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Erin Koffel

*University of Iowa*

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Further Validation of the Iowa Sleep Disturbances Inventory

Erin Koffel

University of Iowa

Erin Koffel, Department of Psychology, University of Iowa.

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Correspondence should be sent to Erin Koffel, Department of Psychology, E11 Seashore Hall, University of Iowa, Iowa City, IA, 52242-1407. Electronic mail may be sent to [erin-koffel@uiowa.edu](mailto:erin-koffel@uiowa.edu).

## Abstract

This study examined the reliability and validity of an expanded version of the Iowa Sleep Disturbances Inventory (ISDI; Koffel & Watson, 2010) in 2 samples (219 college students and 200 psychiatric patients). The expanded ISDI includes the scales of Sleep Paralysis and Sleep Hallucinations. These scales, along with the Nightmares scale, help define a higher order factor entitled Unusual Sleep Experiences. This factor was distinct from the factors of Insomnia and Lassitude that were reported previously. The expanded ISDI showed strong evidence of convergent and discriminant validity with the corresponding interview ratings on a clinician rating version of the ISDI. Mean convergent correlations were .68 in students and .70 in patients. Convergent correlations were significantly higher than discriminant correlations in 99.8% of the 624 comparisons. This study also reports the associations of higher order sleep factors with questionnaire and interview measures of pathological symptoms (e.g., depression, anxiety, dissociation, and schizotypy). The Lassitude factor was specific to dysphoria, whereas the Unusual Sleep Experiences factor was specific to posttraumatic stress disorder (PTSD) and dissociation. Finally, several ISDI scales showed strong evidence of specificity in relation to pathological symptoms; in particular, there were strong associations between (a) ISDI Fatigue and measures of dysphoria, (b) ISDI Nightmares and measures of PTSD, and (c) ISDI Sleep Hallucinations and measures of dissociation.

*Keywords:* sleep, major depression, anxiety disorders, dissociation, schizotypy

### Further Validation of the Iowa Sleep Disturbances Inventory

For over 50 years, researchers have investigated the overlap between sleep disturbances and psychopathology. In this time, a significant body of research has shown that insomnia (including difficulties falling asleep, awakenings during the night, and poor sleep quality) and lassitude (including oversleeping and feelings of fatigue and sleepiness) are associated with depression and anxiety disorders (Benca, 2005; Mellman, 2006; Papadimitriou & Linkowski, 2005; Peterson & Benca, 2006; Stein & Mellman, 2005). More unusual sleep experiences (including narcolepsy symptoms and nightmares) have been linked to dissociation, schizotypy, and posttraumatic stress disorder (PTSD) (Koffel & Watson, 2009b). Watson (2001) refers to these unusual nighttime experiences as sleep-related experiences and suggests that “measures of dissociation, schizotypy and sleep-related experiences define a common domain that is characterized by unusual cognitions and perceptions” (p. 531).

Moving beyond these broad associations to determine which sleep disturbances show specificity to pathological symptoms is important for differential diagnosis. Studies examining the high rates of comorbidity among disorders (particularly the mood and anxiety disorders) have emphasized the need to focus on symptom dimensions that show greater specificity (Watson, 2009). For example, sleep dimensions that are more strongly related to a particular disorder compared to other disorders should be emphasized in the diagnostic criteria. To thoroughly investigate the specificity of sleep disturbances and pathological symptoms (e.g., depression, anxiety, dissociation and schizotypy) it is necessary to have comprehensive measures of sleep disturbances.

Although the most widely-used sleep questionnaires demonstrate good psychometric properties in terms of reliability and criterion validity (Sateia, Doghramji, Hauri, & Morin,

2000), many are limited to a narrow range of content, most commonly lassitude and insomnia. For example, the widely used Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) has seven subscales measuring subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. However, it does not provide measures of more unusual sleep experiences, such as nightmares or narcolepsy symptoms. Another widely used instrument, the Insomnia Severity Index (ISI; Morin, 1993), is also limited to difficulties sleeping at night and functioning during the day.

A second limitation of the existing sleep measures is that they were not created using structural analyses and several scales have been found to be multidimensional. For example, the PSQI and ISI combine insomnia and lassitude items into a total score; however, factor analyses with these instruments suggest that the items define multiple distinct dimensions (Bastien, Vallieres, & Morin, 2001; Cole, et al., 2006; Savard, Savard, Simard, & Ivers, 2005). A similar problem emerged when Sleep-50 items were submitted to factor analysis (Spoormaker, Verbeek, van den Bout, & Klip, 2005). The Sleep-50 consists of multiple scales measuring various sleep complaints, however, the structure that emerged in the factor analysis did not match the rationally derived scales. To address these limitations, Koffel and Watson (2010) created the Iowa Sleep Disturbances Inventory (ISDI), an instrument designed to measure self-reported sleep disturbances, particularly those disturbances that coincide with mental disorders. This instrument differs in two crucial ways from previous instruments. First, it provides an assessment of 11 specific dimensions of sleep complaints, which represents broader coverage than is provided by most instruments. Second, the ISDI scales are based on structural analyses, with each scale representing a single, underlying dimension of sleep disturbance.

## **Development and Preliminary Validation of the ISDI**

### **Development of the ISDI**

In the first phase of scale development, a large item pool of 268 items was administered to 298 undergraduate students. Items were arranged into rational homogeneous item composites (HICs) or groupings of hypothetically related items (Hogan, 1983) to ensure proper coverage of the various content areas. Items were submitted to a series of principal factor analyses and preliminary scales were created based on 9 content factors: Initial Insomnia, Anxiety at Night, Light Sleep, Fatigue, Excessive Sleep, Irregular Schedule, Movement at Night, Sensations at Night, and Nightmares. In the second phase of scale development, a revised item pool consisting of 196 items was administered to 335 undergraduate students. In these analyses, we obtained 11 interpretable factors, including the 9 dimensions that previously emerged and 2 additional dimensions of Nonrestorative Sleep and Fragmented Sleep. The final ISDI scales were based on these 11 factors. In addition, a broader Daytime Disturbances scale was created based on the close relationship between the Fatigue and Nonrestorative Sleep dimensions.

### **Preliminary Validation of the ISDI**

Koffel and Watson (2010) examined the reliability and validity of the ISDI scales in three additional scale validation samples: 374 undergraduate students, 188 psychiatric patients, and 205 sleep disorder patients. It is important to note that the structure of the ISDI replicated across these samples in both item-level and scale-level factor analyses. These analyses supported a hierarchical structure of sleep complaints, in which the specific ISDI scales defined two higher order factors of Insomnia and Lassitude. Specifically, of the 11 nonoverlapping ISDI scales, 5 loaded primarily on Insomnia at  $|.30|$  or greater in all three samples (Fragmented Sleep, Initial

Insomnia, Light Sleep, Anxiety at Night, Sensations at Night), and another 3 loaded primarily on Lassitude at 1.301 and greater in all samples (Fatigue, Excessive Sleep, and Nonrestorative Sleep). The three remaining scales (Nightmares, Movement at Night, and Irregular Schedule) tended to split across the two factors in these samples.

The ISDI showed evidence of good reliability in these scale validation samples, with coefficient alphas typically exceeding .80, average interitem correlations (AICs) within the acceptable range, and a mean short-term retest reliability of .79 over 2 weeks. The ISDI scales in these samples showed good convergent and discriminant validity with some of the most widely used sleep measures. In addition to accounting for most of the variance in the existing measures, the ISDI also appeared to measure sleep disturbances not captured by the traditional measures, including nightmares, movements at night, and sensations at night. This study also began to address the issue of the construct validity of the ISDI in these samples. Specifically, we expected the ISDI to show significant relations with the theoretically relevant variables of diagnostic group and self-reported pathological symptoms. Psychiatric patients showed consistently higher scores than other groups on the majority of ISDI scales. In addition, several ISDI scales showed specificity to measures of psychopathology, including ISDI Fatigue with dysphoria and ISDI Nightmares with the PTSD symptom of traumatic intrusions. These data suggest that some sleep dimensions are more diagnostically informative than others.

### **Expansion of the ISDI**

The ISDI scales define a two-factor structure of sleep disturbances that is robust and has been replicated in several studies (Buysse, et al., 2010; Koffel & Watson, 2009a, 2010). However, there is evidence that some sleep dimensions represented with the standard ISDI scales, including the Nightmares scale, do not fit solidly within this two-factor structure of

Insomnia and Lassitude (Koffel & Watson, 2010). Previous research has suggested the existence of an additional higher order sleep factor, consisting of narcolepsy symptoms, nightmares, and dreaming (Watson, 2001). This factor, which is referred to as Unusual Sleep Experiences in the current study, shows evidence of specificity with PTSD symptoms within the mood and anxiety disorders, and more broadly, to measures of dissociation and schizotypy (Koffel & Watson, 2009b).

One of the primary goals of this study was to expand the current ISDI to include more measures of the Unusual Sleep Experiences factor in order to continue mapping the overlap between this factor and pathological symptoms. Since the standard ISDI scales do not contain measures of narcolepsy symptoms, the current study details the addition of two narcolepsy scales: Sleep Hallucinations and Sleep Paralysis. These additional scales were developed using data from three scale validation samples—students, psychiatric patients, and sleep disorder patients—previously reported in Koffel and Watson (2010). These participants completed an expanded version of the ISDI containing items referring to narcolepsy symptoms. Although the data were gathered in the earlier study, the analyses of these items have not been reported previously. In the current study, these items were submitted to principal factor analysis to develop narcolepsy scales. The final narcolepsy scales were then validated in the student and psychiatric patient samples described in this study. Coefficient alphas and AICs were calculated to ensure that the scales had adequate reliability in samples that were independent from the scale development samples. In addition, the scales from the expanded ISDI were submitted to exploratory factor analysis to determine if an additional factor of Unusual Sleep Experiences could be extracted, in addition to the factors of Insomnia and Lassitude.



