 years and the standard deviation was 12.4 years.

Hypothesis 1

To test whether CBT-I training history (number of hours of advanced training) predicted adherence to EBP **(**percentage of correct answers on the CBT-I questionnaire), a linear regression was conducted for the sample as a whole. The linear regression revealed no significance with regard to total training hours predicting practice adherence for the full sample, $R^2 = -.01$, $F(1,64) = .18$, $p < .67$ (See Table 3).

Table 3

Training History and Adherence Regression Analysis (Whole Sample)

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	95742238	64	1495972	.1841	.67
M-Residual	275429	1	275429		
Total	96017667	65			

Next, to examine the surprising lack of significance, several post-hoc analyses were conducted. First, linear regressions were used to assess whether CBT-I training history predicted practice adherence by level of education, by splitting master's and doctoral level participants into separate groups. The linear regressions revealed no significant results with regard to training history predicting adherence for either doctoral level practitioners, $R^2 = -.02$, $F(1,42) = .20$, $p < .69$), or master's level practitioners, $R^2 = -.05$, $F(1,20) = .04$, $p < .82$ (See Tables 4 and 5).

Table 4

Training History and Adherence Regression Analysis (Masters Group)

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	23077034	20	153852	.05	.83
Residual	55409	1	55409		
Total	23132443	21			

Table 5

Training History and Adherence Regression Analysis (Doctoral Group)

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	71404904	42	700117	.20	.70
Residual	273485	1	273485		
Total	71678389	43			

A Pearson's chi-square item analysis was used to assess for statistically significant differences between master's and doctoral level practitioners. This comparison revealed no significant differences with respect to individual items on the Pearson's chi-square with the statistical significance level set at .05 (See Table 6).

Of note were several items that both master's and doctoral level practitioners answered incorrectly more frequently than expected. *Expected* in this context refers to error rates equal to or exceeding 50% incorrect. The 50% threshold is based on the researchers' qualitative comparisons of item scores rather than specific statistical practice. The higher than expected error rate included item 31 (When conducting CBT-I, what treatments do you typically use?), item 34 (How do you assess and determine prescribed

time in bed [PTIB], i.e., prescribed sleep opportunity?), and item 42 (When conducting sleep restriction, the rule I use for time to bed is_____.).

Item 31 assessed the practitioners' use of the essential components of CBT-I (sleep restriction, stimulus control, cognitive elements, and sleep hygiene). Results indicated both master's and doctoral level practitioners had a tendency to omit sleep hygiene as a recommendation. Master's level clinicians omitted sleep hygiene 60% of the time and doctoral level practitioners omitted sleep hygiene 67.4% of the time. The omission of this component of the CBT-I protocol resulted in a disproportionate error rate when compared to the error rates of the other items.

Item 34 assessed the practitioners' understanding of prescribed time in bed. The percent of master's level clinicians that answered the item incorrectly was 53.33% and the doctoral level incorrect response rate was 66.70%. Item 42 assessed practitioners' application and understanding of time to bed, which is a formula that is an important component of CBT-I. Sixty percent of master's level practitioners answered incorrectly and 66.67% of doctoral level practitioners answered incorrectly.

Table 6

Chi-Square Item Analyses for Education and Practice Adherence

Item	Degree	N	% of Incorrect Responses	% of Correct Responses	Prob.
Item 31(a) Treatment 1	Masters	15	20.00	80.00	.97
	Doctorate	49	20.41	79.60	
Item 31(b) Treatment 2	Master's	15	20.00	80.00	.74
	Doctorate	49	16.33	83.70	
Item 31(c) Treatment 3	Master's	15	33.33	66.70	.60
	Doctorate	49	40.82	59.18	
Item 31(d) Treatment 4	Master's	15	60.00	40.00	.60
	Doctorate	49	67.40	32.65	

Item 32 Essential instruments	Master's Doctorate	16 49	37.50 55.10	62.50 42.90	.36
Item 33 Sleep eff. calc.	Master's Doctorate	15 47	20.00 25.53	80.00 74.50	.66
Item 34 Assess (PTIB)	Master's Doctorate	15 48	53.33 66.70	46.70 33.33	.40
Item 35 Days of sleep diary	Master's Doctorate	14 48	7.14 4.17	92.90 95.83	.64
Item 36 Sleep eff. & sleep diary	Master's Doctorate	15 48	33.33 27.08	66.70 72.92	.64
Item 37 Rule upward titration	Master's Doctorate	15 48	26.70 35.42	73.33 64.60	.53
Item 38 Rule: downward titration	Master's Doctorate	15 48	33.33 50.00	66.67 50.00	.30
Item 39 No change PTTB	Master's Doctorate	15 48	20.00 41.70	80.00 58.33	.13
Item 40 Upward titration PTTB	Master's Doctorate	15 49	53.33 30.61	46.70 69.40	.10
Item 41 CBT-I frequency	Master's Doctorate	15 48	13.33 10.42	86.70 89.60	.80
Item 42 Time to bed rule	Master's Doctorate	15 48	60.00 66.70	40.00 33.3	.64
Item 43	Master's	16	12.50	87.50	.98

Behaviors in bedroom	Doctorate	49	12.24	87.80	
Item 44. removed from study					
Item 45 When to Leave bedroom	Master's	15	33.33	66.70	.90
	Doctorate	48	31.25	68.80	
Item 46	Master's	16	12.50	87.50	.90
	Doctorate	50	14.00	86.00	
Item 47 removed from study					
Item 48 Napping rule	Master's	15	13.33	86.70	.52
	Doctorate	48	20.83	79.17	
Item 49 # of sessions sleep hygiene	Master's	15	13.33	86.70	.17
	Doctorate	48	31.30	68.80	
Item 50 Sleep hygiene handouts	Master's	15	13.33	86.70	.60
	Doctorate	47	19.15	80.90	
Item 51 CBT-I cog. elements	Master's	15	26.67	73.33	.43
	Doctorate	46	17.39	82.61	
Item 52 Sleep restric. model	Master's	15	66.70	33.33	.14
	Doctorate	47	44.70	55.32	
Item 53 -56 removed from study					

Hypothesis 2

To test whether CBT-I training history predicted practice density, a linear regression was conducted. The amount of specialized training in CBT-I (number of reported hours in specialized training in graduate education and continuing education) was found to be a significant and positive predictor of practice density for the full sample, $R^2 = .03$, $F(1,113) = 5.03$, $p < .03$. Additionally, the amount of reported specialized training in CBT-I was also a significant and positive predictor of the reported annual total hours of CBT-I practice, $R^2 = .03$, $F(1,117) = 4.20$, $p < .04$ (see Tables 7 and 8).

Table 7

Training History and Practice Density Regression Analysis (Whole Sample)

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	164490811	113	1455671	.03	.03*
Residual	7316304	1	7316304		
Total	171807115	114			

*$p < .05$

Table 8

Training History and Years Practicing CBT-I Regression Analysis (Whole Sample)

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	196216986	117	1677068	4.19	.04*
Residual	7022083	1	7022083		
Total	203239069	118			

*$p < .05$

When broken down into master's and doctoral level practitioner subgroups, the total reported training hours were a significant predictor of the percentage of CBT-I practice out of reported total clinical practice for the doctoral level practitioners, $R^2 = .04$, $F(1,78) = 3.92$, $p < .05$, but not significant for the master's level practitioners, $R^2 = -.03$, $F(1,33) = .00$, $p < .97$ (Sees Table 9 and 10). Moreover, the reported hours of specialized training did not predict the reported total years practicing CBT-I for the doctoral level practitioners, $R^2 = .01$, $F(1,85) = 2.02$, $p < .20$, or master's level practitioners, $R^2 = -.03$, $F(1,30) = .00$, $p < .92$ (Sees Table 9 and 10). Tables 11 and 12 illustrate the regression analyses of training history and years practicing CBT-I within the master's group and training history and practice density within the doctoral group, respectively.

