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Dissociations of the Night: Individual Differences in Sleep-Related Experiences and Their Relation to Dissociation and Schizotypy

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Abstract

I examined the associations among sleep-related experiences (e.g., hypnagogic hallucinations, nightmares, waking dreams, lucid dreams), dissociation, schizotypy and the Big Five personality traits in two large student samples. Confirmatory factor analyses indicated that (a) dissociation and schizotypy are strongly correlated—yet distinguishable— constructs and (b) the differentiation between them can be enhanced by eliminating detachment/depersonalization items from the dissociation scales. A general measure of sleep experiences was substantially correlated with both schizotypy and dissociation (especially the latter) and more weakly related to the Big Five. In contrast, an index of lucid dreaming was weakly related to all of these other scales. These results suggest that measures of dissociation, schizotypy and sleep-related experiences all define a common domain characterized by unusual cognitions and perceptions.

Dissociations of the Night: Individual Differences in Sleep-Related Experiences and Their Relation to Dissociation and Schizotypy

People clearly show marked individual differences in their waking behaviors and experiences. Researchers have been intensely interested in these individual differences and have extensively studied their origins, nature, and consequences. This body of research has helped to clarify a wide range of phenomena, including interpersonal behavior, sexual activity, work and academic performance, and drug and alcohol use (e.g., Clark & Watson, 1999). In contrast, individual differences in sleep-related behaviors and experiences have received far less attention. This neglect is unfortunate, because there also are substantial individual differences in such variables as sleep quality, sleep quantity (i.e., the actual duration of sleep), sleep schedule (i.e., characteristic times of rising and retiring), and the frequency of dream recall. Moreover, these individual differences are strongly stable over time and consistent across contexts. Watson (2001a, 2001b), for instance, demonstrated that individual differences in sleep quantity, sleep schedule, and dream recall were consistent across the days of the week, with mean evening-by-evening correlations ranging from .44 to .81. Furthermore, Watson (2001a, 2001b) reported two-month retest correlations of .66 (dream recall), .68 (sleep quantity), and .86 (sleep schedule). Thus, all of these sleep-related variables show the two fundamental properties of a trait.

What factors are responsible for these marked individual differences in nocturnal experience? We now have good evidence regarding several of these variables. First, individual differences in sleep quality are substantially related to subjective distress, negative emotionality, and elevated levels of psychological disorder. For instance, insomnia is a very common symptom in major depression and various anxiety disorders (Lacks & Morin, 1992; Totterdell, Reynolds, Parkinson, & Briner, 1994). Moreover, many depressed and anxious individuals display abnormally long sleep latencies, frequent

interruptions and awakenings, relative shallow sleep, and reduced latency to the first episode of rapid eye movement (REM) sleep (Fuller, Waters, Binks, & Anderson, 1997; Monroe, Thase, & Simons, 1992; Wu & Bunney, 1990). Finally, subjective ratings of poor sleep quality are significantly related to anxiety, depression, and trait measures of neuroticism (Totterdell et al., 1994; Watson, 2001a).

In contrast, characteristic differences in morningness versus eveningness are related to disinhibition and impulsivity. Several studies, for instance, have shown that high scores on the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975) Psychoticism scale are associated with a later, more evening-oriented sleep schedule (e.g., Mitchell & Redman, 1993; Wilson, 1990). Similarly, Watson (2001a) collected daily reports of rising and retiring times across a three-month study period; he found that disinhibited individuals maintained significantly later sleep schedules over the course of the study.

Finally, several studies have examined individual differences in dream recall (i.e., the frequency of remembered dreams). The resulting data are quite consistent and suggest that individuals who have more memorable dreams—that is, dreams that are highly vivid, intense, unusual and interesting—show better overall recall. For instance, more frequent dream recall is associated with higher scores on measures of creativity, daydreaming, fantasy proneness, absorption, and hypnotic susceptibility (e.g., Cohen, 1974; Fitch & Armitage, 1989; Hill, Diemer, & Heaton, 1997). In a related vein, indicators of schizotypy are associated with higher scores on measures of both (a) general dream recall and (b) the frequency of reported nightmares (Claridge, Clark, & Davis, 1997; Hartmann, Russ, Oldfield, Sivan, & Cooper, 1987; Levin, 1998; Levin & Raulin, 1991). Finally, Watson (2001b) collected daily reports of dream recall across a three-month period; he found that more frequent dream recall was associated with higher scores on measures of dissociation, schizotypy, and openness to experience.

In contrast, we know less about the correlates of other important sleep-related experiences, such as sleep paralysis (i.e., being awake but unable to move or speak), hypnagogic hallucinations (i.e., intense, dreamlike imagery during the onset of sleep), hypnopompic hallucinations (i.e., dreamlike images during the offset of sleep), waking dreams (i.e., being unsure whether one actually experienced something or only dreamed about it), and lucid dreaming (i.e., being aware that one is dreaming and/or being able to control the content of the dream experience). It is important to note that many of these sleep-related experiences are quite common in the general population. For example, Ohayon, Priest, Caulet, and Guilleminault (1996) examined a representative community sample of nearly 5,000 British respondents aged 15 and older. They found that 37% of their sample reported experiencing hypnagogic imagery at least twice a week over the past year; moreover, 12.5% of the respondents reported hypnopompic hallucinations at least twice weekly over the same period.