### **Further Validation of the ISDI**

Another goal of the current study was to further validate the ISDI in terms of convergent, discriminant, and construct validity. Although information on the validity of the ISDI in samples of students and patients has been reported previously (Koffel & Watson, 2010), this study extends these findings using interview data in additional samples of students and psychiatric patients. In addition, this study provides preliminary validation for the expanded ISDI. The following sections briefly review the previous validity findings, and then describe how these findings are augmented in the current study.

#### **Convergent and Discriminant Validity of the Expanded ISDI**

In the previous study, Koffel and Watson (2010) examined convergent and discriminant validity using correlations between the ISDI scales and several widely used questionnaire measures of sleep disturbances, including the Epworth Sleepiness Scale (ESS; Johns, 1991), the Women's Health Initiative Insomnia Rating Scale (WHIIRS; Levine, et al., 2003), and the PSQI. The findings were very encouraging and suggested that the ISDI accounted for much of the variance in these existing measures. However, these findings were based on questionnaire data and a thorough evaluation of convergent and discriminant validity requires more than one method (Campbell & Fiske, 1959), such as questionnaire and interview.

These analyses are explicated in the current study by examining the correlation between questionnaire and interview measures of the expanded ISDI in students and psychiatric patients. Since there is no existing sleep interview that measures all of the dimensions included on the expanded ISDI, the ISDI Clinician Rating Scale (ISDI-CR) was created. The ISDI-CR includes ratings for the 11 nonoverlapping standard ISDI scales and the two additional narcolepsy scales included in this study (i.e., Sleep Hallucinations and Sleep Paralysis). A multitrait-multimethod

matrix consisting of ISDI and ISDI-CR ratings was created to assess convergent and discriminant validity (Campbell & Fiske, 1959). Convergent validity was examined by calculating the correlations between the ISDI scales and corresponding ISDI-CR rating scales. Discriminant validity was examined by comparing the convergent correlations to the other correlations within the same row and column of the heteromethod block (Campbell & Fiske, 1959).

### **Construct Validity of the Expanded ISDI**

As mentioned earlier, Koffel and Watson (2010) examined the construct validity of the standard ISDI scales in psychiatric patients by correlating them with the Inventory of Depression and Anxiety Symptoms (IDAS; Watson, et al., 2007). Several ISDI scales showed evidence of specificity with pathological symptoms, including Nightmares with traumatic intrusions and Fatigue with dysphoria. These analyses are extended in the current study by correlating (a) higher order sleep factors obtained after submitting ISDI scales to factor analysis and (b) individual ISDI scales with questionnaire and interview measures of pathological symptoms. These analyses were conducted using the psychiatric patient sample from the current study and included symptoms of depression, panic, social anxiety, PTSD, dissociation and schizotypy. These are all disorders which have shown robust associations with sleep disturbances in the literature and should have significant relations with the ISDI scales. Moreover, these analyses allow an examination of specificity of sleep and psychopathology; that is, whether certain sleep disturbances are hallmarks of certain disorders.

### **Hypotheses for the Current Study**

Based on the earlier study by Koffel and Watson (2010), it was expected that the expanded ISDI would have strong convergent correlations with the corresponding ISDI-CR

ratings and would show significantly higher convergent correlations compared to the other correlations within the same row and column of the heteromethod block (i.e., evidence of discriminant validity). The hypotheses regarding the construct validity of the ISDI were two-fold. First, it was hypothesized that the ISDI scales would define a three factor structure of Lassitude, Insomnia, and Unusual Sleep Experiences, given the evidence for the existence of each of these higher order factors (Koffel & Watson, 2009a, 2009b). Based on previous research, the Lassitude factor would be specific to dysphoria compared to other symptom dimensions, whereas the Insomnia factor would show weaker, non-specific relations with most symptom dimensions (Koffel & Watson, 2009a, 2010). It was also hypothesized that the Unusual Sleep Experiences factor would show specificity to symptoms of dissociation, schizotypy, and PTSD (Koffel & Watson, 2009b; Watson, 2001).

The second set of hypotheses is in regard to the individual ISDI scales. It was hypothesized that the ISDI Fatigue scale would be specific to dysphoria, whereas the ISDI Initial Insomnia scale would be nonspecific (Koffel & Watson, 2010). It was also hypothesized that the ISDI Nightmares scale would show specificity to the PTSD symptom of traumatic intrusions and to symptoms of dissociation and schizotypy (Koffel & Watson, 2009b, 2010). Since there is less research regarding the specificity of narcolepsy symptoms with psychopathology, specific hypotheses regarding these sleep experiences were not made.

## **Methods**

### **Participants**

**Student sample.** This sample consisted of 219 college students enrolled in an introductory psychology course. The student sample included 161 women and 58 men. Age

ranged from 18 to 30 and the mean age was 19. The sample included 201 Whites (91.8%), 11 Asian Americans (5.0%), 4 African Americans (1.8%), and 3 multiracial participants (1.4%).

**Psychiatric patient sample.** This sample consisted of 200 outpatient psychiatric patients recruited in a variety of ways, including fliers and e-mails. The primary locations of recruitment were the Community Mental Health Center of Mideastern Iowa, the Adult Psychiatry Clinic at the University of Iowa Hospitals and Clinics, and the University of Iowa campus. The inclusion criteria were that they were 18 or older, currently receiving treatment for mental health or substance abuse issues and sufficiently fluent in English to give consent. The patient sample consisted of 150 women and 50 men. Age ranged from 18 to 67 and the mean age was 36 years. The sample included 178 Whites (89.0%), 8 multiracial participants (4.0%), 8 African Americans (4.0%), 5 Asian Americans (2.5%), and 1 American Indian/Alaska Native (.5%).

### **Procedure**

Students and psychiatric patients were assessed in small group sessions in a lab space, during which they completed a questionnaire packet and an hour long clinical interview in a separate office. Each session lasted approximately 2 hours. The interviews were taped with permission for interrater reliability. Students were recruited from September to November 2009 and received research credit upon completion of the study. The student sessions took place during the beginning of the term to avoid the potential influence of final exams on sleep. Psychiatric patients were recruited from November 2009 to December 2009 and were paid \$40 at the completion of the study.

### **Self-Report Measures**

**ISDI.** Participants completed the ISDI (Koffel & Watson, 2010). The ISDI is a true/false measure with 11 scales representing specific sleep dimensions, including Nightmares,

Initial Insomnia, Fragmented Sleep, Anxiety at Night, Light Sleep, Movement at Night, Sensations at Night, Excessive Sleep, Irregular Schedule, Nonrestorative Sleep, and Fatigue and one broad scale of Daytime Disturbances. Participants also completed items referring to narcolepsy symptoms in order to develop and validate additional ISDI scales; this process will be described in greater detail later. The coefficient alphas for the standard ISDI scales were all were above .78 in the student sample and .79 in the patient sample.

**IDAS.** Psychiatric patients completed the IDAS, a multi-dimensional measure of depression and anxiety that contains 10 specific symptom scales and 2 broad scales of General Depression and Dysphoria (Watson, et al., 2007). The Dysphoria scale contains items that assess the core emotional and cognitive symptoms of depression, including depressed mood, anhedonia, worry, worthlessness, guilt, psychomotor problems, cognitive problems, and hopelessness. The specific IDAS scales were created using structural analyses and represent distinct symptom dimensions of depression and anxiety. Participants choose a response that reflects the way they have been feeling during the past two weeks. Responses are rated on a five point scale, ranging from 1 (*not at all*) to 5 (*extremely*). The Dysphoria scale was used as a general measure of depression in this study because it does not contain items asking about sleep problems or fatigue. Similarly, the score on the Traumatic Intrusions scale was calculated after removing an item related to nightmares to avoid inflating the correlation between the pathological symptoms and nighttime symptom scales. The coefficient alphas for the IDAS scales were .72 or above in the patient sample.

**PTSD Checklist-Civilian Version (PCL-C).** To obtain a measure of PTSD, patients completed the PCL-C (Weathers, Litz, Herman, Huska, & Keane, 1993). This instrument measures the 17 symptoms included in the diagnostic criteria for PTSD. Participants are asked

to choose a response from a 5-point scale (ranging from *not at all* to *extremely*) that best describes how much they have been bothered by each symptom in the past month. Although this instrument provides an overall score, it can be analyzed based on the underlying symptom dimensions of Dysphoria, Hyperarousal, Intrusions, and Avoidance (Simms, Watson, & Doebbeling, 2002). In this study, the scores for Intrusions and Dysphoria were calculated after removing items related to nightmares and insomnia. The total score had a coefficient alpha of .89 in patients. The dimensional scores had coefficient alphas of .78 and above, with the exception of Hyperarousal, which had a coefficient alpha of .69. The smaller coefficient alpha for Hyperarousal is most likely due to the small number of items in this scale (i.e., 2 items).

**Dissociative Processes Scale (DPS).** The patients completed the DPS (Harrison & Watson, 1992), a 33-item questionnaire designed to measure dissociative tendencies in non-clinical samples. Respondents rate each statement on a 5-point scale (1 = *strongly disagree* to 5 = *strongly agree*). Three factor-analytically derived subscales measure Obliviousness, Detachment and Imagination. In patients, the DPS total score had a coefficient alpha of .93 and the subscales had coefficient alphas of .82 or above.

**Schizotypal Personality Questionnaire (SPQ).** To obtain a measure of schizotypy, patients completed the SPQ (Raine, 1991), a 74-item true/false questionnaire that was constructed around the *Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R)* (American Psychiatric Association, 1987) criteria for schizotypal personality disorder. The questionnaire has nine subscales, one for each of the diagnostic criteria of schizotypal personality disorder. However, it can also be scored based on five underlying symptom dimensions, including Unusual Beliefs/Experiences, Mistrust, Social Anhedonia, Social Anxiety, and

Eccentricity/Oddity (Chmielewski & Watson, 2008). The subscales had coefficient alphas of .67 or higher in patients. The dimensional scores had coefficient alphas of .76 or higher in patients.