Table 9

Training History and Practice Density Regression Analysis (Master's Group)

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	10775947	33	326544	.00	.97
Residual	499	1	499		
Total	10776446	34			

Table 10

Training History and Practice Density Regression Analysis (Doctoral Group)

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	145437273	78	7313706	3.92	.05*
Residual	7313706	1	7313706		
Total	152750979	79			

*$p < .05$

Table 11

Years Practicing CBT-I Regression Analysis (Master's Group)

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	24612059	30	820402	.01	.92
Residual	7815	1	7815		
Total	24619873	31			

Table 12

Practice Density Regression Analysis (Doctoral Group)

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	169391882	85	1992846	2.02	.16
Residual	4034328	1	4034328		
Total	173426211	86			

Hypothesis 3

It was determined that there were not enough participants in each of the professions to do a complete statistical comparison. Therefore, it was decided that groups would be broken down into master's versus doctoral level groups of practitioners. An independent-samples t-test was conducted to compare the total number of hours of specialized CBT-I training of doctoral and master's level clinicians. With regard to total hours of specialized training, there were significant group differences between doctoral and master's level practitioners, with doctoral level practitioners having more hours of specialized CBT-I training (M = 821.21, SD = 1422.80) than master's level clinicians (M = 304.81, SD = 833.20), $t(126)=2.07$, p=.04). Results are illustrated in table 13.

Table 13

Total Training Hours t-test to Determine Variance between Master's and Doctoral Level Practitioners

	Mean	SD	N	DF	T	sig.
Master's	304.81	833.20	37	126	2.07	.04*
Doctorate	821.21	1422.80	91			

*$p < .05$

There were also significant group differences with regard to practice density, or the total percentage of CBT-I hours practiced annually out of total practice hours. Doctoral level practitioners reported a higher practice density (M = 39.93, SD = 31.70)

than the master's level group (M = 24.40, SD = 31.90), $t(146) = 2.72$, $p = .01$. Results are shown in Table 14.

Table 14

Practice Density: Percent of CBT-I Practice out of Total Practice: t-test to Determine Variance between Master's and Doctoral Level Practitioners

	Mean	SD	N	DF	T	sig.
Master's	24.40	31.90	44	146	2.72	.01*
Doctorate	39.93	31.70	104			

*$p < .05$

There were also significant group differences between groups in the total number of years applying CBT-I, with doctoral practitioners reporting more years applying CBT-I (M = 9.20, SD = 6.70) than master's level practitioners (M = 3.70, SD = 3.50), $t(148) = 4.93$, $p = .0001$). Table 15 depicts this.

Table 15

Years Practicing CBT-I: t-test to Determine Variance between Master's and Doctoral Level Practitioners

	Mean	SD	N	DF	T	sig.
Master's	3.7	9.30	41	148	4.93	.00*
Doctorate	9.2	11.20	109			

*$p < .05$

There were no significant between-group differences with regard to reported adherence to empirically validated protocols, with doctoral level practitioners (M = 64.02, SD = 22.20) scoring similarly to master's level practitioners (M = 66.34, SD = 24.1), $t(83) = 2.72$, $p = .66$. The score represents the percentage of total correct answers on the practice questionnaire (See Table 16).

Table 16

Adherence Percentage: t-test to Determine Variance between Master's and Doctoral Level Practitioners

	Mean	SD	N	DF	T	sig.
Master's	66.34	24.1	27	83	-.44	.66
Doctorate	64.02	22.2	58			

Chapter 6: Discussion

Previous research found significant deficits in educational curricula regarding insomnia and its treatment, with some professions, such as those in the medical field, receiving more training than graduate psychology programs (Lichstein et al., 1998; Meltzer et al., 2009; Moline & Zendell, 1993). Additionally, there is great variability in how doctoral programs in clinical psychology train students in behavioral sleep medicine, with some programs offering explicit CBT-I training and others providing little or no instruction on insomnia, beyond considering it as a secondary symptom of other disorders (Lichstein et al., 1998). Although there have been a few studies exploring the extent to which graduate students were trained in insomnia treatment such as CBT-I, a review of the literature reveals minimal research to date examining how the differences in training impact clinical practice, specifically with regard to CBT-I treatment. The absence of literature pertaining to how training impacts the application of the empirically validated CBT-I represents a significant limitation in the existing literature.

This study examined how the amount of CBT-I education influenced the knowledge and application of CBT-I. More precisely, researchers examined how the total number of hours of specialized professional training in CBT-I predicted knowledge and practice of CBT-I (percentage of correct answers on the practice questionnaire) and practice density (percentage of annual CBT-I practice out of annual total practice and the number of years practicing CBT-I). The sample included 165 participants consisting of 73% females and 27% males. Although the majority of the participants were from the United States (n = 143), there was also some international participation.

The existing literature indicates that there are substantial differences in the amount and type of training medical and mental health professionals receive for the assessment and treatment of insomnia (Meltzer et al., 2009). Overall, the results of the present study demonstrate that practitioners who obtained more training in CBT-I are significantly more likely to apply CBT-I, treat more cases as evidenced by the number of hours practicing, and have practiced CBT-I for longer periods. Although there were many similarities, some differences between practitioners with master's versus doctoral degrees were noted.

The State of Education in Insomnia and CBT-I

In 2009, only 6% of psychology training programs offered formal didactic courses in behavioral sleep medicine, and 31% of training programs offered some education in treating sleep disorders. Overall, training programs are understaffed with professionals who are knowledgeable about insomnia and other sleep disorders, with only 16% of the programs polled reporting that they have faculty trained in sleep medicine (Meltzer et al., 2009). Although the training for psychology students is limited, approximately 39% of training directors believe education in insomnia treatment should be a mandatory part of the curriculum (Meltzer et al., 2009). The present study sought to illuminate the current state of education in behavioral sleep medicine, specifically regarding the impact of CBT-I training on the professional practice of those providing insomnia treatment.

The present study assessed the participants (N = 165) to examine how the number of hours of advanced training impacted the knowledge and practice of CBT-I (percentage of correct answers on the practice questionnaire) and practice density (percentage of annual CBT-I practice out of annual total practice and the number of total of years

practicing CBT-I). All participants were professionals who received advanced training in CBT-I. These practitioners reported attaining a variety of degrees, including BA, BS, MA, MS, RN, MSN, MSW, LCSW, NP, Psy.D., Ph.D., DO, MD, RST, and Other.