Nevertheless, few studies have explored the nature of individual differences on these variables. Jakes and Hemsley (1987) reported that the EPQ Psychoticism scale was unrelated to the frequency of hypnagogic/hypnopompic imagery; however, these results were based on only 24 respondents. Fukuda, Inamatsu, Kuroiowa, & Miyasita (1991) examined a large group of Japanese college students, and found that participants who had experienced sleep paralysis obtained higher scores on measures of neuroticism and negative emotionality. Blagrove and Hartnell (2000) reported that frequent lucid dreamers were more creative and had a more internal locus of control than non-lucid dreamers.

To date, Watson (2001b) has conducted the most complete analysis of these variables. Watson (2001b) factor analyzed a preliminary, 19-item version of the Iowa Sleep Experiences Survey (ISES; Watson, 1999); the 10 best factor markers were summed into an overall scale that assessed the frequency of waking dreams, lucid

dreams, narcoleptic sleepiness, nightmares, and recurring dreams. This index was significantly correlated (*r*s = .39 and .42) with two measures of dream recall frequency. Given the extensive evidence (reviewed earlier) regarding the correlates of dream recall, these results suggest that these other sleep-related experiences also would be associated with dissociation, schizotypy, and openness to experience. This expectation was confirmed. Specifically, the ISES General Sleep Experiences scale had correlations ranging from .30 to .52 with various measures of dissociation, and from .20 to .36 with indicators of schizotypy. Finally, among the traits comprising the five-factor model of personality (John & Srivastava, 1999; Watson, Clark, & Harkness, 1994), the ISES was substantially related only to openness (*r* = .40).

These significant correlations between the ISES general score and schizotypy are consistent with other evidence establishing a clear link between schizophrenia and narcolepsy (Howland, 1997; C. Jackson & Bachman, 1996; Wilcox, 1985), a disorder that frequently is manifested in such symptoms as sleep paralysis and hypnagogic/ hypnopompic hallucinations (American Psychiatric Association, 1994). It is noteworthy, moreover, that schizophrenia and schizotypy also are substantially related to dissociative tendencies. For instance, Putnam, Guroff, Silberman, Barban and Post (1986) found that nearly half of their patients with dissociative identity disorder (DID) received prior diagnoses of schizophrenia. Similarly, DID patients actually report significantly more Schneiderian first-rank symptoms (which originally were thought to be pathognomonic of schizophrenia) and positive symptoms of schizophrenia (e.g., hallucinations and delusions) than do schizophrenics (Ellason & Ross, 1995; Kluft, 1987; Ross, Miller, Reagor, Bjornson, Fraser, & Anderson, 1990); conversely, dissociative symptoms are prominent in schizophrenics (Haugen & Castillo, 1999; Spitzer, Haug, & Freyberger, 1997). Finally, self-report measures of dissociation and schizotypy are substantially interrelated (Startup, 1999; Watson, 2001b). Taken together, these data suggest that

measures of dissociation, schizotypy, and sleep-related experiences define a common domain that is characterized by intense and unusual cognitive/perceptual phenomena (see also Thalbourne, & Houran, 2000, who argue that schizotypy, fantasy proneness, absorption, creativity and paranormal experiences all are manifestations of the broad trait of "transliminality").

The Current Study

The current study reports results from two large undergraduate samples. It was designed to extend the existing literature in three ways. First, I attempted to create a simple, reliable measure tapping a broad range of sleep-related experiences. Although the preliminary version of the ISES showed interesting correlates, the 10-item scale created by Watson (2001b) had an internal consistency reliability (coefficient alpha) of only .74, suggesting the need for additional items. I therefore created a revised and expanded pool of 24 items for this study. I conducted separate principal factor analyses of this expanded ISES item pool in each sample; this enabled me to identify consistent, replicable factor markers that were used as the basis for subsequent scale development.

Second, I examined the nature of individual differences in sleep experiences by relating them to a broad range of measures. The respondents in both samples completed three indicators of schizotypy, as well as three general measures of dissociation. Furthermore, two of these dissociation measures—the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986) and Dissociative Processes Scale (DPS; Harrison & Watson, 1992)—contain factor-analytically derived subscales assessing distinctive types of content. The inclusion of these subscales allowed me to examine how sleep-related experiences correlate with specific types of content. Finally, the participants completed a measure of the prominent five-factor or "Big Five" model of personality. This model consists of five broad dimensions—neuroticism, extraversion, openness, agreeableness and conscientiousness—that have consistently emerged in factor analyses of both self-

and peer-related personality (John & Srivastava, 1999; Watson et al., 1994). On the basis of the results reported by Watson (2001b), I predicted that sleep experiences would be moderately to strongly correlated with individual differences in dissociation, schizotypy and openness, and would be more weakly related to the other Big Five traits.