### **Interview Measures**

**ISDI-CR.** Both students and patients completed the ISDI-CR. The ISDI-CR is an interview consisting of a series of items that represent the 11 nonoverlapping ISDI scales, plus additional items asking about sleep paralysis and sleep hallucinations. The ratings are made on a 3-point scale (*absent, subthreshold, present*). Interviewers begin by asking a standard question for each symptom and continue asking standard follow-up questions until they feel that they can make an accurate rating. In addition, interviewers can ask non-standard follow-up questions to reach a rating. For example, the symptom of nightmares is assessed by the initial question “Do you have frequent nightmares?” and can be followed by the questions “Do you have recurring bad dreams?” or “Do nightmares make it hard to fall asleep?” In addition, the interviewers determined if the sleep-related symptoms were (a) noticeable to others or (b) affected functioning (i.e., day to day activity and behavior) and ensured that they did not occur solely under the influence of drugs or alcohol.

The interviews were audiotaped to assess interrater reliability. A total of 51 student (23% of the sample) and 50 patient interviews (25% of the sample) were randomly selected and scored by a second interviewer. In the student sample, the sleep dimensions had intraclass correlations ranging from .67 (Nightmares) to .92 (Light Sleep), with a median value of .81 and a mean value of .82. In the patient sample, the sleep dimensions had intraclass correlations ranging from .60 (Excessive Sleep) to .92 (Light Sleep), with a median value .87 of and a mean value of .86. Intraclass correlations in this range indicate good to excellent interrater reliability (Cicchetti, 1994).

**Clinician Rating version of the IDAS (IDAS-CR).** Patients were also interviewed using the IDAS-CR (Watson, et al., 2008). The IDAS-CR consists of a series of ratings representing each of the 10 standard IDAS scales, although in this study the ratings for Insomnia and Lassitude were omitted since these sleep disturbances were measured in the ISDI-CR interview. A rating is also made for the broader Dysphoria scale. Ratings are made on a 3-point scale (*absent, subthreshold, present*) and are based on a standard initial probe question and follow up questions for each symptom. In addition, clinicians can ask additional (e.g., non-standard) questions before making their final rating. Interviewers also determine if the symptoms have been present more days than not in the last two weeks and whether they have been (a) noticeable to others or (b) affected functioning (i.e., day to day activity and behavior).

The interviews were audiotaped to assess interrater reliability. A total of 50 patient interviews (25% of the sample) were randomly selected and scored by a second interviewer. The symptom dimensions had intraclass correlations ranging from .83 (Well-Being) to .96 (Traumatic Intrusions), with a median value .88 of and a mean value of .90. Intraclass correlations in this range indicate excellent interrater reliability (Cicchetti, 1994).

**Personality, Cognitions, Consciousness, and Perceptions Interview (PCCP).** Patients were also interviewed using the PCCP, which includes items referring to the symptom dimensions of dissociation (Obliviousness/Amnesia, Depersonalization/Derealization, Imagination/Absorption) and schizotypy (Social Anhedonia, Supernatural Beliefs of Magical Ideation, Paranoia, Hallucinations, Eccentricity/Oddity) (Chmielewski & Watson, 2007, October). As in the other interviews, ratings are made on a 3-point scale (*absent, subthreshold, present*) based on a standard initial probe question, as well as several standard follow up questions, for each symptom. In addition, the interviewers determined if the symptoms were (a)



noticeable to others or (b) affected functioning (i.e., day to day activity and behavior) and ensured that they did not occur solely under the influence of drugs or alcohol. With some symptom dimensions, the interviewer also ensured that they did not occur in the context of sleep (e.g., hallucinations).

The interviews were audiotaped to assess interrater reliability. A total of 50 patient interviews (25% of the sample) were randomly selected and scored by a second interviewer. The symptom dimensions had intraclass correlations ranging from .61 (Eccentricity/Oddity) to .88 (Obliviousness/Amnesia), with a median value of .82 and a mean value of .80. Intraclass correlations in this range indicate good to excellent interrater reliability (Cicchetti, 1994). Three psychiatric patients were missing interview data on the IDAS-CR and PCCP, and thus the analyses in the following sections that include these interviews are restricted to the 197 participants that had complete data

## Results

### Expansion of the ISDI

As mentioned previously, the new ISDI scales were developed using three separate samples from a previously published dataset: (a) 374 college students enrolled in an introductory psychology course, (b) 188 psychiatric patients recruited from local mental health centers, and (c) 205 patients who had been diagnosed with sleep disorders at the University of Iowa Hospitals and Clinics (Koffel & Watson, 2010). Along with the standard ISDI, these participants completed items referring to narcolepsy symptoms; although the data were gathered during an earlier study, analyses with the narcolepsy items have not been reported previously. The additional narcolepsy items were selected based on an extensive literature review of previous sleep questionnaires, a review of the sleep disturbances listed in the *Diagnostic and Statistical*

*Manual of Mental Disorders* (American Psychiatric Association, 2000) and the *International Classification of Sleep Disorders* (ICSD-2; American Academy of Sleep Medicine, 2005), and a sleep item bank from the University of Pittsburgh containing nearly 3,000 items (Buysse, et al., 2010). The response format was identical to the other ISDI items.

Items originally were arranged into rational HICs in order to ensure proper coverage of each narcolepsy symptom (Sleep Paralysis HIC with 7 items, Cataplexy HIC with 5 items, and a Sleep Hallucinations HIC with 5 items). All items were submitted to principal factor analysis in each of the samples in order to select items for the scales. The prior communality estimates were calculated using squared multiple correlations (SMCs). All factors were rotated using both varimax (which constrains the factors to be orthogonal) and promax (which allows the factors to be correlated). The varimax rotation was used to identify problematic items that “split” between two or more factors. The goal in these analyses was to extract the greatest number of factors that were interpretable and distinct from one another and to create scales based on these factors. When selecting items for the scales, several guidelines were followed to ensure that the items would be maximally informative and distinct: (1) items that loaded too strongly on a factor (i.e., .90 or above) were considered redundant and removed; (2) items that loaded below .40 were considered weak markers of a dimension and were removed; (3) items that loaded strongly onto more than one factor were considered a threat to the discriminant validity of the scales and were removed. Three interpretable factors were extracted in each sample, and three scales were created based on these analyses: a 5-item measure of Cataplexy (e.g., “I sometimes feel weak when I laugh”), a 4-item measure of Sleep Paralysis (e.g., “I sometimes find that I can’t move my body when I wake up), and a 5-item measure of Sleep Hallucinations (e.g., “I sometimes see or hear things that are not real when falling asleep or waking up”).

Next coefficient alphas and AICs were calculated for these scales in the three scale development samples from the previously published dataset, as well as in the two scale validation samples from the current study (i.e., students and psychiatric patients). The Cataplexy scale had unacceptably low internal consistencies in several samples, including the students and patients in the current study (.55 and .66, respectively). As a result, this scale was dropped from further consideration. Table 1 reports the reliabilities of the remaining two narcolepsy scales of Sleep Hallucinations and Sleep Paralysis. Both scales show evidence of good internal consistency, with coefficient alphas of mostly .70 and above. Sleep Hallucinations had a coefficient alpha of .68 in two of the samples, however, the mean coefficient alpha for this scale was .71. AICs provide a measure of internal consistency that is not affected by the number of items in a scale. AICs should fall in the range of .15 (broad constructs) to .50 (narrow constructs) (Clark & Watson, 1995). The new ISDI scales have AICs that tend to fall within the upper limits of this range, suggesting that these scales are measuring relatively narrow and specific dimensions of sleep disturbances.

To determine the structure of the expanded ISDI in the students and psychiatric patients from the current study, the ISDI scales were submitted to principal factor analysis with both promax and varimax rotations. This study reports on the promax rotations in the following analyses in order to examine the correlations among the factors. It was hypothesized that the ISDI would define three higher order factors representing Lassitude, Insomnia, and Unusual Sleep Experiences. These analyses initially revealed the presence of a large and relatively broad factor of sleep complaints, which was defined by the majority of scales (11 out of the 13 scales loaded on this factor at .30 or above in students and 9 out of the 13 scales loaded on this factor at

.30 or above in patients) and accounted for 70% of the common variance in students and 57% of the common variance in patients.

In the next step, two factors were extracted representing Lassitude/Unusual Sleep Experiences and Insomnia. In students, these two factors jointly accounted for 95% of the common variance and were only moderately correlated at .42. In patients, these two factors accounted for 86% of the common variance and were weakly correlated at .26.

When three factors were extracted, they represented Insomnia, Lassitude, and Unusual Sleep Experiences in both samples. These three factors accounted for 100% of the common variance in students and patients. Table 2 presents the correlations among these three factors in students and patients. Correlations ranged from .31 to .41 in students and .14 to .30 in patients, suggesting that they are distinct dimensions of sleep disturbances. It was impossible to extract a fourth factor in students. In patients, the fourth factor was defined by the Movement and Sensations at Night Scales, suggesting a factor defined by the symptoms of restless legs syndrome. However, since this factor did not replicate across samples, the three factor solution is reported in this study.

Table 2 reports the factor loadings from the three-factor solution in the students and patients. It is important to note that the three factor structure is clear and well-defined, with very few cross-loadings. Specifically, 4 scales loaded primarily on Insomnia at  $|\lambda| \geq .30$  in both samples (Initial Insomnia, Anxiety at Night, Fragmented Sleep, and Light Sleep), 3 scales loaded primarily on Lassitude at  $|\lambda| \geq .30$  and greater in both samples (Fatigue, Nonrestorative Sleep, and Irregular Schedule), and 3 scales loaded primarily on Unusual Sleep Experiences at  $|\lambda| \geq .30$  and greater in both samples (Sleep Hallucinations, Sleep Paralysis, and Nightmares). The three remaining scales (Excessive Sleep, Sensations at Night, and Movement at Night) tended to split

across the three factors or had weak loadings on all three factors. The Insomnia factor represents problems sleeping at night, whereas the Lassitude factor represents a combination of oversleeping and feelings of fatigue/sleepiness. The Unusual Sleep Experiences factor represents nightmares and symptoms of narcolepsy.