Findings and Clinical Implications

With regard to the first hypothesis, this study found that among practitioners who received CBT-I training, the total hours of training alone did not predict increases in adherence to EBP in the sample as a whole. Post-hoc analysis was conducted to determine whether there were significant differences among practitioners with differing levels of education, that is, master's versus doctoral level clinicians. There was a clear disparity in the amount of training in behavioral sleep medicine generally and CBT-I specifically among mental and medical professionals, with the mean number of hours of total training for the master's clinicians being 304.8 and the mean for the doctoral clinicians being 821.2. The results also demonstrated that training hours alone did not significantly predict knowledge of CBT-I between groups of practitioners (master's and doctoral level practitioners). CBT-I knowledge was measured by the percent of correct answers on the questionnaire, which measured reported adherence to empirically validated protocols. The previous literature pertaining to the impact of training and years of experience on symptom reduction, therapeutic effectiveness, and clinician attitudes about treatment is mixed. Some studies suggested that the level of training does not impact a practitioner's ability to treat insomnia symptoms (Forand et al., 2011). Other findings on practitioner competency demonstrate that more experienced practitioners achieve greater anxiety symptom reduction when applying CBT (Branson et al., 2015). To date, the same research methodology that examined the efficacy of a practitioner

applying CBT has not been applied to CBT-I. It should be noted that the present study assessed practitioners' knowledge and not the clinical outcomes. Consequently, it is possible that if the two groups of practitioners, master's and doctoral, were compared based on level of training, the application of the CBT-I would result in a differential patient outcome.

More globally, the lack of statistically significant differences between master and doctoral level clinicians regarding the number of training hours and knowledge of CBT-I indicates that specialized training in CBT-I may quickly and efficiently impart key knowledge resulting in greater impact on reported adherence to EBP than does much more prolonged and costly formal academic training, especially when such training does not address insomnia treatment specifically, as is the case with most programs surveyed. Given the high prevalence of insomnia and the efficiency of clinical training, the data would suggest that all graduate programs should, at a minimum, provide some education in EBPs such as CBT-I, because even modest levels of training may make it likely that practitioners will become knowledgeable in this EBP.

There are a number of possible explanations as to why training history did not predict adherence to EBP. First, because all of the participants were trained in CBT-I, having attended at least one specialized training, it is likely that participants learned relevant material during that time and that the questionnaire was a valid measure of that knowledge. If this is the case, then results seem to indicate that specialized CBT-I training resulted in and was more predictive of adherence to and knowledge of CBT-I than the level of education (master's vs. doctoral degree). These results could be interpreted to mean that proper, focused, expert CBT-I training is necessary and sufficient

to attain such knowledge and that CBT-I training is so effective that even a limited number of expert CBT-I training sessions result in greater knowledge and adherence to EBP than does years of more general academic training, as indicated by a lack of statistical difference between master's and doctoral level practitioners. This may mean that, although advanced academic training is necessary, the current curriculum does not appear to be sufficient to learn evidence-based CBT-I.

Another possible explanation for the results is that, because both groups of practitioners (master's and doctoral) similarly omitted specific components of evidence-based protocols or incorrectly answered items similarly between groups, their scores were correspondingly suppressed. One surprising example is that the majority of participants omitted sleep hygiene as a necessary component of evidence-based CBT-I. Additionally, many practitioners reported using incorrect formulas to calculate essential elements of CBT-I. Errors included essential components of SRT, such as prescribed time in bed and prescribed time to bed. The fact that these formulas were not used properly indicates a lack of knowledge and possibly an absence of adherence to common components of evidence-based CBT-I (Edinger & Carney, 2015; Manber & Carney, 2015; Morin & Espie, 2003; Perlis et al., 2008).

It is also possible that each practitioner independently evaluated the importance of sleep hygiene and its impact on treatment outcomes and chose to exclude this component. It is also possible that practitioners' training deemphasized the sleep hygiene, in favor of standalone EBP packages (SCT, SRT, and CBT-I), all which incorporate essential sleep hygiene elements. On the other hand, many practitioners might assume that sleep

hygiene is an implicit part of CBT-I and not necessary to include; because sleep hygiene by itself has not been demonstrated to be a standalone EBP.

Because common errors occurred regardless of the level of training in both academia and CBT-I-specific training, this study illuminates important areas that CBT-I trainers may now want to focus on more closely for beginners, advanced, and follow-up training. Most practitioners incorrectly answered the question regarding the accepted evidence-based recommendations for the prescribed time in bed and prescribed time to bed. Examples of incorrect responses for the prescribed time in bed included "rough guess" and, "using a calculator and computer program." Examples of incorrect responses for the prescribed time to bed include "not sure" and "when feeling sleepy."

Although practitioners' inability to identify the correct formulas for the prescribed time in bed and prescribed time to bed could reflect a lack of practical knowledge of one of the most essential elements of the SRT component of treatment CBT-I or, more optimistically, this may demonstrate the growing popularity and dependence on spreadsheet programs that do the calculations for the practitioner. Of course, lack of knowledge and improper calculation could result predictably in the faulty application of SRT recommendations, such as prescribed time in bed and time to bed. Conversely, using technology for calculations could compensate for this lack of technical knowledge (calculations) and may result in more accurate calculations by reducing human error.

It is also possible some of the response errors were the result of the wording of some of the items that were confusing, which was indicated by one such response, "I don't understand the question." Of course, the admission of uncertainty by this participant could be a reflection of the absence of knowledge or confusion with the

wording, which may have caused a higher than expected error rate on items 31 (When conducting CBT-I, what treatments do you typically use), 34 (How do you assess and determine prescribed time in bed [PTIB], i.e., prescribed sleep opportunity), and 42 (When conducting sleep restriction, the rule I use to define time to bed is _____.).

Regarding the absence of sleep hygiene as an essential component, the reason many practitioners may have likely omitted this item is that it is not a standalone intervention. The wording of the question asked for "treatments that are typically used." The intended wording of the question was to assess both practitioners' knowledge and also their real-life application of the empirically validated protocol. The data suggest that practitioners do not view sleep hygiene as an essential part of CBT-I. It should also be noted that many practitioners included mindfulness as an essential component, though mindfulness is not a formal part of the validated protocol. Given the frequency of mindfulness inclusion, additional research should be conducted to assess how the formal inclusion of mindfulness into the CBT-I protocol enhances treatment from a symptom reduction perspective. Additional research regarding the presence or absence of sleep hygiene should also be conducted in order to further understand why some practitioners do not include it and the impact the absence or presence of sleep hygiene has on the remission of insomnia symptoms.

Participants scored between 60% and 70% correct responses on questions related to CBT-I knowledge. The skew of the data could be representative of the distribution of participants, with some individuals scoring high on the questionnaire and other participants scoring low, thereby skewing the mean. When the knowledge percentage

scores were compared between groups (master's and doctoral), there was no significant difference between groups with respect to correct versus incorrect responses on the knowledge questionnaire. The absence of statistically significant differences implies that another possible reason for the error rates could be that there were some items on the questionnaire that was more difficult for all participants. The exact reason why said items were difficult is unknown.

With regard to hypothesis 2, this study demonstrated that practitioners who have a greater number of hours of CBT-I training apply CBT-I significantly more, as measured by greater practice density (total number of hours of CBT-I out of total clinical hours of practice) and had a significantly higher total number of years practicing CBT-I than those with less training. Manber et al. (2013) found that individuals who received formal training in CBT-I reported higher ratings of skill-specific self-efficacy and increased positive attitudes toward CBT-I than individuals who did not receive training. These results support the need for early evidence-based CBT-I training in educational settings and supplementary training so that practitioners can increase self-efficacy and refine their skill sets so that they may incorporate evidence-based CBT-I into their clinical work earlier in their careers if they desire to treat more CBT-I patients in clinical practice.