Third, I attempted to clarify the underlying structure of the broader domain by examining the nature of the relation between dissociation and schizotypy. As discussed previously, the data consistently demonstrate a strong and systematic link between these constructs. Indeed, it is unclear whether they truly can be distinguished in self-report data. Startup (1999), for instance, obtained a .58 correlation between the DES and a measure of schizotypy. He further noted that this discriminant correlation was as high as the convergent correlations that typically are reported for measures of dissociation and schizotypy. These results therefore raise the issue of whether these measures actually define two distinct constructs, or whether they simply assess a single undifferentiated dimension. Because I included multiple indicators of both constructs, I was able to test this issue by conducting confirmatory factor analyses that compared 1- versus 2-factor models in each sample. Moreover, by including a measure of the Big Five, I examined whether the substantial overlap between dissociation and schizotypy is primarily attributable to the underlying influence of general personality traits such as neuroticism or openness.

Method

Participants and Procedure

The results reported in this study are based on two samples of students who were enrolled in an introductory psychology course at the University of Iowa. They participated in partial fulfillment of a course research requirement. All respondents were assessed in small-group sessions, typically involving 15-30 students. Sample 1 consisted of 482 students (196 men, 285 women, 1 unspecified) who were assessed during the

spring, summer, and fall of 1998. Sample 2 was composed of 466 students (166 men, 299 women, 1 unspecified) who were assessed during the spring, summer, and fall of 1999. The data reported here are based on the 471 (Sample 1) and 457 (Sample 2) participants who had complete data on all of the measures.

Measures

Big Five Inventory. Scores on the Big Five traits were obtained using the Big Five Inventory (BFI; John, Donahue, & Kentle, 1991). The participants in both samples completed a version of the BFI containing an 18-item scale to assess Openness and 9-item scales to measure each of the other traits. They responded to each item on a 7-point scale ranging from "very uncharacteristic of myself" to "very characteristic of myself."

Previous research has established the reliability and convergent validity of the BFI scales. With regard to the latter, each of the scales is strongly correlated with its counterpart on both the revised NEO Personality Inventory (NEO-PI-R) and the briefer NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) (Watson et al., 1994; Watson & Hubbard, 1996). In the current samples, the internal consistency reliabilities (coefficient alpha) of the scales ranged from .71 (Conscientiousness) to .83 (Extraversion) in Sample 1, and from .76 (Conscientiousness) to .85 (Extraversion) in Sample 2.

Dissociation measures. As noted previously, the participants completed three general measures of dissociation. Of these, the Dissociative Processes Scale (DPS; Harrison & Watson, 1992) is the only one that was designed explicitly to assess normal-range individual differences in dissociative tendencies, rather than pathological forms of dissociation. The DPS consists of 33 items that were selected on the basis of a series of factor analyses; respondents rate the extent to which they agree or disagree with each statement on a 5-point scale (1 = *strongly disagree,* 2 = *disagree,* 3 = *neutral or cannot decide,* 4 = *agree,* 5 = *strongly agree*). The DPS total score had coefficient alphas of .93 in Sample 1 and .93 in Sample 2.

The DPS also includes three factor-analytically derived subscales. The 14-item Obliviousness subscale assesses the tendency to engage in mindless and automatic behaviors, and to enter into naturally-occurring trance states (e.g., “I will sometimes walk into a room, and not remember why I went in there”; “At times people have told me that I seemed to be off in a world of my own”). The 6-item Detachment subscale measures feelings of depersonalization and derealization (e.g., “Sometimes when I am looking in the mirror I feel like I am seeing someone else”). Finally, the Imagination subscale (7 items) assesses individual differences in absorption, imaginativeness, and fantasizing (e.g., “If I want to, I can imagine some things so vividly that they hold my attention like a good movie or book does”; “I have an interesting fantasy life”). Coefficient alphas for these subscales ranged from .84 to .86 in Sample 1, and from .84 to .86 in Sample 2. Correlations among the subscales ranged from .53 to .59 in Sample 1, and from .50 to .59 in Sample 2.

Next, the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986) is a widely used 28-item questionnaire that was designed to measure dissociative tendencies in both nonclinical and clinical samples. Respondents are presented with a variety of experiences and asked to estimate “what percentage of the time this happens to you”; these ratings are made on an 11-point scale (0%, 10%, 20%, etc.). Coefficient alphas for the DES total score were .93 in Sample 1 and .92 in Sample 2.

Factor analyses of the DES items have led to the development of three subscales that parallel those of the DPS (Carlson & Putnam, 1992): Amnesia (8 items; e.g., “Some people have the experience of finding themselves in a place and having no idea how they got there"), Depersonalization and Derealization (Depersonalization) (6 items; e.g., “Some people have the experience of feeling that other people, objects, and the world around them are not real”), and Absorption and Imaginative Involvement (Absorption) (9 items; e.g., “Some people find that when they are watching television or a movie they

become so absorbed in the story that they are unaware of other events happening around them"). Coefficient alphas for these subscales ranged from .84 to .86 in Sample 1, and from .81 to .86 in Sample 2. Correlations among the subscales ranged from .67 to .71 in Sample 1, and from .58 to .68 in Sample 2.