Comparability coefficients were computed to examine the degree of similarity for the regression-based factor scores in the student and psychiatric patient samples (Everett & Entrekin, 1980). A set of regression-based factor scoring weights were generated for the three-factor, promax-rotated solution in each sample. The scoring weights from each sample were then applied to the scale scores for the student sample and the psychiatric patient sample, which resulted in a total of 6 factor scores per sample (3 representing the student factors and 3 representing the patient factors). The two solutions then were compared in each sample. If the solutions are similar (e.g., Insomnia weights from the student data vs. the parallel weights from the psychiatric patient data), then the corresponding weights for each factor will produce highly correlated scores. The six correlations ranged from .95 to .98, which exceeds the benchmark of .90 (Everett, 1983). These values establish that the factor structure replicated quite well across these samples.

### **Further Validation of the ISDI: Convergent and Discriminant Validity**

**Student sample.** A multitrait-multimethod matrix consisting of ISDI and ISDI-CR ratings was created to assess convergent and discriminant validity (Campbell & Fiske, 1959). Table 3 presents the heteromethod block of these correlations in the student sample from the current study. It was predicted that the ISDI and ISDI-CR would show strong convergent correlations and that these correlations would be significantly higher than the other correlations with the same row and column of the block. In terms of convergent validity, the questionnaire

and interview measures of sleep dimensions were very strongly related, with correlations ranging from .58 (Anxiety at Night) to .78 (Irregular Schedule). After transforming the correlations to Fisher's  $z$  to correct for non-normal distribution (Fisher, 1921), the mean convergent correlation was .68.

When discussing the discriminant validity, it is important to note that measures of various sleep symptoms are not expected to be completely unrelated. In particular, it would be expected that sleep dimensions that cohere together to form higher order factors would have moderate correlations. However, it is expected that measures of the same construct (e.g., ISDI Light Sleep and ISDI-CR Light Sleep) will be more highly correlated than measures of different constructs (e.g., ISDI Light Sleep and ISDI-CR Sleep Hallucinations). To establish discriminant validity, the convergent correlations should be higher than the other correlations within the same row and column of the block (Campbell & Fiske, 1959). Although an examination of Table 3 shows that this is the case, the discriminant validity was tested more formally by comparing the convergent correlations with the 24 discriminant correlations for each scale (a total of 312 comparisons overall), using the Williams modification of the Hotelling test for dependent correlations (Kenny, 1987). All of these comparisons were significant at the  $p < .05$  level, one-tailed.

**Patient sample.** The same analyses were conducted using the patient data from the current study. Table 4 presents the heteromethod block of these correlations in the patient sample. Convergent correlations ranged from .54 (Sleep Hallucinations) to .79 (Light Sleep). The mean convergent correlation was .70. To examine the discriminant validity, the convergent correlations were compared once again with the 24 discriminant correlations for each scale. Of the 312 comparisons, 311 were significant at the  $p < .05$  level, one-tailed. At this significance level, the convergent correlation for Anxiety at Night was not significantly higher than the

discriminant correlation for the ISDI-CR Anxiety at Night and the ISDI Initial Insomnia scale ( $z = 1.5$ ).

**Summary.** These analyses clearly demonstrate strong convergent and discriminant validity of the ISDI and ISDI-CR in the student and patient data. Of the 624 comparisons of the convergent and discriminant correlations, 623 were significant (99.8%). These results are particularly impressive given that two different methods were utilized in the data collection, with the questionnaire data based on scale scores and the interview data based on single ratings. The data suggest that the expanded ISDI measures 13 distinct sleep dimensions that can be distinguished from one another across different methods (i.e., questionnaire and interview).

#### **Further Validation of the ISDI: Construct Validity**

**Higher order sleep factors.** Next the relation between the three higher order sleep factors (i.e., Insomnia, Lassitude, and Unusual Sleep Experiences) and pathological symptom dimensions in patients from the current study was examined. Regression-based factor scores obtained from the three factor solution (with promax rotation) were used to calculate correlations with questionnaire and interview measures of depression, anxiety, dissociation, and schizotypy. Table 5 lists the correlations between the sleep factors and questionnaire measures, whereas Table 6 lists the correlations between the sleep factors and interview measures. In general, the correlations (and evidence of specificity) were smaller in the interview data compared to the questionnaire data, however, the general patterns of correlations replicate well.

As hypothesized, Lassitude showed the highest correlations with measures of dysphoria compared to other symptom dimensions. To further quantify this specificity, the correlations of Lassitude and dysphoria (IDAS Dysphoria, PCLC Dysphoria, and IDAS-CR Dysphoria) were compared to the correlations of Lassitude and the other pathological symptom dimensions using

the Williams modification of the Hotelling test for dependent correlations (Kenny, 1987).

Overall, Lassitude demonstrated clear evidence of specificity to dysphoria across methods. In 49 out of 54 significance tests (90.7%), Lassitude had significantly larger correlations with dysphoria than other pathological symptom dimensions at  $p < .05$ , one-tailed. This provides evidence that Lassitude is a hallmark of dysphoria and a diagnostically informative symptom in the context of depression.

Compared to Lassitude, Insomnia showed smaller, more non-specific relations with the pathological symptom dimensions, which was predicted. The highest correlation in the questionnaire data was with IDAS Appetite Loss ( $r = .32$ ), which was significantly larger than the other coefficients in 13 out of 20 comparisons at  $p < .05$ , one-tailed. The highest correlation in the interview data was with IDAS-CR Well-Being ( $r = -.21$ ). This correlation was significantly larger than 9 of the 16 coefficients for the other symptom dimensions. Insomnia does not show the same specificity as Lassitude and the pathological symptom to which it is most highly correlated varies across methods; the data suggest that Insomnia is a relatively non-informative symptom in the context of these psychological disorders.

The Unusual Sleep Experiences factor showed more complex relations with pathological symptom dimensions. It has been hypothesized that unusual sleep experiences, schizotypy, and dissociation form a common domain (see Koffel & Watson, 2009b). As such, it was expected that the Unusual Sleep Experiences factor would show specificity to dissociation and schizotypy. It was also hypothesized that the Unusual Sleep Experiences factor would show specificity to PTSD. An examination of Table 5 and 6 shows that these predictions were mainly supported. Unusual Sleep Experiences had the highest correlations with PTSD symptoms (particularly traumatic intrusions) and with symptoms of dissociation. It had moderate correlations with some



facets of schizotypy and panic, although these findings did not replicate across methods. In 31 out of 54 significance tests (57.4%), Unusual Sleep Experiences had a larger correlation with traumatic intrusions—including IDAS Traumatic Intrusions, PCLC Intrusions, and IDAS-CR Intrusions—compared to other pathological symptom dimensions. It had larger correlations with obliviousness/amnesia in 18 of 36 comparisons (50.0%), with imagination/absorption in 14 of 36 comparisons (38.8%), and with depersonalization/derealization in 13 of 36 comparisons (36.1%). Unlike the predictions, Unusual Sleep Experiences did not show evidence of specificity with schizotypy. Overall, there is evidence that Unusual Sleep Experiences, PTSD and, to some extent, dissociation form a common domain. Unusual Sleep Experiences appears to be diagnostically informative in the context of PTSD and dissociation.

**ISDI scales.** When examining the ISDI scales in relation to pathological symptom dimensions in the patient sample, it was found that the Fatigue, Nightmares, and Sleep Hallucinations scales tended to have higher correlations with pathological symptoms (i.e., above .30) and showed more evidence of specificity than the other ISDI scales. Tables 7 and 8 show the relation of these three ISDI scales with pathological symptom dimensions as measured by questionnaires and interviews, respectively. The Fatigue scale showed the highest correlations with measures of dysphoria, as was hypothesized. To further quantify this specificity, the Williams modification of the Hotelling test for dependent correlations (Kenny, 1987) was used. Fatigue showed specificity to dysphoria—including IDAS Dysphoria, PCLC Dysphoria, and IDAS-CR Dysphoria—compared to other symptom dimensions in 53 of 54 comparisons (98.1%) at  $p < .05$ , one-tailed. These analyses suggest that the specificity of the Lassitude factor with dysphoria is mainly driven by measures of fatigue, whereas other dimensions of Lassitude, such as excessive sleep and irregular schedule, are more nonspecific sleep complaints.

The Nightmares scale had the highest correlations with the PTSD symptoms of intrusions and avoidance, as was hypothesized. In particular, the Nightmares scale was specific to traumatic intrusions—including IDAS Traumatic Intrusions, PCLC Intrusions, and IDAS-CR Traumatic Intrusions—in 45 of 54 comparisons (83.3%). The predictions that Nightmares would also show specificity to dissociation and schizotypy were not consistently supported by the data.

No specific hypotheses were made regarding the relations of the ISDI narcolepsy scales with pathological symptoms, however, the Sleep Hallucinations scale showed specificity to dissociation. In particular, the Sleep Hallucinations scale was specific to the depersonalization/derealization dimension in 28 of 36 comparisons (77.8%). Once again, these analyses suggest that the nightmares and sleep hallucinations facets of the Unusual Sleep Experiences factor are more informative than other sleep dimensions within this factor. The remaining scales within Unusual Sleep Experiences had smaller relations to pathological symptoms and are unlikely to be as informative in a diagnostic context.

## **Discussion**

### **Expansion of the ISDI**

One of the goals of this study was to expand the ISDI in order to improve the measurement of the Unusual Sleep Experiences factor. Two new scales were added to the ISDI: Sleep Hallucinations and Sleep Paralysis. The additional ISDI scales were created using three large samples of students, psychiatric patients, and sleep disorder patients from a previous study (Koffel & Watson, 2010). These scales were then validated in two independent samples of students and psychiatric patients from the current study. The expanded ISDI showed good internal reliability in the scale validation samples, with coefficient alphas of the standard scales at .78 or above and coefficient alphas of the additional ISDI scales at .70 and above.