Post-hoc regression analyses between the master's and doctoral groups demonstrated that the hours of training predicted the practice density for the doctoral practitioners but not for the master's group. This means that doctoral level practitioners who receive more training tend to incorporate the clinical application of CBT-I more into their caseload than master's practitioners. The amount of training was not predictive of the number of years of practicing CBT-I for master's or doctoral groups. It is possible

that the very nature of being in school longer contributed to the prediction that the amount of training causes more CBT-I practice percentage out of the total clinical practice; however, researchers do not consider the longer training as the primary reason for this. The immediate application of a specialized treatment early in doctoral training is uncommon. Many programs do not start field experience until a practitioner has demonstrated his or her knowledge and competencies, which may happen in the second or third year of a doctoral program. The fact that many doctoral programs do not start field placement until later in training conflicts with the idea that 5 years of schooling inevitably equates to 5 years CBT-I application.

One possible reason for why the amount of training was not a significant predictor of the number of years of practicing CBT-I respective of subgroups is that the sample may have included practitioners who research more than they practice. Another possible explanation is that some of the practitioners may have more training hours in order to comply with state continuing education (CE) requirements for licensure, but may have no intention of applying CBT-I to their respective clinical practice.

It must also be noted that, when broken down into subgroups during post-hoc analyses, the variables of interest (years practicing CBT-I and the percentage of CBT-I therapy hours out of total clinical hours) were significant only for the doctoral level clinicians but not for those with master's degrees. Upon reviewing the data, the master's group had far fewer training hours on average, which made it more difficult for the analyses to predict the variables of interest. It should also be noted that the master's group was underpowered when compared the doctoral level group, which may also have impacted the ability of the selected analyses to detect significance. Also related to

hypothesis 2, there were instances in which the training hours appeared exaggerated. Given the mean standard deviation for the whole sample relative to the total number of training hours in CBT-I, it is possible that some practitioners attempted to provide an approximation of their training experience as was requested by the questionnaire.

Hypothesis 3 demonstrated that there are significant group differences with regard to the number of hours practitioners are trained in CBT-I, the number of hours the clinicians practiced CBT-I, and the number of years the practitioners practiced CBT-I. There were no significant group differences with regard to the knowledge of CBT-I.

Limitations

The current study may have been limited by a number of factors. For example, the sample selection process and recruitment relied heavily on CBT-I listservs that were comprised of CBT-I trained psychological and medical professionals. Although the sample size is fairly large, the database of therapists was limited to practitioners who received training from independent training seminars, but also seminars that overlapped in terms of educational content. Because some of the practitioners were taught by common programs, one could hypothesize that the results yielded a higher level of knowledge of CBT-I and increased practice density than would have occurred if compared to a control group of students and professionals who had not received specialized formal training. The selection of the sample of practitioners who were trained in CBT-I may limit the generalizability of the study and may underestimate the magnitude of the CBT-I training effects for this population, in that there may have been a very high floor effect in this sample than would have been seen if we had compared those

with specialized CBT-I training to professionals with more general clinical education or other specialized types of behavioral sleep medicine training.

Many VA clinicians receive specialized CBT-I and training, and utilization rates are high among VA clinicians. The success of CBT-I for insomnia among the VA population is notable, with one study demonstrating average scores for individuals with insomnia symptoms decreased on average from 20.7 to 10.9 on the Insomnia Severity Index from pre- to post treatment (Trockel, Karlin, Taylor, & Manber, 2014). Unfortunately, it appears that VA therapists were underrepresented in the study, further limiting the generalizability of the current study.

One should also note that, when comparing practice density and hours of training, all types of training are not equal and the type of clinical intervention each practitioner engaged in may differ significantly. Although the hours of training and type of practice may be convenient metrics, the actual content of the training and types of clinical settings in which the practice hours were attained may be quite different. Moreover, the study did not measure patient outcome or the relevant variables that predict it.

Future Directions

The implications of the results are highly applicable to counseling and doctoral level training. Given the worldwide near-epidemic of sleep deprivation and insomnia and the high prevalence in clinical populations, it is incumbent upon medical and mental health professionals to be trained in treating, or at least properly referring individuals for adequate treatment. Luckily, there is an EBP available. Ideally, all mental health clinicians and relevant medical practitioners could be trained adequately for these

purposes, so that practitioners could incorporate validated insomnia interventions, such as CBT-I, into their practices for the benefit of their patients.

From these results, it seems clear that training might be improved with some modification, as most of the practitioners reported some errors in adhering to evidence-based protocols, as demonstrated by the median scores for all practitioners on the questionnaire scoring between 60% and 70% on adherence. The existing literature demonstrated that there are differences in how strictly practitioners apply certain interventions, with more experienced practitioners adhering more strictly than their less experienced counterparts (Campbell et al., 2013). Campbell et al.'s (2013) findings are relevant to the present study because there appears to be similar knowledge between groups of practitioners with different amounts of training. It may be necessary for future research to examine how the amount of training impacts the application of CBT-I in an observable, measurable way and how those differences in application relate to the reduction in insomnia.

Moreover, investigating how insomnia interventions are being applied in outpatient community behavioral health settings, inpatient psychiatric hospitals, and other treatment settings would be important. Finally, the value of specialized training, level of practical knowledge, and adherence to EBPs may become clearer when CBT-I trained clinicians are compared to those with more general clinical education or other specialized types of behavioral sleep medicine training.

Conclusion

It is clear that there is a disparity in the amount of training in behavioral sleep medicine generally and CBT-I specifically among mental health and medical

professionals, with the mean number of hours of total training for the master's clinicians being 304.8 and the mean for the doctoral clinicians being 821.2. Although there is a large disparity in the number of hours, the amount did not translate into a difference in knowledge, as evidenced by the scores on the practice questionnaire being relatively similar. This is good news for the mental health field because it means that even a modest amount of specialized training can have a large impact on how much practitioners know about the CBT-I protocol.

The findings also demonstrate that clinicians increase the hours of CBT-I practice when they attain more hours of training. The results suggest that clinicians who obtain more specialized CBT-I training report treating a higher percentage of insomnia patients in their caseloads and report more years of treating insomnia patients. This is important to note because it could be evidence that individuals with more training are more likely to apply evidence-based CBT-I, which hopefully translates to more availability of empirically validated interventions.

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Appendix A

Questionnaire

Confidential

Landing Page

Welcome.
Thank you for visiting our site and considering taking our survey re: CBT-I

The survey is divided into three parts. The first part will ask you about your demographic information and will take less than five minutes of your time. The second part will ask you about your clinical training and will take between 15-20 minutes of your time. The final part will ask you about your practice approaches utilizing the CBT-I protocol and will take approximately 15-30 minutes of your time. In total, the survey will take you between 35 and 55 minutes. Please note that you can save your responses and complete the survey over more than one sitting.

Thank you in advance for your participation. The data you provide will greatly inform what we know about what is modal for CBT-I practice and if (and how) practice is informed by one's training history or clinical setting. Please know that this research is part of a dissertation project but that it is our expectation to open the data base to the BSM community for secondary analyses.
Your participation is greatly appreciated.

Please note the last question "is there anything pertaining to training and practice of behavioral sleep medicine that we didn't ask that we should have". Please be mindful that we will ask this question at the end of the survey.

Confidential

Demographics

The following survey assesses practitioner demographics. There are 4 items which will likely take less than 2 minutes of your time to complete.

1) Please list your age _____

2) Please select your gender
- ○ Male
- ○ Female
- ○ Transgender

3) Please select your ethnicity
- ○ African
- ○ Latino
- ○ Caucasian
- ○ Asian
- ○ multi racial

4) Current country of residence: _____

progress bar

Confidential

Clinical Training Demographics

The following assessment is intended to measure clinical training experience and is made up of 25 items total. Please note that the 25 items may be followed up by additional questions regarding specific numbers of training hours. The entire questionnaire will take 10-15 minutes of your time.