Finally, the Questionnaire of Experiences of Dissociation (QED; Riley, 1988) is a 26-item scale with a true-false format. The QED was drawn from the clinical literature and was intended primarily for research on the dissociative disorders. Coefficient alphas for the QED total score were .80 in Sample 1 and .80 in Sample 2.

I factor analyzed the QED items to examine whether they yielded content factors paralleling those of the DPS and DES. However, separate principal factor analyses in each sample yielded only one replicable content factor that closely resembled the DPS Detachment and DES Depersonalization scales (e.g., "I often feel as if things were not real"). The 9 replicable markers of this factor were used to create a Detachment subscale, with coefficient alphas of .76 and .78 in Samples 1 and 2, respectively. The 17 remaining QED items (e.g., "I have had periods where I could not remember where I had been the day (or days) before") then simply were collapsed into a Nondetachment subscale in subsequent analyses (alpha = .72 in both samples). These two QED subscales were moderately intercorrelated in both Sample 1 (r = .48) and Sample 2 (r = .52).

Schizotypy measures. The participants also completed three measures of schizotypy. The Perceptual Aberration scale (L. J. Chapman et al., 1978) and the Magical Ideation scale (Eckblad & Chapman, 1983) are widely used measures that were developed as part of the Chapmans' longstanding research on psychosis proneness. The items for both scales (which were intermixed in a single questionnaire) are answered using a true/false format. The 35-item Perceptual Aberration scale consists of 28 items assessing bizarre distortions in the experience of one's own body (e.g., "I have sometimes felt that some part of my body no longer belongs to me"), together with seven items

tapping other types of distorted perceptions (e.g., "Sometimes people whom I know well begin to look like strangers"); I eliminated one item, however, that assessed content quite similar to that found in the dissociation scales ("Now and then when I look in the mirror, my face seems quite different than usual") and that might spuriously inflate the association between dissociation and schizotypy. Next, the 30-item Magical Ideation scale measures odd, unconventional beliefs about a variety of events and experiences (e.g., "I have had the momentary feeling that someone's place has been taken by a look-alike"). Extensive data support the reliability and validity of these scales (see J. P. Chapman, Chapman, & Kwapil, 1995; L. J. Chapman, Chapman, Kwapil, Eckblad, & Zinser, 1994). In the current study, the scales had coefficient alphas of .85 (Perceptual Aberration) and .84 (Magical Ideation) in Sample 1, and .85 (Perceptual Aberration) and .84 (Magical Ideation) in Sample 2.

In addition, the participants completed the STQ Schizotypal Personality scale (Claridge & Broks, 1984). The full STQ consists of two scales based on the *DSM-III* (American Psychiatric Association, 1980) symptom criteria for schizotypal personality disorder and borderline personality disorder; the items are rated using a yes/no format. The students in this study completed a shortened form of the Schizotypal Personality scale, which was comprised of 13 items that have been found to discriminate particularly well between clinical and nonclinical respondents (see M. Jackson & Claridge, 1991, Table 8); again, however, I eliminated two questions ("When you looked in a mirror, have you ever felt that your face seemed different?"; "Are you easily distracted by daydreams?") whose content overlapped with that of the dissociation scales. The remaining items reflect tendencies toward paranoid ideation (e.g., "Do you feel that you cannot get 'close' to other people?"), unusual perceptual experiences (e.g., "Do you ever have the sensation that your body or part of it is changing shape?"), and magical thinking

(e.g., "Do you sometimes feel that your accidents are caused by mysterious forces?"). The scale had coefficient alphas of .64 in Sample 1 and .64 in Sample 2.

Iowa Sleep Experiences Survey (ISES). Finally, participants completed an expanded, 24-item ISES item pool. The ISES asks respondents to rate the frequency of various sleep- and dream-related experiences (1 = *never,* 2 = *less than once a year,* 3 = *once or twice a year,* 4 = *several times a year,* 5 = *once or twice a month,* 6 = *several times a month,* 7 = *several times a week*). The data from each sample were subjected to separate principal factor analyses with squared multiple correlations in the diagonal. The resulting solutions were extremely similar and revealed two meaningful factors; these were rotated using varimax. The first factor in each sample was a broad, general dimension that was defined by the majority of the items; it accounted for 64.2% and 66.2% of the common variance in Samples 1 and 2, respectively. In contrast, the second factor was quite specific and was marked by three items tapping various aspects of lucid dreaming.

Accordingly, items that were consistent factor markers in both samples were used to create two scales: General Sleep Experiences (15 items) and Lucid Dreaming (3 items). The items comprising each scale are presented in Table 1. The General Sleep Experiences scale contains several common symptoms of narcolepsy (e.g., cataplexy, hypnagogic and hypnopompic hallucinations, dreams of falling) and numerous items reflecting vivid and unusual dreams (e.g., nightmares, prophetic dreams, recurring dreams), as well as other types of interesting nocturnal experiences (e.g., waking dreams, sensing the presence of someone who isn't actually there). Coefficient alphas for this scale were .83 in Sample 1 and .85 in Sample 2.