After submitting the expanded ISDI scales to separate factor analyses in the student and psychiatric patient samples from the current study, a robust three factor structure consisting of Insomnia, Lassitude, and Unusual Sleep Experiences was found. Insomnia included measures of long sleep latency and nighttime awakenings. Lassitude was represented by measures of fatigue, sleepiness, excessive sleep and irregular sleep-wake schedules. Unusual Sleep Experiences was represented by measures of nightmares and narcolepsy symptoms. The structure was clear and well-defined in both samples, with very few cross-loadings. In addition, the factor loadings were similar in both students and psychiatric patients, with comparability coefficients well above the benchmark of .90. The three factor structure clearly replicated well across samples and supports previous findings that psychiatric patients and students do not have qualitatively different sleep (Koffel & Watson, 2009a, 2010).

#### **Further Validation of the ISDI: Convergent and Discriminant Validity**

The expanded ISDI showed strong evidence of convergent and discriminant validity with the corresponding interview ratings on the ISDI-CR in the sample of students and psychiatric patients from the current study. In terms of convergent validity, the correlations ranged from .54 to .79. The mean convergent correlation was .68 in students and .70 in patients. The ISDI scales also demonstrated good discriminant validity in this study. Of the 624 comparisons of the convergent and discriminant correlations, 623 were significant (99.8%). These analyses provide strong evidence that the expanded ISDI measures 13 distinct sleep dimensions that can be distinguished from one another across different methods.

#### **Further Validation of the ISDI: Construct Validity**

One of the goals of this study was to examine the construct validity of the expanded ISDI in psychiatric patients from the current study by correlating (a) higher order sleep factors and (b)

individual ISDI scales with questionnaire and interview measures of pathological symptoms. These analyses helped determine which sleep disturbances show specificity to pathological symptom dimensions, which has important diagnostic implications. Identifying and focusing on symptoms that show specificity will lead to improvements in differential diagnosis and reduce the comorbidity among disorders (Watson, 2009).

Although a variety of sleep disturbances have been linked to psychopathology both in the research literature and in diagnostic criteria, the current study suggests that many of these relations are relatively weak and nonspecific. For example, the Insomnia factor and corresponding facets did not show strong, consistent evidence of specificity with any pathological symptoms. This is particularly concerning since insomnia is part of the diagnostic criteria of several disorders, including depression, PTSD, and GAD. Despite its inclusion in the diagnostic criteria of these disorders, insomnia is not more strongly related to symptoms of anxiety or depression compared to other pathological symptoms.

The Lassitude and Unusual Sleep Experiences factors did show specificity to pathological symptoms, suggesting that these sleep experiences are diagnostically informative, particularly in the context of depression, PTSD, and dissociation. The most robust evidence of specificity was the relation of the Lassitude factor with dysphoria; Lassitude had a significantly stronger correlation with dysphoria than other pathological symptom dimensions in 90.7% of the comparisons. In addition, Unusual Sleep Experiences was specific to symptoms of PTSD (in particular traumatic intrusions) and dissociation.

Despite this evidence of specificity, most of the scales that make up the Lassitude and Unusual Sleep Experiences factors were relatively nonspecific. Within the Lassitude factor, only fatigue shows consistent evidence of specificity with dysphoria. Within the Unusual Sleep

Experiences factor, only nightmares and sleep hallucinations show specificity with PTSD and dissociation, respectively. These analyses support the inclusion of fatigue in the diagnostic criteria for depression and the inclusion of nightmares in the criteria for PTSD. In addition, they suggest that sleep hallucinations are specific to dissociation and may be an informative symptom in the context of dissociative disorders.

The findings from this study also have important assessment implications. Namely, the analyses suggest that sleep instruments need to 1) provide separate scores for the various dimensions of sleep disturbances and 2) include a broader range of sleep phenomena. For example, this study has demonstrated that lower order facets show varying degrees of specificity (e.g., the fatigue facet of Lassitude is more informative in the context of depression than the irregular schedule facet). Unfortunately, many sleep instruments do not model these lower order facets, which may result in a loss of information. Finally, many existing sleep instruments do not provide scores for more unusual sleep phenomena, including symptoms of narcolepsy and nightmares. However, these sleep experiences (in particular, nightmares and sleep hallucinations) show impressive specificity with pathological symptoms.

### **Limitations and Future Directions**

**Need for replication.** This study was based on predominately female samples of students and psychiatric patients. It will be important to examine the structure and specificity of sleep complaints in additional populations of males and females with sleep disturbances, including older adults, sleep disorder patients and medical patients. The two factor structure of Insomnia and Lassitude has shown to be quite robust across populations, including younger and older adults, psychiatric patients and sleep disorder patients (Koffel & Watson, 2009a, 2010).

However, the three factor structure presented in this paper is preliminary and will need to be replicated in additional samples.

**Additional higher order sleep factors.** Future research will need to determine if additional factors beyond Insomnia, Lassitude, and Unusual Sleep Experiences can be identified. In particular, it appears that measures of restless legs syndrome (e.g., movements and sensations at night) tend to cohere together when a fourth factor is extracted in psychiatric patients. However, this fourth factor was unstable and under-defined in the current study. Including additional measures of restless legs syndrome will be necessary to determine the nature of this fourth factor and its relations to pathological symptoms.

**Additional measures of psychopathology.** The current study was primarily limited to measures of internalizing disorders and dissociation/schizotypy. It will be necessary to expand this work to examine the specificity of sleep disturbances with externalizing symptoms (e.g., drug and alcohol use, antisocial personality disorder). In addition, it will be important to continue examining these relations at a symptom-level; as is clearly demonstrated in this study, symptoms within the same disorder can show differential relations with sleep complaints.

**Incremental validity.** Finally, it will be important to demonstrate the incremental validity of the ISDI scales compared to other widely used measures of sleep disturbances. For example, it will be necessary to demonstrate that the ISDI predicts variance in psychological symptom scores above and beyond other measures of sleep disturbance. Previous research has shown that several of the ISDI scales capture dimensions of sleep disturbances that are not measured with existing instruments. Some of these sleep disturbances are also strongly related to pathological symptoms (e.g., nightmares), which would suggest that the ISDI scales would have incremental validity.

Overall, the data presented in this study demonstrate that the expanded ISDI reliably assesses 13 distinct sleep dimensions in students and psychiatric patients. In addition to its clinical utility, the process of creating and validating of the ISDI has led to greater clarity regarding the symptom structure of sleep complaints, the hierarchical organization of these sleep complaints, and the relation of sleep complaints with psychopathology. Sleep disturbances are prominent in psychopathology and the current study suggests that several sleep complaints show impressive specificity with pathological symptoms. At the same time, many sleep disturbances are less informative in the context of psychological disorders, despite their inclusion in diagnostic criteria and their emphasis in the research literature. It is my hope that the current study helps to highlight the importance of identifying sleep symptoms that show evidence of specificity. Focusing on these symptoms will ultimately improve differential diagnosis, assessment, and treatment of psychopathology.

## References

- American Academy of Sleep Medicine. (2005). *The international classification of sleep disorders: Diagnostic and coding manual* (2nd ed.). Westchester, IL: Author.
- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd rev. ed.). Washington, DC: Author.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (text revision ed.). Washington, DC: Author.
- Bastien, C. H., Vallieres, A., & Morin, C. M. (2001). Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Medicine, 2*, 297-307.
- Benca, R. M. (2005). Mood disorders. In M. H. Kryger, T. Roth & W. C. Dement (Eds.), *Principles and practice of sleep medicine* (4th ed., pp. 1311-1325). Philadelphia, PA: Saunders.
- Buysse, D. J., Reynolds, C. F., 3rd, Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*, 193-213.
- Buysse, D. J., Yu, L., Moul, D. E., Germain, A., Stover, A., Dodds, N. E., et al. (2010). Development and validation of patient-reported outcome measures for sleep disturbance and sleep-related impairments. *Sleep, 33*, 781-792.
- Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56*, 81-105.
- Chmielewski, M., & Watson, D. (2007, October). *Oddity: The third higher order factor of psychopathology*. Poster session presented at the annual meeting of the Society for Research in Psychopathology, Iowa City, IA.
- Chmielewski, M., & Watson, D. (2008). The heterogeneous structure of schizotypal personality disorder: Item-level factors of the Schizotypal Personality Questionnaire and their



- associations with obsessive-compulsive disorder symptoms, dissociative tendencies, and normal personality. *Journal of Abnormal Psychology, 117*, 364-376.
- Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological Assessment, 6*, 284-290.
- Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment, 7*, 309-319.
- Cole, J. C., Motivala, S. J., Buysse, D. J., Oxman, M. N., Levin, M. J., & Irwin, M. R. (2006). Validation of a 3-factor scoring model for the Pittsburgh Sleep Quality Index in older adults. *Sleep, 29*, 112-116.
- Everett, J. E. (1983). Factor comparability as a means of determining the number of factors and their rotation. *Multivariate Behavioral Research, 18*, 197-218.
- Everett, J. E., & Entekin, L. V. (1980). Factor comparability and the advantages of multiple group factor analysis. *Multivariate Behavioral Research, 2*, 165-180.
- Fisher, R. A. (1921). On the probable error of a coefficient of correlation deduced from a small sample. *Metron, 1*, 3-32.
- Harrison, J. A., & Watson, D. (1992). *The Dissociative Processes Scale*. Unpublished manuscript. University of Iowa, Iowa City.
- Hogan, R. T. (1983). A socioanalytic theory of personality. In M. Page (Ed.), *1982 Nebraska Symposium on Motivation* (pp. 55-89). Lincoln: University of Nebraska Press.
- Johns, M. W. (1991). A new method for measuring daytime sleepiness: The Epworth Sleepiness Scale. *Sleep, 14*, 540-545.
- Kenny, D. A. (1987). *Statistics for the social and behavioral sciences*. Boston: Little, Brown.
- Koffel, E., & Watson, D. (2009a). The two-factor structure of sleep complaints and its relation to depression and anxiety. *Journal of Abnormal Psychology, 118*, 183-194.
- Koffel, E., & Watson, D. (2009b). Unusual sleep experiences, dissociation, and schizotypy: Evidence for a common domain. *Clinical Psychology Review, 29*, 548-559.