5) Please select your highest degree

- ☐ Bachelor of Arts (BA)
- ☐ Bachelor of Science (BS)
- ☐ Master of Arts (MA)
- ☐ Master of Science (MS)
- ☐ Registered Nurse (RN)
- ☐ Master of Science in Nursing (MSN)
- ☐ Master of Social Work (MSW)
- ☐ Licensed Clinical Social Worker (MSW)
- ☐ Occupational Therapist (OT)
- ☐ Nurse Practitioner (NP)
- ☐ Registered Sleep Technologist (RST)
- ☐ Doctor of Osteopathic Medicine (DO)
- ☐ Medical Doctor (MD)
- ☐ Doctor of Psychology (Psy.D.)
- ☐ Doctor of Philosophy (PhD.)
- ☐ other not listed

What is the "other" type of degree you hold? _____

6) In what year was your highest degree obtained _____

7) The license (or licenses) I currently hold is/are:

- ☐ Licensed Social Worker (LSW)
- ☐ Licensed Clinical Social Work (LCSW)
- ☐ Licensed Clinical Mental Health Counselor (LCMHC)
- ☐ Licensed Professional Counselor (LCPC)
- ☐ Marriage and Family Therapist (MFT)
- ☐ Master's license practitioner (MLP)
- ☐ Licensed Psychologist (LCP)
- ☐ Licensed Practical Nurse (LPN)
- ☐ Registered Nurse (RN)
- ☐ Doctor of Osteopathy (DO)
- ☐ Medical Doctor (MD)
- ☐ Registered Polysomnographic Technologist (RPSGT)
- ☐ other
- ☐ I am unlicensed

What is the other type of license you hold? _____

8) Did you receive training on CBT-I as an undergraduate?

- ○ Yes
- ○ No

What type of training experience did you receive as an undergraduate? Please check all that apply.

- ☐ research assistant relevant to CBT-I
- ☐ research assistant relevant to BSM
- ☐ clinical observation
- ☐ supervision hours received
- ☐ Other

What is the estimated total number of hours of training you received as a research assistant relevant to CBT-I _____

What is the estimated total number of hours of training you received as a research assistant relevant to behavioral sleep medicine _____

What is the estimated total number of hours of training you obtained in the form of clinical observation _____

Please list the estimated total hours of "other" experience _____

What is the estimated total number of hours of supervision you received in CBT-I as an undergraduate? _____

Please list the "other" type of training received _____

9) Did you receive training on CBT-I as a post-bac student?
- ○ Yes
- ○ No

What type of CBT-I training experience did you receive as a post-bac? Please check all that apply.
- ☐ research assistant relevant to CBT-I
- ☐ research assistant relevant to BSM
- ☐ clinical observation
- ☐ supervision hours received
- ☐ Other

As a research assistant, what are the estimated total number of hours of training you received relevant to CBT-I _____

As a post-bac, what is the estimated total number of hours of training you received as a research assistant relevant to behavioral sleep medicine? _____

As a post-bac, what is your estimated total number of clinical observation hours? _____

As a post-bac, what is the estimated total number of supervision hours you received related to CBT-I? _____

As a post-bac, what was the "other" type of training that you received? _____

What was the estimated total number of "other" hours you received as a post-bac? _____

10) Did you receive training on CBT-I as a graduate student?
- ○ Yes
- ○ No
- ○ Not applicable

Did you receive training on CBT-I as a graduate student? Please check all that apply.
- ☐ research assistant relevant to CBT-I
- ☐ research assistant relevant to Behavioral sleep medicine
- ☐ conducted CBT-I / Behavior sleep medicine related research
- ☐ clinical observation
- ☐ conducted CBT-I w/ supervision
- ☐ supervision hours received
- ☐ Other

As a graduate student, what are the estimated total number of hours you assisted in research relevant to CBT-I as a graduate student? _____

As a graduate student, what are the estimated total number of hours you accrued as a research assistant that is relevant to behavioral sleep medicine _____

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As a graduate student what are the estimated total number of hours you conducted CBT-I/behavioral sleep medicine research _____

As a graduate student, what is the estimated total number of hours you observed? _____

As a graduate student, what is the estimated total number of supervision hours you received as it relates to CBT-I _____

As a graduate student, what was the "other" type of training you received? _____

How many estimated hours of "other" training did you receive in total as a graduate student? _____

11) Did you receive training on CBT-I in medical school?
- ○ Yes
- ○ No
- ○ Not applicable

What type of CBT-I training did you receive in medical school? Please check all that apply.
- ☐ Observed treatment
- ☐ conducted CBT-I w/ supervision
- ☐ conducted CBT-I / BSM related research
- ☐ supervision hours received
- ☐ Other

As a medical student, what is the estimated total number of hours you observed treatment? _____

As a medical student, how many estimated total hours did you conduct CBT-I with supervision? _____

As a medical student, how many estimated total hours did you conduct CBT-I/behavioral sleep medicine research? _____

As a medical student, how many estimated total hours of supervision did you receive? _____

As a medical student, what was the "other" type of training you received in CBT-I? _____

As a medical student, what was the estimated total number of "other" hours? _____

12) Did you receive training on CBT-I as an intern?
- ○ Yes
- ○ No
- ○ Not applicable

What type of training did you receive as an intern? Please check all that apply.
- ☐ observed treatment
- ☐ conducted CBT-I w/ supervision
- ☐ conducted CBT-I / behavioral sleep medicine related research
- ☐ supervision hours received
- ☐ other

As an intern, what is the estimated total number of hours that you observed treatment using CBT-I? _____

As an intern, what is the estimated total number of hours you conducted CBT-I with supervision? _____

As an intern, what is the estimated total number of hours that you conducted CBT-I/behavioral sleep medicine research? _____

As an intern, what was the estimated total number of hours that you received supervision related to CBT-I? _____

As an intern, what is the "other" type of training that you received related to CBT-I? _____

As an intern, how many estimated total hours of "other" training did you receive? _____

13) Did you receive training on CBT-I as a resident?
- ○ yes
- ○ no
- ○ not applicable

As a resident, what type of CBT-I training did you receive?
- ○ observed treatment
- ○ conducted CBT-I w/ supervision
- ○ conducted CBT-I / behavioral sleep medicine related research
- ○ supervision hours received
- ○ other

As a resident, what is the estimated total number of treatment you observed? _____

As a resident, what is the estimated total number of hours you conducted CBT-I with supervision? _____

As a resident, what is the estimated total number of hours you conducted CBT-I/behavioral sleep medicine related research? _____

As a resident, what is the estimated total number of hours you received supervision? _____

As a resident, What is the "other" type of training that you received? _____

As a resident how many estimated total hours of "other" training did you receive? _____

14) Did you receive training on CBT-I as a post doctoral fellow?
- ○ yes
- ○ no
- ○ not applicable

What type of CBT-I training did you receive as post doc fellow?
- ☐ observed treatment
- ☐ conducted CBT-I w/ supervision
- ☐ conducted CBT-I/ behavioral sleep medicine-related research
- ☐ received supervision in CBT-I/behavioral sleep medicine
- ☐ other

As a post doctoral fellow, what was the estimated total number of hours you observed treatment? _____

As a post doctoral fellow, what was the estimated total number of hours you conducted CBT-I with supervision? _____

As a post doctoral fellow, what was the estimated total number of hours you conducted CBT-I/ behavioral sleep medicine related research? _____

As a post doctoral fellow, what was the estimated total number of hours you received supervision? _____

As a post doctoral fellow what is the "other" type of training you received? _____

As a post doctoral fellow, what is the estimated total number of "other" hours you received? _____

15) Did you receive CE training related to CBT-I?