Coefficient alphas for the 3-item Lucid Dreaming scale were .75 in Sample 1 and .78 in Sample 2. Scores on the two ISES scales were moderately correlated in both samples (*r*s = .43 and .41 in Samples 1 and 2, respectively), indicating that they represent

relatively distinct—but related—constructs. Finally, it should be noted that neither scale showed substantial sex differences. Specifically, sex (coded 0 = male, 1 = female) correlated .18 (Sample 1; $p < .01$, two-tailed) and .12 (Sample 2; $p < .05$, two-tailed) with General Sleep Experiences, and -.03 (Sample 1; n.s.) and .03 (Sample 2; n.s.) with Lucid Dreaming.

Results

Association between Dissociation and Schizotypy

Correlational analyses. Table 2 presents correlations among the three general dissociation scores and the three measures of schizotypy. The convergent correlations invariably are quite high, indicating that these scales are assessing very similar content. Specifically, the mean convergent correlations among the dissociation scales were .65 and .66 in Samples 1 and 2, respectively (in these and in all subsequent analyses, Fisher's *r*-to-*z* transformation was used to compute average correlations); similarly, the mean convergent correlations among the schizotypy measures were .61 and .60 in Samples 1 and 2, respectively. Thus, in a purely convergent sense, each of these scales appears to be an appropriate measure of its target construct.

However, consistent with previous analyses of this issue (Startup, 1999; Watson, 2001b), the discriminant correlations also are quite high. In fact, replicating the findings of Startup (1999), the average discriminant correlations (mean $r = .55$ and .56 in Samples 1 and 2, respectively) are similar in magnitude to the convergent correlations described earlier. These findings again challenge the discriminant validity of these measures and raise the possibility that all of these scales actually may reflect a single undifferentiated dimension. The discriminant validity of the QED is particularly suspect, as its correlations with the schizotypy measures (which ranged from .54 to .66 across the two samples) were as high as its convergent correlations with the DES (rs = .61 and .63 in Samples 1 and 2, respectively).

Confirmatory factor analyses. I therefore conducted a series of confirmatory factor analyses to compare two contrasting models of the structure defined by the dissociation and schizotypy scales: (a) a 1-factor model in which all of the variables reflected a single underlying dimension versus (b) a two-factor model in which the three general dissociation scales defined one factor, and the three schizotypy scales loaded on the other. In light of the strong correlations observed in Table 2, the factors in the latter model were allowed to be correlated. All analyses were conducted using EQS (Bentler & Wu, 1995); all models were tested using covariance matrices and the maximum likelihood estimation method.

I considered six different fit indices in evaluating these models: the overall model χ^2, the Bentler-Bonnett Normed Fit Index (NFI), the Comparative Fit Index (CFI), the Goodness-of-Fit Index (GFI), the Standardized root-mean-square residual (SRMR), and the Root-mean-square error of approximation (RMSEA) (for recent discussions of fit indices, see Finch & West, 1997; Hu & Bentler, 1998, 1999). Although there are no strict criteria for evaluating these fit indices, conventional "rule-of-thumb" guidelines suggest that a fit is acceptable if (a) NFI, CFI and GFI are .90 or greater and (b) SRMR and RMSEA are .10 or less. However, Hu and Bentler (1999) recently recommended more stringent cutoffs for several of these indices, suggesting values of .95 for CFI, .08 for SRMR, and .06 for RMSEA. In interpreting these results, I will consider NFI, CFI, and GFI values of .90 or greater to indicate an "adequate" fit, and values of .95 or greater to represent an "excellent" fit. SRMR and RMSEA values of .10 or less will be viewed as reflecting an adequate fit, with values of .06 or less representing an excellent fit.

Table 3 reports the fit indices for the analyzed models in both samples. With the exception of unacceptably high RMSEA values, the 1-factor model provided an adequate fit to the data; thus, a model specifying that all these variables define a single underlying dimension is not unreasonable. Nevertheless, the 2-factor model fit the data significantly

better in both Sample 1 [$\chi^2_{diff}(1) = 72.38$; $p < .01$] and Sample 2 [$\chi^2_{diff}(1) = 55.93$; $p < .01$]. Moreover, the 2-factor model generally provided an excellent fit to the data: NFI, CFI, and GFI all exceeded .97 in both samples, whereas SRMR was consistently less than .04; in contrast, RMSEA (.089 and .079 in Samples 1 and 2, respectively) suggested that the fit was only adequate. In light of these data, one can conclude that the dissociation and schizotypy scales can be distinguished at some level.

Table 4, however, presents the factor intercorrelations from the 2-factor model in each sample. As would be expected from earlier findings (especially the generally adequate fit provided by the 1-factor model), these two factors were very strongly correlated ($r = .85$ and .87 in Samples 1 and 2, respectively) in both samples. Thus, although these constructs can be distinguished, the level of differentiation clearly is quite weak. Indeed, factor correlations greater than .85 typically are interpreted as challenging the discriminant validity of the underlying constructs (see Kline, 1998).