- Koffel, E., & Watson, D. (2010). Development and initial validation of the Iowa Sleep Disturbances Inventory. *Assessment, 17*, 423-439.
- Levine, D. W., Kripke, D. F., Kaplan, R. M., Lewis, M. A., Naughton, M. J., Bowen, D. J., et al. (2003). Reliability and validity of the Women's Health Initiative Insomnia Rating Scale. *Psychological Assessment, 15*, 137-148.
- Mellman, T. A. (2006). Sleep and anxiety disorders. *Psychiatric Clinics of North America, 29*, 1047-1058.
- Morin, C. M. (1993). *Insomnia: Psychological assessment and management*. New York: Guilford Press.
- Papadimitriou, G. N., & Linkowski, P. (2005). Sleep disturbance in anxiety disorders. *International Review of Psychiatry, 17*, 229-236.
- Peterson, M. J., & Benca, R. M. (2006). Sleep in mood disorders. *Psychiatric Clinics of North America, 29*, 1009-1032.
- Raine, A. (1991). The SPQ: a scale for the assessment of schizotypal personality based on DSM-III-R criteria. *Schizophrenia Bulletin, 17*, 555-564.
- Sateia, M. J., Doghramji, K., Hauri, P. J., & Morin, C. M. (2000). Evaluation of chronic insomnia: An American Academy of Sleep Medicine review. *Sleep, 23*, 243-308.
- Savard, M. H., Savard, J., Simard, S., & Ivers, H. (2005). Empirical validation of the Insomnia Severity Index in cancer patients. *Psychooncology, 14*, 429-441.
- Simms, L. J., Watson, D., & Doebbeling, B. N. (2002). Confirmatory factor analyses of posttraumatic stress symptoms in deployed and nondeployed veterans of the Gulf War. *Journal of Abnormal Psychology, 111*, 637-647.
- Spoormaker, V. I., Verbeek, I., van den Bout, J., & Klip, E. C. (2005). Initial Validation of the SLEEP-50 Questionnaire. *Behavioral Sleep Medicine, 3*, 227-246.
- Stein, M. B., & Mellman, T. A. (2005). Anxiety disorders. In M. H. Kryger, T. Roth & W. C. Dement (Eds.), *Principles and practice of sleep medicine* (4th ed., pp. 1297-1310). Philadelphia, PA: Saunders.

- Watson, D. (2001). Dissociations of the night: Individual differences in sleep-related experiences and their relation to dissociation and schizotypy. *Journal of Abnormal Psychology, 110*, 526-535.
- Watson, D. (2009). Differentiating the mood and anxiety disorders: A quadripartite model. *Annual Review of Clinical Psychology, 5*, 221-247.
- Watson, D., O'Hara, M. W., Chmielewski, M., McDade-Montez, E. A., Koffel, E., Naragon, K., et al. (2008). Further validation of the IDAS: Evidence of convergent, discriminant, criterion, and incremental validity. *Psychological Assessment, 20*, 248-259.
- Watson, D., O'Hara, M. W., Simms, L. J., Kotov, R., Chmielewski, M., McDade-Montez, E. A., et al. (2007). Development and validation of the Inventory of Depression and Anxiety Symptoms (IDAS). *Psychological Assessment, 19*, 253-268.
- Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (1993, October). *The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility*. Paper presented at the annual meeting of the International Society for Traumatic Stress Studies, San Antonio, TX.

Table 1

*Internal Consistency Reliabilities (Coefficient Alphas) and Average Interitem Correlations (AICs) of the New Iowa Sleep Disturbances Inventory (ISDI) Scales*

ISDI Scale	Scale development sample						Scale validation sample			
	Student		Psychiatric patient		Sleep disorder patient		Student		Psychiatric patient	
	<i>(n = 374)</i>		<i>(n = 188)</i>		<i>(n = 205)</i>		<i>(n = 219)</i>		<i>(n = 200)</i>	
	$\alpha$	AIC	$\alpha$	AIC	$\alpha$	AIC	$\alpha$	AIC	$\alpha$	AIC
Sleep Hallucinations (5 items)	.68	.30	.68	.30	.76	.39	.71	.33	.70	.32
Sleep Paralysis (4 items)	.74	.42	.82	.53	.85	.59	.79	.48	.78	.47

FURTHER VALIDATION

Table 2

*Factor Structure of the ISDI*

ISDI scales	Student			Psychiatric patient		
	Insomnia	Lassitude	Unusual	Insomnia	Lassitude	Unusual
Initial Insomnia	<b>.73</b>	.11	-.07	<b>.67</b>	.26	-.06
Anxiety at Night	<b>.61</b>	-.12	.05	<b>.53</b>	.17	.08
Fragmented Sleep	<b>.52</b>	.02	.19	<b>.59</b>	-.04	.13
Light Sleep	<b>.46</b>	.01	-.05	<b>.56</b>	-.12	-.06
Fatigue	.12	<b>.72</b>	-.03	-.10	<b>.68</b>	.04
Nonrestorative Sleep	.13	<b>.67</b>	-.10	.13	<b>.61</b>	-.06
Excessive Sleep	<b>-.33</b>	<b>.54</b>	.11	<b>-.36</b>	<b>.45</b>	.22
Irregular Schedule	.11	<b>.40</b>	.06	.10	<b>.52</b>	-.09
Sleep Hallucinations	.06	.12	<b>.52</b>	.13	-.06	<b>.61</b>
Sleep Paralysis	-.14	.11	<b>.52</b>	-.05	.04	<b>.34</b>
Nightmares	.17	.04	<b>.51</b>	.12	.02	<b>.60</b>
Sensations at Night	.05	-.11	<b>.51</b>	.24	-.10	.16
Movement at Night	-.01	-.04	.27	-.01	-.04	<b>.33</b>
Lassitude and Unusual		(.41)			(.30)	
Insomnia and Lassitude		(.39)			(.25)	
Insomnia and Unusual		(.31)			(.14)	

*Note.*  $n = 219$  (students),  $200$  (psychiatric patients). Factor loadings of  $|.30|$  and higher are highlighted. Correlations among factors are in parentheses. Unusual = Unusual Sleep Experiences

Table 3

*Correlations Between the Iowa Sleep Disturbances Inventory (ISDI) and the Iowa Sleep Disturbances Inventory Clinician Rating Scale (ISDI-CR) in Students*

ISDI Scale	ISDI-CR Item												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Irregular Schedule	<b>.78</b>	.03	.31	.31	.12	.03	.32	.11	.16	.12	.16	.11	.16
2. Light Sleep	.05	<b>.77</b>	.26	.25	.06	-.04	.05	.18	.15	.11	.08	.21	.24
3. Initial Insomnia	.28	.35	<b>.73</b>	.25	-.02	.02	.26	.07	<u>.43</u>	.06	.14	.15	<u>.49</u>
4. Fatigue	.30	.18	.27	<b>.71</b>	.33	.05	<u>.47</u>	.10	.27	.05	.24	.27	.29
5. Excessive Sleep	.16	-.10	-.02	.31	<b>.70</b>	-.02	.16	.08	-.12	.07	.11	.01	-.02
6. Movement at Night	-.02	-.08	.00	.02	-.12	<b>.70</b>	.16	.00	.10	.11	.09	.01	.01
7. Nonrestorative Sleep	.34	.18	.33	<u>.41</u>	.20	.10	<b>.68</b>	.06	.22	.07	.20	.13	.19
8. Sleep Paralysis	.06	.11	.16	.20	.11	.07	.12	<b>.67</b>	.00	.19	.31	.22	.10
9. Fragmented Sleep	.13	.25	.38	.25	.02	.09	.07	.09	<b>.62</b>	.03	.22	.20	.34
10. Sensations at Night	.04	.07	.05	.15	-.02	.25	.12	.23	.09	<b>.60</b>	.10	.12	.05
11. Sleep Hallucinations	.12	.08	.15	.16	-.03	.11	.19	.18	.21	.05	<b>.59</b>	.22	.09
12. Nightmares	.10	.17	.20	.29	.06	.05	.17	.26	.27	.06	.26	<b>.59</b>	.26
13. Anxiety at Night	.07	.22	<u>.42</u>	.14	-.06	.03	.09	.04	.37	.06	.11	.19	<b>.58</b>

*Note.*  $n = 219$ . Convergent correlations are in bold along the diagonal. Discriminant correlations of  $|\text{.40}|$  and greater are underlined. Correlations of  $|\text{.14}|$  and greater are significant at  $p < .05$ , two-tailed.

Table 4

*Correlations Between the Iowa Sleep Disturbances Inventory (ISDI) and the Iowa Sleep Disturbances Inventory Clinician Rating Scale ( ISDI-CR) in Psychiatric Patients*

ISDI Scale	ISDI-CR Item												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Light Sleep	<b>.79</b>	.05	.00	.39	.10	-.08	.23	-.10	.01	-.14	-.03	.24	.09
2. Irregular Schedule	-.01	<b>.76</b>	.23	.00	.01	.00	.22	.27	.00	.02	.20	.27	.02
3. Fatigue	.01	.26	<b>.73</b>	.17	.08	.08	.09	.38	.04	.05	.30	.13	.05
4. Fragmented Sleep	<u>.41</u>	.14	.07	<b>.73</b>	.27	.09	.33	-.04	.02	.00	-.01	.36	.07
5. Nightmares	.13	.01	.09	.20	<b>.72</b>	.13	.12	.11	.00	.10	.11	.18	.32
6. Movement at Night	-.09	-.12	-.02	.12	.12	<b>.72</b>	.00	.06	.12	.06	.06	-.03	-.02
7. Initial Insomnia	.24	.33	.06	.29	.11	.04	<b>.70</b>	-.01	.10	.06	.23	<u>.52</u>	.08
8. Excessive Sleep	-.08	.12	.28	-.04	.21	.05	-.09	<b>.70</b>	-.07	.06	.15	.01	.04
9. Sensations at Night	.04	.01	-.13	.08	.08	.27	.14	-.05	<b>.68</b>	.04	.12	.03	.09
10. Sleep Paralysis	-.00	.02	.14	.05	.16	.03	.02	.07	.04	<b>.66</b>	.02	.03	.24
11. Nonrestorative Sleep	.09	.28	.39	.10	.03	.03	.22	.16	.06	-.01	<b>.64</b>	.18	-.01
12. Anxiety at Night	.18	.21	.05	.31	.35	.07	<u>.47</u>	.12	.06	.09	.09	<b>.60</b>	.07
13. Sleep Hallucinations	.05	.10	.02	.18	.37	.03	.22	.02	.07	.28	.03	.13	<b>.54</b>

*Note.*  $n = 200$ . Convergent correlations are in bold along the diagonal. Discriminant correlations of  $|\geq .40|$  and greater are underlined. Correlations of  $|\geq .14|$  and greater are significant at  $p < .05$ , two-tailed.