- ○ Yes
- ○ No

What type of CE training did you receive? Please check all that apply.

- ☐ CBI-I ed. products Basic Course in person/DVD/Download (Perlis/Posner)
- ☐ CBTI-ed. products Advanced Course in person/DVD/Download (Perlis/Posner)
- ☐ CBTI-ed. products Mock Case Video DVD/Download (Perlis/Posner)
- ☐ DoD Training (Brim)
- ☐ University of Massachusetts MP3 CBT-I Training (Jacobs)
- ☐ University of Massachusetts Seminar in person/DVD/Download (Jacobs)
- ☐ University of Massachusetts onsite live Seminar (Jacobs)
- ☐ Memorial University onsite live Seminar (Garland)
- ☐ Penn Basic course onsite live seminar (Perlis/Posner/Ellis)
- ☐ Penn Advanced Course onsite live seminar (Perlis/Posner/Ellis)
- ☐ PESI Basic Course DVD/Download (Perlis/Posner)
- ☐ PESI Basic Course Webinar (Perlis/Posner)
- ☐ PESI Basic Course onsite live seminar (Carney or Posner)
- ☐ Ryerson University Basic Course onsite live seminar (Carney)
- ☐ VA Training onsite live seminar (Manber/Carney)
- ☐ Other

How many estimated hours total was the CBI-I ed. products Basic Course in person/DVD/Download (Perlis/Posner)? _____

How many estimated total hours was the CBTI-ed. products Advanced Course in person/DVD/Download (Perlis/Posner)? _____

How many estimated total hours was the CBTI-ed. products Mock Case Video DVD/Download (Perlis/Posner)? _____

How many estimated total hours was the DoD Training (Brim)? _____

How many estimated total hours was the University of Massachusetts MP3 CBT-I Training (Jacobs)? _____

How many estimated total hours was the University of Massachusetts Seminar in person/DVD/Download (Jacobs)? _____

How many estimated total hours was the University of Massachusetts onsite live Seminar (Jacobs)? _____

How many estimated total hours was the Memorial University onsite live Seminar (Garland)? _____

How many estimated total hours was the Penn Basic course onsite live seminar (Perlis/Posner/Ellis)? _____

How many estimated total hours was the Penn Advanced Course onsite live seminar (Perlis/Posner/Ellis)? _____

How many estimated total hours was the PESI Basic Course DVD/Download (Perlis/Posner)? _____

How many estimated total hours was the PESI Basic Course Webinar (Perlis/Posner)? _____

How many estimated total hours was the PESI Basic Course onsite live seminar (Carney or Posner)? _____

How many estimated total hours was the Ryerson University Basic Course onsite live seminar (Carney)? _____

How many estimated total hours was the VA Training onsite live seminar (Manber/Carney)? _____

What is the "other" CE training that you received? _____

How many estimated total hours was the "other" training? _____

16) How many years estimated have you been practicing as a clinician? _____

17) What is the total number of estimated years you have been treating patients with CBT-I? _____

18) During the past year, how many total number of hours did you see patients? _____

19) How would you describe the socioeconomic status of the majority of your patients?
- ○ mostly low-income
- ○ mostly working-class
- ○ mostly wealthy

20) How would you describe the health insurance of your patients? Please check all that apply
- ☐ uninsured
- ☐ Medicaid
- ☐ Medicare
- ☐ mostly insured
- ☐ private insurance

21) Which of the following best describes the majority of your patients?
- ○ Mostly white/ Caucasian
- ○ Mostly African American/Black
- ○ Mostly Hispanic
- ○ Mostly non-African/Hispanic American
- ○ Other

22) During the past year, on average, how many estimated total hours per week did you meet with patients specifically regarding sleep disorders? _____

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23) I have conducted the following. Please check all that apply.

- ☐ CBT-I for insomnia
- ☐ CPAP desensitization
- ☐ sleep restriction for Restless leg and periodic limb movement PL/PLM
- ☐ chronotherapy for circadian rhythm disorders
- ☐ bright light therapy
- ☐ imagery rehearsal or other for nightmares syndrome in adults
- ☐ scheduled awakenings for parasomnias in adults
- ☐ behavioral interventions for narcolepsy
- ☐ behavioral interventions for pediatric insomnia
- ☐ behavioral interventions for pediatric enuresis
- ☐ behavioral interventions for infant sleep consolidation
- ☐ behavioral interventions for pediatric nightmares
- ☐ behavioral interventions for pediatric sleep walking
- ☐ behavioral interventions for night terrors
- ☐ behavioral interventions for pediatric problems with co sleeping
- ☐ behavioral interventions for bedtime refusal
- ☐ Other

In the past year, what is the estimated total number of hours you conducted CBT-I for insomnia? _____

In the past year, what is the estimated total number of hours you conducted CPAP desensitization _____

In the past year, how many estimated hours total have you conducted sleep restriction for Restless leg and periodic limb movement PL/PLM? _____

In the past year, how many estimated hours total have you conducted chronotherapy for circadian rhythm disorders? _____

In the past year, how man estimated hours total have you conducted bright light therapy? _____

In the past year, how many estimated hours total have you conducted imagery rehearsal or other for nightmares syndrome in adults? _____

In the past year, how many estimated hours total have you conducted scheduled awakenings for parasomnias in adults? _____

In the past year, how many estimated hours total have you conducted behavioral interventions for narcolepsy? _____

In the past year, how many estimated hours total have you conducted behavioral interventions for pediatric insomnia? _____

In the past year, how many estimated hours total have you conducted behavioral interventions for pediatric enuresis? _____

In the past year, how many estimated hours total have you conducted behavioral interventions for infant sleep consolidation? _____

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In the past year, how many estimated hours total have you conducted behavioral interventions for pediatric nightmares? _____

In the past year, how many estimated hours total have you conducted behavioral interventions for pediatric sleep walking? _____

In the past year, how many estimated hours total have you conducted behavioral interventions for night terrors? _____

In the past year, how many estimated hours total have you conducted behavioral interventions for pediatric problems with co sleeping? _____

In the past year, how many estimated hours total have you conducted behavioral interventions for bedtime refusal? _____

What is the "other" type of therapy you conducted? _____

What is the estimated total number of hours you conducted "other" type therapy over the past year? _____

24) In your practice do you treat disorders other than sleep related disorders?
- ○ Yes
- ○ No

25) Do you treat other disorders irrespective of targeted disorders with empirically supported interventions?
- ○ Yes
- ○ No

26) Which most accurately applies to your professional practice?
- ○ I do not treat insomnia, although I am interested in the topic.
- ○ I behaviorally treat a variety of sleep disorder conditions.
- ○ I regularly treat a variety of sleep disorders behaviorally
- ○ I treat insomnia exclusively and refer patients for treatment of virtually all other comorbidities including other sleep disorders.