I therefore conducted additional analyses to clarify these ambiguous findings. First, as would be expected in nonclinical samples, scores on most of these measures—including the DES, QED, and all three schizotypy scales—were positively skewed (i.e., most respondents had low scores that fell below the mean). This raises the possibility that these initial results were problematic due to violations of multivariate normality. I therefore reran these analyses using the robust maximum likelihood method, which accounts for nonnormality in the data. EQS provides two fit indices that are robust across deviations from multivariate normality: The Satorra-Bentler scaled chi-square (S-B χ^2) and the robust comparative fit index (RCFI). An examination of these indices yielded the same basic conclusions as before. Again, whereas the 1-factor solution provided a reasonably good fit to the data (RCFI = .891 and .934 in Samples 1 and 2, respectively), the 2-factor solution yielded an excellent fit (RCFI = .964 and .981 in Samples 1 and 2, respectively). Moreover, the 2-factor solution again fit the data significantly better than

the 1-factor solution in both Sample 1 [S-B $\chi^2_{diff}(1) = 51.53$; $p < .01$] and Sample 2 [S-B $\chi^2_{diff}(1) = 43.51$; $p < .01$]. Thus, the superiority of the 2-factor model is not simply an artifact of nonnormality.

Next, I examined how specific item content might influence the association between dissociation and schizotypy. As noted earlier, I eliminated a few schizotypy items (one from Perceptual Aberration and two from the STQ) that assessed content quite similar to that found in the dissociation scales. Conversely, an inspection of the dissociation measures indicated that the overlapping item content was almost entirely confined to the Detachment/ Depersonalization subscales in each instrument. Accordingly, I ran two additional sets of confirmatory factor analyses. In the first series, the Detachment/Depersonalization scale from each instrument (i.e., DPS Detachment, DES Depersonalization, QED Detachment) was used to define the dissociation factor. In the second set, each dissociation measure was rescored using only nondetachment items. Specifically, (a) the DPS was scored as the sum of its Obliviousness and Imagination subscales, (b) the DES was scored as the sum of its Amnesia and Absorption subscales, and (c) the QED was assessed using its Nondetachment subscale.

Table 4 presents the correlations between the dissociation and schizotypy factors in these 2-factor models. These results indicate that the detachment/depersonalization items are not clearly distinguishable from schizotypy. In fact, the factor correlation in Sample 2 was so strong that the 2-factor solution failed to fit the data better than the 1-factor solution [$\chi^2_{diff}(1) = 0.39$; n.s.]. In contrast, the factor correlations using the nondetachment items—although still substantial (*r*s = .77 and .75 in Samples 1 and 2, respectively)— nevertheless reflected a much better level of differentiation. These data establish that at least some types of dissociative content can be distinguished from schizotypy.

Creation of dissociation and schizotypy composites. On the basis of these last results, I created separate composite measures of dissociation and schizotypy. I created the schizotypy composite by first standardizing the three marker scales and then averaging them. I then created a parallel dissociation composite by standardizing and averaging the three nondetachment markers described in the previous analysis (e.g., the DPS was assessed as the sum of its Obliviousness and Imagination subscales). As would be expected, these composites were strongly interrelated (r = .65 and .64 in Samples 1 and 2, respectively). In addition, to examine how sleep-related experiences correlate with specific types of dissociation, I created three content-based composites by standardizing and then averaging the corresponding subscales from the DPS and DES (i.e., DPS Obliviousness/ DES Amnesia, DPS Imagination/DES Absorption, and DPS Detachment/DES Depersonalization).

Relations between Dissociation, Schizotypy and the Big Five

Next, I examined how these dissociation and schizotypy composites correlated with the Big Five scales. As would be expected from previous research (Berenbaum & Fujita, 1994; Kihlstrom, Glisky, & Angiulo, 1994), neuroticism was positively correlated with scores on all five composites, with coefficients ranging from .25 to .40 across the two samples. The more important point, however, is that all of the correlations were low to moderate in magnitude; indeed, only one of the 50 coefficients (that between neuroticism and the schizotypy composite in Sample 1) was as high as |.40|. These results establish that the dissociation and schizotypy scales assess content that is not well represented in general trait measures, including neuroticism. Moreover, they indicate that the substantial overlap between dissociation and schizotypy is not simply attributable to the underlying influence of traits such as neuroticism or openness.

Analyses of Sleep Experiences

Scale-based analyses. Table 5 presents correlations between the ISES scales and measures of the Big Five, dissociation and schizotypy. One noteworthy aspect of these data is that the ISES Lucid Dreaming scale was not strongly associated with any of the other measures. In fact, none of its correlations exceeded |.30| in either sample.

In sharp contrast, the ISES General Sleep Experiences scale was moderately to strongly related to both the dissociation (*r*s = .53 and .54 in Samples 1 and 2, respectively) and schizotypy composites (*r*s = .47 and .43 respectively). It was much more weakly related to the Big Five traits, however, with no coefficients exceeding |.30|. Follow-up tests indicated that its correlations with both composites were significantly greater than its correlations with all five BFI scales in both samples (for dissociation, the *z*s ranged from 5.44 to 8.70 in Sample 1, and from 5.65 to 8.65 in Sample 2; for schizotypy, the *z*s ranged from 4.10 to 7.49 in Sample 1, and from 3.09 to 6.51 in Sample 2; all *p*s < .01, two-tailed). These results are consistent with my earlier suggestion that measures of dissociation, schizotypy and sleep-related experiences define a common domain that is characterized by unusual cognitions and perceptions. Furthermore, the relatively weak correlations with the BFI scales establish that the associations among these constructs cannot be attributed to the underlying influence of the Big Five.