Table 5

*Correlations Between Higher Order Sleep Factors and Questionnaire Measures of Pathological Symptoms in Patients*

	Lassitude	Insomnia	Unusual Sleep Experiences
Depression scale			
IDAS Dysphoria	<b>.55</b>	.25	.23
PCLC Dysphoria*	<b>.49</b>	.24	.27
IDAS Well-Being	<b>-.33</b>	-.12	-.11
IDAS Ill Temper	<b>.32</b>	.17	.22
IDAS Appetite Loss	.21	<b>.32</b>	.25
IDAS Appetite Gain	.28	-.10	.05
IDAS Suicidality	.25	.14	.18
Panic scale			
IDAS Panic	<b>.37</b>	.23	.29
Social anxiety scale			
IDAS Social Anxiety	<b>.39</b>	.17	.19
SPQ Social Anxiety	.23	.11	.10
PTSD scale			
IDAS Traumatic Intrusions*	.26	.19	<b>.40</b>
PCLC Intrusions*	.23	.23	<b>.40</b>
PCLC Avoidance	.27	.24	<b>.34</b>
PCLC Hyperarousal	.18	.25	.24
Dissociation scale			
DPS Imagination	.26	.13	<b>.39</b>
DPS Detachment	.24	.14	<b>.35</b>
DPS Obliviousness	<b>.38</b>	.15	<b>.38</b>
Schizotypy scale			
SPQ Unusual Beliefs/Experiences	.14	.03	<b>.31</b>
SPQ Mistrust	.29	.05	.21
SPQ Social Anhedonia	.26	.19	.03
SPQ Eccentricity/Oddity	.25	.10	.18

*Note.*  $n = 200$ . Correlations of  $|\geq .30|$  and greater are in bold. Correlations of  $|\geq .14|$  and greater are significant at  $p < .05$ , two-tailed. IDAS = Inventory of Depression and Anxiety Symptoms. PCLC = PTSD Checklist- Civilian Version. SPQ = Schizotypal Personality Questionnaire. DPS = Dissociative Processes Scale. \* = sleep-related items removed.



Table 6

*Correlations Between Higher Order Sleep Factors and Interview Measures of Pathological Symptoms in Patients*

	Lassitude	Insomnia	Unusual Sleep Experiences
<b>IDAS-CR</b>			
Dysphoria	<b>.33</b>	.06	.04
Well-Being	<b>-.23</b>	<b>-.21</b>	-.09
Ill Temper	.06	.02	.16
Appetite Loss	.09	.18	.12
Appetite Gain	.12	-.05	.01
Suicidality	<b>.22</b>	.05	.07
Panic	<b>.32</b>	.17	<b>.22</b>
Social Anxiety	<b>.26</b>	.11	.14
Traumatic Intrusions	.08	.06	<b>.23</b>
<b>PCCP</b>			
Imagination/Absorption	.15	-.01	<b>.22</b>
Depersonalization/Derealization	.14	.11	<b>.24</b>
Obliviousness/Amnesia	.14	-.02	<b>.26</b>
Supernatural Beliefs	-.05	-.07	.07
Hallucinations	.01	.01	.19
Paranoia	.18	.01	.11
Social Anhedonia	.18	.15	.07
Eccentricity/Oddity	.11	.14	<b>.23</b>

*Note.*  $n = 197$ . Correlations of  $|\geq .20|$  and greater are in bold. Correlations of  $|\geq .14|$  and greater are significant at  $p < .05$ , two-tailed. IDAS-CR = Clinician Rating version of the IDAS. PCCP = Personality, Cognitions, Consciousness, and Perceptions Interview.

Table 7

*Correlations Between Iowa Sleep Disturbances Inventory (ISDI) and Questionnaire Measures of Pathological Symptoms in Patients*

	ISDI scales		
	Fatigue	Nightmares	Sleep Hallucinations
Depression scale			
IDAS Dysphoria	<b>.51</b>	.14	.14
PCLC Dysphoria*	<b>.48</b>	.19	.14
IDAS Well-Being	<b>-.35</b>	-.01	-.02
IDAS Ill Temper	.28	.17	.12
IDAS Appetite Loss	.17	.18	.27
IDAS Appetite Gain	.29	.00	-.11
IDAS Suicidality	.25	.16	.14
Panic scale			
IDAS Panic	<b>.32</b>	.22	.22
Social Anxiety scale			
IDAS Social Anxiety	<b>.37</b>	.08	.14
SPQ Social Anxiety	.25	.06	.00
PTSD scale			
IDAS Traumatic Intrusions*	.21	<b>.45</b>	.27
PCLC Intrusions*	.18	<b>.49</b>	.25
PCLC Avoidance	.20	<b>.38</b>	.23
PCLC Hyperarousal	.14	.24	.16
Dissociation scale			
DPS Imagination	.15	<b>.37</b>	<b>.33</b>
DPS Detachment	.16	.22	<b>.38</b>
DPS Obliviousness	<b>.34</b>	.24	.29
Schizotypy scale			
SPQ Unusual Beliefs/Experiences	.10	.19	<b>.30</b>
SPQ Mistrust	.22	.16	.07
SPQ Social Anhedonia	.27	.03	-.05
SPQ Eccentricity/Oddity	.21	.12	.14

*Note.*  $n = 200$ . Correlations of  $|\geq .30|$  and greater are in bold. Correlations of  $|\geq .14|$  and greater are significant at  $p < .05$ , two-tailed. IDAS = Inventory of Depression and Anxiety Symptoms. PCLC = PTSD Checklist- Civilian Version. SPQ = Schizotypal Personality Questionnaire. DPS = Dissociative Processes Scale. \* = sleep-related items removed.

Table 8

*Correlations Between Iowa Sleep Disturbances Inventory (ISDI) and Interview Measures of Pathological Symptoms in Patients*

	ISDI scales		
	Fatigue	Nightmares	Sleep Hallucinations
<b>IDAS-CR</b>			
Dysphoria	<b>.40</b>	-.02	.00
Well-Being	-.27	-.05	-.02
Ill Temper	.06	.11	.08
Appetite Loss	.09	.09	.11
Appetite Gain	.19	.01	-.06
Suicidality	.26	.04	.03
Panic	<b>.31</b>	.18	.13
Social Anxiety	.24	.07	.09
Traumatic Intrusions	.07	<b>.31</b>	.07
<b>PCCP</b>			
Imagination/Absorption	.18	.18	.14
Depersonalization/Derealization	.10	.14	<b>.30</b>
Obliviousness/Amnesia	.12	.22	.16
Supernatural Beliefs	-.03	.04	.08
Hallucinations	.01	.17	.20
Paranoia	.16	.10	.00
Social Anhedonia	.12	.10	-.08
Eccentricity/Oddity	.01	.23	.19

*Note.*  $n = 197$ . Correlations of  $|\geq .30|$  and greater are in bold. Correlations of  $|\geq .14|$  and greater are significant at  $p < .05$ , two-tailed. IDAS-CR = Clinician Rating version of the Inventory of Depression and Anxiety Symptoms. PCCP = Personality, Cognitions, Consciousness, and Perceptions interview.

## ISDI

These questions ask about your sleeping habits. Please circle “true” if the statement sounds like you and “false” if the statement does not sound like you.

- |  |             |              |
|--|-------------|--------------|
| 1. It takes me a long time to fall asleep.   | <b>TRUE</b> | <b>FALSE</b> |
| 2. Most days I feel wide awake.  | <b>TRUE</b> | <b>FALSE</b> |
| 3. I have nightmares frequently.   | <b>TRUE</b> | <b>FALSE</b> |
| 4. I usually wake up feeling refreshed and rested.                                       | <b>TRUE</b> | <b>FALSE</b> |
| 5. If I wake up during the night, I find it difficult to fall asleep again.              | <b>TRUE</b> | <b>FALSE</b> |
| 6. I rarely take naps.   | <b>TRUE</b> | <b>FALSE</b> |
| 7. My sleep is light.  | <b>TRUE</b> | <b>FALSE</b> |
| 8. I wake up most mornings at roughly the same time.                                     | <b>TRUE</b> | <b>FALSE</b> |
| 9. I sometimes have a hard time falling asleep due to uncomfortable feelings in my legs. | <b>TRUE</b> | <b>FALSE</b> |
| 10. Worries don't keep me up at night.   | <b>TRUE</b> | <b>FALSE</b> |
| 11. I move my legs or arms a lot when I sleep.   | <b>TRUE</b> | <b>FALSE</b> |
| 12. I tend to fall asleep quickly.   | <b>TRUE</b> | <b>FALSE</b> |
| 13. I usually feel tired during the day.   | <b>TRUE</b> | <b>FALSE</b> |
| 14. I don't have nightmares.   | <b>TRUE</b> | <b>FALSE</b> |
| 15. I have a hard time waking up during the week.  | <b>TRUE</b> | <b>FALSE</b> |
| 16. I sometimes wake up early and can't get back to sleep.                               | <b>TRUE</b> | <b>FALSE</b> |
| 17. I take long naps.  | <b>TRUE</b> | <b>FALSE</b> |
| 18. I am a deep sleeper.   | <b>TRUE</b> | <b>FALSE</b> |