27) Apart from insomnia, what other areas of expertise do you have? _____

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28) I treat insomnia, as well as the following comorbidities:

- ☐ hypersomnolence disorder
- ☐ narcolepsy
- ☐ obstructive sleep apnea/ hypopnea
- ☐ central sleep apnea:
- ☐ idiopathic central sleep apnea
- ☐ cheyne-stokes breathing
- ☐ sleep related hypoventilation:
- ☐ idiopathic hypoventilation
- ☐ congenital central alveolar hypoventilation
- ☐ comorbid sleep-related hypoventilation
- ☐ circadian rhythm sleep-wake disorder:
- ☐ delayed sleep phase type
- ☐ advanced sleep phase type
- ☐ irregular sleep-wake type
- ☐ non 24 hour sleep-wake type
- ☐ shift work type
- ☐ unspecified type
- ☐ sleep walking type
- ☐ sleep terror type
- ☐ nightmare disorder
- ☐ rapid eye movement sleep behavior disorder
- ☐ restless leg syndrome
- ☐ substance/medication-induced sleep disorder
- ☐ other specified insomnia disorder
- ☐ unspecified insomnia disorder
- ☐ other specified hypersomnolence disorder
- ☐ unspecified hypersomnolence disorder
- ☐ other specified sleep-wake disorder
- ☐ unspecified sleep-wake disorder
- ☐ disruptive mood dysregulation disorder
- ☐ major depressive disorder
- ☐ persistent depressive disorder
- ☐ premenstrual dysphoric disorder
- ☐ substance/medication-induced depressive disorder
- ☐ depressive disorder due to another medical condition
- ☐ other specified depressive disorder
- ☐ unspecified depressive disorder
- ☐ separation anxiety disorder
- ☐ selective mutism
- ☐ specific phobia
- ☐ social anxiety disorder
- ☐ panic disorder
- ☐ agoraphobia
- ☐ generalized anxiety disorder
- ☐ substance/medication-induced anxiety disorder
- ☐ anxiety disorder due to another medical condition
- ☐ other specified anxiety disorder
- ☐ unspecified anxiety disorder
- ☐ Personality disorders
- ☐ Psychotic disorders
- ☐ Non-sleep-related medical disorders

29) Which of the following best describes the setting in which you practice CBT-I?

- ○ Private practice (solo practitioner)
- ○ private pracice (group practice)
- ○ HMO, CPO (Ex.Kaiser Permanente, Geisinger)
- ○ private hospital setting
- ○ university based practice (private solo)
- ○ HMO/PPO sleep center
- ○ university affiliate (private practice)
- ○ university based sleep center (private)
- ○ VA hospital inpatient
- ○ VA hospital outpatient

30) What is the setting in which your patients are primarily seen?

- ○ individual in person CBT-I
- ○ individual telehealth CBT-I
- ○ CBT-I group in person

progress bar 2

Please complete the survey below.

Thank you!

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Practice Approaches to CBT-I

The final section of the survey is intended to measure practice approaches to CBT-I and is made up of 25 short answer items. The entire third assessment should take 15-20 minutes total.

31) When conducting CBT-I, what treatments do you typically use?

32) When conducting assessments for CBT-I, what instruments (measures) do you consider to be essential?

33) How is sleep efficiency calculated? (please specify the formula and the manner in which you calculated e.g spread sheet, calculator)

34) How do you assess and determine prescribed time in bed (PTIB), i.e., prescribed sleep opportunity?

35) At baseline, when assessing TIB (average sleep opportunity), ideally how many days of sleep diary data should be used?

36) During the course of treatment, the calculation of sleep efficiency should be based on how many days/weeks of sleep diaries (minimum)?

37) When applying Sleep Restriction, and using SE%, what do you use for the threshold for upward titration of PTTB?

38) When applying Sleep Restriction, and using SE%, what do you use for the threshold for downward titration of PTTB?

39) When applying Sleep Restriction, and using SE%, what do you use for the threshold for no change in PTTB?

40) When applying Sleep Restriction, what increment is used for upward titration of PTTB?

41) The frequency with which CBT-I sessions should occur (optimally) is _____?

42) When conducting sleep restriction, the rule I use to define time to bed is _____

43) According to the principles of stimulus control, what behaviors are permitted in the bedroom?

44) What behaviors are permitted during the practice of stimulus control (outside the bedroom)?

45) What are the instructions for when to leave the bedroom in the event that a patient cannot sleep?

_____

46) When is it appropriate to return to the bedroom?

_____

47) How do you determine the prescription for time in bed?

_____

48) According to standard stimulus control instructions, the rule with respect to napping is _____?

_____

49) Ideally, how many sessions should be devoted to sleep hygiene?

_____

50) If a handout for sleep hygiene is provided to patients what are key elements that should be included_____?

_____

51) Cognitive elements of CBT-I may include _____?

_____

52) When explaining the rationale for sleep restriction, what if any model do you use to explain the concept to the patient?

_____

53) What are common patient resistances? Name three.

_____

54) What recommendations do you typically make with respect to relapse prevention?

_____

55) Is there a component or measurement that has not been inquired about in this questionnaire that you believe is critical to the conduct of CBT-I?

_____

56) Is there anything pertaining to training and practice of behavioral sleep medicine that we didn't ask that would we should have?

_____

progress bar 3

Appendix B

Free Response Coding Rules, CBT-I Questionnaire

Mark D. DelGuercio, Dr. Brad Rosenfield, Dr. Michael Perlis, Dr. David Festinger

General instructions: *Progress sequentially through each participant's responses. Follow explicit directions for each question and code* ***EXACTLY*** *as directed. If answers are not provided in the acceptable answer list (located directly beneath the question) or if instructions do not specifically instruct the scorer to accept variations of the list, answers should be marked incorrect.*

31. (a-d) When conducting CBT-I, what treatments do you typically use?

4 points possible, 1 point per correct answer
Acceptable answers:

- Sleep hygiene
- Sleep restriction
- Stimulus control
- Cognitive restructuring/ thought disputation/decatastrophizing (CT in relation to adherence problems. any variation of addressing cognitive elements impacting sleep)

32. When conducting assessments for CBT-I, what instruments (measures) do you consider to be essential?

1 point possible. 1 point is awarded for journal/sleep diary/sleep log (1 point). If the participant gives just journal it's 1 point and if they give any of the below listed assessments without sleep journal it is 0 points. Assessments not listed in the list below do not negatively impact the score but are not awarded a point.
Acceptable answers:

- A Sleep Environment Checklist
- Actigraphy
- Caffeine Knowledge Quiz
- Dysfunctional Beliefs About Sleep Scale (DBAS)
- Epworth Sleepiness Scale (ESS)
- Insomnia Severity Index (ISI)
- Insomnia Symptom Questionnaire
- Medical History Checklist
- Motivation for Change Index
- Multi Factorial Fatigue Inventory (MFFI)
- Multiple sleep Latency Test (MSLT)
- Polysomnopraph
- Sleep Disorders Symptoms Checklist
- Symptom Checklist

- Sleep diary
- Sleep Environment Checklist
- The Sleep Behavior Scale
- The Insomnia Severity Scale (ISI)
- The Pittsburg Sleep Quality Index (PSQI)
- The Pre-Sleep Arousal Scale
- The Sleep Disturbance Questionnaire
- The Sleep Hygiene Practice Scale

33. How is sleep efficiency calculated? (please specify the formula and the manner in which you calculated e.g spread sheet, calculator)

1 point for any of the answers listed below (manner in which the score is calculated does not influence the point awarded in any way):

Acceptable answers:

- (TST/TIB)x100
- percentage of time asleep relative to the time allotted for sleep 100* (TST/TIB)
- ratio of time asleep over time spent in bed multiplied by 100
- sleep efficiency is calculated by dividing the patient's average total sleep time by the average time spent in bed and then multiplying by 100

34. How do you assess and determine prescribed time in bed (PTIB), i.e., prescribed sleep opportunity? (Answer must include the word average to be marked correct) **note that "sleep ability" is an acceptable alternative to "average" because "sleep ability" is calculated using averages.