General Sleep Experiences also correlated more strongly with the dissociation composite than with the schizotypy composite in both Sample 1 ($z = 1.99$; $p < .05$, two-tailed) and Sample 2 ($z = 3.38$; $p < .01$, two-tailed). These data therefore establish an especially strong affinity between sleep experiences and dissociation. This raises a further question: Are sleep experiences particularly strongly related to certain types of dissociation? Table 5 addresses this issue by reporting correlations between the ISES scales and the three content-based composites. These data do show evidence of specificity, in that General Sleep Experiences had a significantly stronger correlation with Imagination/ Absorption than with Detachment/Depersonalization in both Sample 1 ($z =$

4.67; $p < .01$, two-tailed) and Sample 2 ($z = 2.48$; $p < .05$, two-tailed). It also was more strongly correlated with Imagination/Absorption than with Obliviousness/Amnesia in Sample 1 ($z = 4.69$; $p < .01$, two-tailed), but this did not replicate in Sample 2 ($z = 1.69$; n.s.). Overall, these data suggest a particularly strong affinity between sleep experiences and individual differences in absorption, imaginativeness, and fantasizing.

The schizotypy scales also showed evidence of specificity. Thus, General Sleep Experiences correlated more strongly with Magical Ideation than with Perceptual Aberration in both samples (Sample 1 $z = 2.27$, $p < .05$, two-tailed; Sample 2 $z = 3.58$, $p < .01$, two-tailed). It also was more strongly correlated with Magical Thinking than with Schizotypal Personality in Sample 2 ($z = 3.65$, $p < .01$, two-tailed), but not in Sample 1 ($z = 0.34$; n.s.).

Item-based analyses. Another way to explore the specificity versus generality of these associations is to examine how individual ISES items are linked to dissociation and schizotypy. I investigated this issue by correlating the 15 General Sleep Experiences items with the dissociation and schizotypy composites; for ease of presentation, the two samples were combined in these analyses.

The results indicated that dissociation and schizotypy both are nonspecifically related to a broad range of sleep-related experiences. The dissociation composite was significantly correlated with 14 of the 15 ISES items: It had correlations in the .30 to .39 range with 10 items (being unsure whether one experienced something or only dreamed it, sensing the presence of someone, hypnagogic imagery, hypnopompic imagery, cataplexy, vivid dreams, flying dreams, recurring dreams, prophetic dreams, problem-solving dreams), and correlations in the .18 to .29 range with four others (nightmares, falling dreams, waking up within a dream, dying in a dream). Its only nonsignificant correlation ($r = .06$) was with the general dream recall item (“I remember my dreams"). The schizotypy composite also was significantly related to 14 of 15 items: It had

correlations in the .30 to .39 range with two items (being unsure whether one experienced something or only dreamed it, hypnopompic imagery), and correlations in the .20 to .29 range with 12 others. Interestingly, it also was nonsignificantly related to general dream recall (r = .04)

Discussion

Development of a General Sleep Experiences Scale

The results of this study were highly consistent across the two samples and extend the existing literature in several ways. First, factor analyses of the expanded ISES item pool led to the creation of two scales: General Sleep Experiences and Lucid Dreaming. The former scale should be of particular interest to researchers in this area, as it is the first factor-analytically derived measure that assesses a broad range of sleep-related experiences. As shown in Table 1, it includes several common indicators of narcolepsy (cataplexy, hypnagogic and hypnopompic imagery, dreams of falling), items reflecting intense and unusual dreams (e.g., nightmares, recurring dreams, prophetic dreams, dreams in which the dreamer died), and an array of other interesting nocturnal phenomena (e.g., waking dreams, sensing the presence of someone who isn't actually there). The scale showed an acceptable level of internal consistency in both samples (with coefficient alphas of .83 and .85 in Samples 1 and 2, respectively), indicating that these items reliably assess a common underlying dimension. It is noteworthy, moreover, that I subsequently have obtained a very similar value (alpha = .82) in a new, independent sample of 253 undergraduates. However, retest data still are required to establish the stability of these responses over time.

More fundamentally, additional data are needed to establish the construct validity of this scale. It is particularly important to document the broader convergent validity of these self-rated nocturnal experiences. To date, the only relevant data were reported by Watson (2001b), who collected daily reports of dream recall (i.e., whether or not the

respondents remembered any of their dreams from the previous evening) over a 3-month period (M = 95.0 daily ratings per participant) in a sample of 174 college students. These daily dream reports then were aggregated into an overall measure of recall frequency, which correlated .67 with the ISES general dream recall item. This strong convergent correlation is quite encouraging, and it suggests that respondents can report on their sleep-related experiences with considerable accuracy. Further evidence along these lines would play a key role in establishing the construct validity of this scale.