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|--|-------------|--------------|
| 19. My bedtime is very irregular.  | <b>TRUE</b> | <b>FALSE</b> |
| 20. I sometimes have cramps or pain in my legs during the night.   | <b>TRUE</b> | <b>FALSE</b> |
| 21. I sometimes lie awake worrying.  | <b>TRUE</b> | <b>FALSE</b> |
| 22. I don't move around much in my sleep.  | <b>TRUE</b> | <b>FALSE</b> |
| 23. I often have trouble falling asleep.   | <b>TRUE</b> | <b>FALSE</b> |
| 24. I get drowsy when I sit still during the day.  | <b>TRUE</b> | <b>FALSE</b> |
| 25. I have recurring bad dreams.   | <b>TRUE</b> | <b>FALSE</b> |
| 26. I usually feel energized after I wake up.  | <b>TRUE</b> | <b>FALSE</b> |
| 27. I wake up frequently during the night.   | <b>TRUE</b> | <b>FALSE</b> |
| 28. I can nap anywhere, in any situation   | <b>TRUE</b> | <b>FALSE</b> |
| 29. I am easily awakened by noises.  | <b>TRUE</b> | <b>FALSE</b> |
| 30. I go to sleep most evenings at roughly the same time.  | <b>TRUE</b> | <b>FALSE</b> |
| 31. I sometimes have unusual feelings in my legs at night, such as creeping, crawling, tingling burning or itching sensations. | <b>TRUE</b> | <b>FALSE</b> |
| 32. I have trouble sleeping due to nervousness.  | <b>TRUE</b> | <b>FALSE</b> |
| 33. I am told that I kick my legs when I sleep.  | <b>TRUE</b> | <b>FALSE</b> |
| 34. I fall asleep within minutes of going to bed.  | <b>TRUE</b> | <b>FALSE</b> |
| 35. I seem to have less energy than other people I know.   | <b>TRUE</b> | <b>FALSE</b> |
| 36. My dreams often disturb me.  | <b>TRUE</b> | <b>FALSE</b> |
| 37. I feel much worse in the morning than later in the day.  | <b>TRUE</b> | <b>FALSE</b> |
| 38. When I wake up at night, it takes me a long time to get back to sleep.   | <b>TRUE</b> | <b>FALSE</b> |
| 39. I doze off while watching TV during the day.   | <b>TRUE</b> | <b>FALSE</b> |

- |   |             |              |
|---|-------------|--------------|
| 40. I can sleep through loud noises.  | <b>TRUE</b> | <b>FALSE</b> |
| 41. I have trouble getting my sleep into a proper routine.                        | <b>TRUE</b> | <b>FALSE</b> |
| 42. I cannot keep my legs still when falling asleep.                              | <b>TRUE</b> | <b>FALSE</b> |
| 43. Anxiety sometimes makes it hard for me to fall asleep.                        | <b>TRUE</b> | <b>FALSE</b> |
| 44. My legs jerk when I sleep.  | <b>TRUE</b> | <b>FALSE</b> |
| 45. I often lay awake in bed for some time before I finally fall asleep.          | <b>TRUE</b> | <b>FALSE</b> |
| 46. I sometimes don't have enough energy to get things done.                      | <b>TRUE</b> | <b>FALSE</b> |
| 47. Nightmares cause me to wake up at night.                                      | <b>TRUE</b> | <b>FALSE</b> |
| 48. I often feel more tired in the morning than when I go to sleep.               | <b>TRUE</b> | <b>FALSE</b> |
| 49. I have trouble staying asleep.  | <b>TRUE</b> | <b>FALSE</b> |
| 50. I sleep a lot during the day.   | <b>TRUE</b> | <b>FALSE</b> |
| 51. People have told me that I can sleep through anything.                        | <b>TRUE</b> | <b>FALSE</b> |
| 52. My wake-up time is very irregular.  | <b>TRUE</b> | <b>FALSE</b> |
| 53. I sometimes move my legs around to relieve uncomfortable sensations at night. | <b>TRUE</b> | <b>FALSE</b> |
| 54. My mind sometimes races when I try to sleep.                                  | <b>TRUE</b> | <b>FALSE</b> |
| 55. I rarely have trouble falling asleep.   | <b>TRUE</b> | <b>FALSE</b> |
| 56. I frequently have frightening dreams.   | <b>TRUE</b> | <b>FALSE</b> |
| 57. I move around a lot in my sleep.  | <b>TRUE</b> | <b>FALSE</b> |
| 58. I have trouble waking up in the morning.                                      | <b>TRUE</b> | <b>FALSE</b> |
| 59. I often wake up during the night for no particular reason.                    | <b>TRUE</b> | <b>FALSE</b> |
| 60. I doze off when I relax during the day.                                       | <b>TRUE</b> | <b>FALSE</b> |
| 61. My sleep is easily disturbed.   | <b>TRUE</b> | <b>FALSE</b> |

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|---|-------------|--------------|
| 62. I have woken up because of uncomfortable feelings in my legs.                   | <b>TRUE</b> | <b>FALSE</b> |
| 63. I sometimes have trouble sleeping because I am thinking about the day's events. | <b>TRUE</b> | <b>FALSE</b> |
| 64. I am told that I kick or punch in my sleep.                                     | <b>TRUE</b> | <b>FALSE</b> |
| 65. I find it hard to get my body relaxed at bedtime.                               | <b>TRUE</b> | <b>FALSE</b> |
| 66. I have a hard time focusing during the day because I am tired.                  | <b>TRUE</b> | <b>FALSE</b> |
| 67. I have dreams that are so vivid they influence how I feel the following day.    | <b>TRUE</b> | <b>FALSE</b> |
| 68. I drift off to sleep easily.  | <b>TRUE</b> | <b>FALSE</b> |
| 69. It is difficult for me to pay attention during the day because I am so tired.   | <b>TRUE</b> | <b>FALSE</b> |
| 70. My dreams often are unpleasant.   | <b>TRUE</b> | <b>FALSE</b> |
| 71. I sometimes stay awake thinking about things.                                   | <b>TRUE</b> | <b>FALSE</b> |
| 72. I usually am still tired when I wake up.  | <b>TRUE</b> | <b>FALSE</b> |
| 73. I sleep very poorly.  | <b>TRUE</b> | <b>FALSE</b> |
| 74. I sometimes try too hard to fall asleep.  | <b>TRUE</b> | <b>FALSE</b> |
| 75. I struggle to remain alert during the day.                                      | <b>TRUE</b> | <b>FALSE</b> |
| 76. I sometimes have a hard time sleeping due to bad dreams.                        | <b>TRUE</b> | <b>FALSE</b> |
| 77. It is very hard for me when I need to get up earlier in the morning.            | <b>TRUE</b> | <b>FALSE</b> |
| 78. I wake up earlier than planned.   | <b>TRUE</b> | <b>FALSE</b> |
| 79. I get sleepy as soon as I'm in bed.   | <b>TRUE</b> | <b>FALSE</b> |
| 80. I have dreams about something bad that happened to me.                          | <b>TRUE</b> | <b>FALSE</b> |
| 81. I wake up before I need to  | <b>TRUE</b> | <b>FALSE</b> |

- |  |             |              |
|--|-------------|--------------|
| 82. Nightmares make it hard for me to fall asleep.   | <b>TRUE</b> | <b>FALSE</b> |
| 83. I have a hard time getting comfortable in bed.   | <b>TRUE</b> | <b>FALSE</b> |
| 84. I often feel sleepy during the day.  | <b>TRUE</b> | <b>FALSE</b> |
| 85. Nightmares cause a physical reaction for me (e.g., sweating, pounding heart, shortness of breath). | <b>TRUE</b> | <b>FALSE</b> |
| 86. Daytime sleepiness interferes with my activities.  | <b>TRUE</b> | <b>FALSE</b> |
| 87. I sometimes find that I can't move my body when I wake up.   | <b>TRUE</b> | <b>FALSE</b> |
| 88. I experiences intense, dreamlike images as I begin to wake up.                                     | <b>TRUE</b> | <b>FALSE</b> |
| 89. I feel paralyzed when I'm falling asleep or waking up.   | <b>TRUE</b> | <b>FALSE</b> |
| 90. I experience intense dreamlike images as I begin to fall sleep.                                    | <b>TRUE</b> | <b>FALSE</b> |
| 91. My muscles sometimes feel frozen when I wake up.   | <b>TRUE</b> | <b>FALSE</b> |
| 92. Lying in bed, I sense the presence of someone who isn't actually there.                            | <b>TRUE</b> | <b>FALSE</b> |
| 93. When I wake up or fall asleep I am unable to move for a short time.                                | <b>TRUE</b> | <b>FALSE</b> |
| 94. I sometimes see or hear things that are not real when falling asleep or waking up.                 | <b>TRUE</b> | <b>FALSE</b> |
| 95. I have dream-like images when I awaken in the morning even though I know I am not asleep.          | <b>TRUE</b> | <b>FALSE</b> |



## ISDI Scoring

\*Reverse keyed.

*Daytime Disturbances*  
*Fatigue + Nonrestorative Sleep*

*Nightmares*  
#3, #14\*, #25, #36, #47, #56, #67, #70, #76, #80, #82, #85

*Initial Insomnia*  
#1, #12\* #23, #34\*, #45, #55\*, #65, #68\*, #74, #79\*, #83

*Fatigue*  
#2\*, #13, #24, #35, #46, #66, #69, #75, #84, #86

*Fragmented Sleep*  
#5, #16, #27, #38, #49, #59, #73, #78, #81

*Nonrestorative Sleep*  
#4\*, #15, #26\*, #37, #48, #58, #72, #77

*Anxiety at Night*  
#10\*, #21, #32, #43, #54, #63, #71

*Light Sleep*  
#7, #18\*, #29, #40\*, #51\*, #61

*Movement at Night*  
#11, #22\*, #33, #44, #57, #64

*Sensations at Night*  
#9, #20, #31, #42, #53, #62

*Excessive Sleep*  
#6\*, #17, #28, #39, #50, #60

*Irregular Schedule*  
#8\*, #19, #30\*, #41, #52

*Sleep Paralysis*  
#87, #89, #91, #93

*Sleep Hallucinations*  
#88, #90, #92, #94, #95