    Acceptable answers:

    - Average time from time to bed to time out of bed
    - Average total TST in the past week rounded to the nearest quarter hour
    - Average total sleep time+30minuntes

35. At baseline, when assessing TIB (average sleep opportunity), ideally how many days of sleep diary data should be used?
    Acceptable Answers (Between 1 & 2 weeks). Responses provided in the equivalent number of days are acceptable as long as it's between 7 and 14 days. Exactly 7 and exactly 14 are also permissible.

    Acceptable answers:

    - Usually 1-2 weeks
    - 2 weeks preferred, can use 1 week
    - 1-2 weeks
    - 2 weeks

36. During the course of treatment, the calculation of sleep efficiency should be based on how many days/weeks of sleep diaries (minimum)?
    * if more than one answer is given and one of the answers is wrong, the answer is incorrect. (Ex. "I prefer 7days but use 3 days").

**If answer is less than seven and no unit of measure of time is provided the answer should be marked incorrect.

Acceptable answers:

- 1 week minimum (7 days)
- the amount of time since the last appointment (cannot not be less than 7 days or 1 week)

*If response refers to the "time since last appointment" but does not specific the amount of time since the last appointment the answer should be marked incorrect

37. When applying Sleep Restriction, and using sleep efficiency% (SE%), what do you use for the threshold for upward titration of PTTB?
**Please note that the range 85-90% is not an acceptable answer and should be marked incorrect.

Acceptable answers:

- >90%
- 90%
- 85%.

38. When applying Sleep Restriction, and using sleep efficiency %(SE%), what do you use for the threshold for downward titration of PTTB? * if multiple answers are given and one of them is wrong, mark the answer wrong.

Acceptable answers:

- SE% < 85
- 80%

39. When applying Sleep Restriction, and using sleep efficiency (SE%), what do you use for the threshold for no change in PTTB? **if participant provides a rang of scores outside of the range of acceptable answers mark as incorrect. When tracking frequency distributions, if the range overlaps with an existing category, select the category that most clearly reflects the incorrect versus correct response.

Acceptable answers:

- Between 85% and 90%
- 80-85% (was >80% before 11.7.17)
- If the patient is sleep soundly most nights and feeling alert in the daytime, then no TIB adjustment is needed

40. When applying Sleep Restriction, what increment is used for upward titration of PTTB?

Acceptable answers:

- 15 minutes
- 15 minutes <u>OR</u> 30 minutes if sleepiness is present
  (if the participant uses thirty minutes they MUST indicate that sleepiness is present or explain a general reason for extending the increment to 30min)

41. The frequency with which CBT-I sessions should occur (optimally) is _____?

Acceptable answers:

- Once per week for 4-8 weeks

- Bi weekly
- Weekly at first then bi weekly. Periodic booster sessions can also be scheduled

42. When conducting sleep restriction, the rule I use to define time to bed is _____

Acceptable answers:

- Desired time of awakening-average TST
- Wake time-TIB
- Morning rising time-Average sleep time

*acceptable answers may include the term (PTIB=prescribed time in bed interchangeably with total sleep time). It should be noted that (PTIB) in some protocol permit adding 30 minutes. Thus, desired awakening – PTIB +30 minutes is an acceptable answer.

43. According to the principles of stimulus control, what behaviors are permitted in the bedroom?

Acceptable Answers:

- Sleep and sex
- Sleep

44. What behaviors are permitted during the practice of stimulus control (outside the bedroom)?

Acceptable answers:

- Any normal activity
- Pleasurable normal activities
- Pleasant engaging activities that are not too activating

45. What are the instructions for when to leave the bedroom in the event that a patient cannot sleep?

Acceptable Answers:

- When they are awake and they know it or when they are annoyed
- When they are awake and know it
- 15min
- 10-15min
- 20 minutes or so (or so in this context is anything within 5 minutes of 20 minutes)
  *because “or so” includes a 5 minute span of time (any answer from 10-20 is acceptable)

46. When is it appropriate to return to the bedroom?

Acceptable answers:

- Return only when sleepy (answer must include the word sleepy)
- Return to bed after 20 minutes (modified recommendation
- Tired/fatigued are not acceptable unless used in combination with “sleepy” or “drowsy” or a description of physiological manifestation of sleepiness.

Describing symptoms of sleepiness and drowsiness is also an acceptable answer (ex. Having trouble keeping eyes open). Groggy is also acceptable as it is, by definition, representing weakness associated with sleep.

- "ready for sleep" is unacceptable because it does not indicate a feeling of sleepiness and could be representative of intent and not physiological preparedness for sleep

47. How do you determine the prescription for time in bed?
Acceptable answers:
(not scored) → overlap with question 14

48. According to standard stimulus control instructions, the rule with respect to napping is
_____?
Acceptable Answers:
- Prohibited
- Do not nap
- Avoid daytime napping
- Avoid naps but stopping naps is better
** answer must include a reference to prohibiting napping or avoiding it. If the answer has an elaboration on the restrictions on the napping or a duration of nap time in combination with the words that describe prohibition it is acceptable because it is reflective of the desire to avoid.

49. Ideally, how many sessions should be devoted to sleep hygiene?
Acceptable Answer:
- >0, less than 1
- Anything more than 0 or none
*If no number or duration of time is given the answer is wrong
*ranges occurring outside of one such as 1-2 are marked wrong

50. If a handout for sleep hygiene is provided to patients what are key elements that should be included_____?
Acceptable answers: (any combination of the below listed).
*answers such as "environment" and "bedroom" should be marked wrong because they
they don't sufficiently explain how each relates to sleep.
- Do no try to fall asleep
- But clock under bed
- Avoid naps
- Don't take problems to bed
- Avoid excessive liquids
- Do not go to bed hungry (eat regular meals)
- Get up at the same time every day seven days per week
- Only sleep as much as you need to feel refreshed

- Limit caffeine
- limit nicotine
- limit alcohol
- manage diet
- manage noise
- manage exercise
- manage room temp
- manage body temp
- improve air quality
- limit light
- improve bed comfort

51. Cognitive elements of CBT-I may include _____?
Acceptable answers:
- worrying
- beliefs about safety behaviors
- unrealistic expectations of sleep
- constructive worry
- catastrophic thinking

*Answers such as "challenging thoughts" are not sufficient because they do not accurately describe cognitive restructuring and restructuring catastrophic ideations. Such answers should be marked incorrect.
*Answers that only list common tools of CBT such as "thought records etc" should be marked incorrect unless accompanied by the aforementioned acceptable answers.

52. When explaining the rationale for sleep restriction, what if any model do you use to explain the concept to the patient?
Acceptable answers:
- circadian rhythm & homeostatic sleep drive (two process model)
    - A description of these two processes are an acceptable answer
    - (must explain both processes or the answer should be marked incorrect)
- three process (3P)
- (4P)

53. What are common patient resistances? Name three.
Acceptable answers
(not scored)

54. What recommendations do you typically make with respect to relapse prevention?:
Acceptable Answers:
(not scored)

55. Is there a component or measurement that has not been inquired about in this questionnaire that you believe is critical to the conduct of CBT-I?
Acceptable answers:
(not scored)

56. Is there anything pertaining to training and practice of behavioral sleep medicine that we didn't ask that would we should have?
Acceptable answers:
(not scored)