Correlates of Sleep Experiences

Second, this study has helped to clarify the nature and correlates of sleep-related experiences. The ISES General Sleep Experiences scale was moderately to strongly related to composite measures of schizotypy and dissociation in both samples. Moreover, all of these correlations were significantly greater than those obtained for any of the Big Five traits. These specific links suggest that dissociative, schizotypal and sleep-related phenomena all define a common domain characterized by unusual cognitive and perceptual experiences. Moreover, replicating and extending previous work in this area, they support a *continuity* model of human consciousness: People who are prone to interesting, vivid and unusual experiences during the day also tend to have them at night (see Blagrove & Hartnell, 2000; Claridge et al., 1997; Watson, 2001b).

It also is noteworthy that the General Sleep Experiences scale correlated more strongly with the dissociation composite than with the schizotypy composite in both samples. This pattern suggests some special affinity between dissociative and nocturnal experiences. Subsequent analyses of the content-based dissociation composites indicated that sleep experiences were most strongly correlated with individual differences in Imagination/Absorption and more weakly related to Detachment/Depersonalization. Overall, therefore, these data suggest a particularly strong link between sleep experiences and individual differences in absorption, imagination, daydreaming and fantasizing.

Thus, the current results suggest that dissociative, schizotypal and sleep experiences all define a common domain. What is the nature of this domain, and why do we see such substantial links among these phenomena? A number of researchers—starting from different theoretical frameworks and basing their arguments on a broad array of evidence—have suggested that individual differences in this area reflect the ease with which a person can pass between different states of consciousness (Claridge et al., 1997; Hartmann, 1991; McCreery, 1997; Thalbourne & Houran, 2000). Hartmann (1991), for instance, argues that those who tend to recall more frequent and vivid dreams have "thin boundaries" that permit easy passage between reality-based and fantasy-based states of consciousness. Similarly, Thalbourne and Houran (2000) suggest that schizotypy, fantasy proneness, absorption, creativity and paranormal experiences all are manifestations of the broad trait of "transliminality", which they define as a "tendency for psychological material to cross (*trans*) thresholds (*limines*) into or out of consciousness" (p. 853; emphasis in original).

Viewed in this light, high scorers in this domain may be individuals who readily pass from (a) normal, reality-based mentation to (b) more fantasy-based states of consciousness, such as daydreaming, highway hypnosis, episodes of high absorption (e.g., flow states), and hypnagogic/hypnopompic imagery. The specific nature of this altered state likely depends on a number of factors, including the context (e.g., whether the person is lying in bed versus driving a car), as well as other dispositional characteristics of the individual (e.g., individuals who are anhedonic and interpersonally aloof may tend particularly toward schizotypal manifestations; see Claridge et al., 1997; Meehl, 1962).

The origins of these "boundary" differences remain unclear. It is intriguing to note, however, that some writers have argued that the sleep-wake system may itself be involved (see Claridge et al., 1997; McCreery, 1997). For instance, McCreery (1997)

argues that many schizotypal and paranormal experiences are triggered by brief intrusions of Stage 1 sleep into waking consciousness. Similarly, Claridge et al. (1997) review "strongly converging evidence that so-called *psychosis* proneness relates to a range of sleep-related phenomena" (p. 380; emphasis in original). Thus, it may be that high scorers in this domain are individuals with "thin boundaries" that permit frequent and relatively effortless transitions between sleeping and waking states. If so, this would help to explain why those who prone to interesting, vivid and unusual experiences during the day (i.e., who score high on measures of dissociation and schizotypy) also tend to have them at night (i.e., who score high on the ISES).

In this regard, it also should be noted that the substantial correlations between schizotypy and sleep experiences in the current study are supported by data from clinical samples (e.g., Meehl, 1964). Indeed, as discussed earlier, the findings reported here (see also Watson, 2001b) are consistent with other evidence establishing a significant link between schizophrenia and narcolepsy. Howland (1997), for instance, reviewed data indicating that psychotic symptoms are relatively common in narcolepsy, with as many as 30% of narcoleptics reporting prominent hallucinatory experiences. Similarly, Wilcox (1985) found that narcoleptics reported significantly more symptoms of schizophrenia than did a sex- and age-matched control group; moreover, the odds-ratio for schizophrenia (6.72) indicated a substantially elevated risk for this disorder among the narcoleptics. Combined with the results of the current study, these findings suggest that the relations among sleep experiences, dissociation and schizotypy warrant much closer attention in the future.

Relation between Dissociation and Schizotypy

Third, the current data have helped to clarify the nature of the relation between dissociation and schizotypy. Because the participants were assessed on three general indicators of each construct, I was able to conduct the first formal structural analyses

(using confirmatory factor analysis) of this issue. Separate analyses of each sample indicated that a two-factor model (a) generally provided an excellent overall fit and (b) fit the data significantly better than a 1-factor model. However, the level of differentiation clearly was quite weak in these initial analyses, as the correlation between the factors was extremely high in both samples (r = .85 and .87 in Samples 1 and 2, respectively). These initial results were clarified by subsequent analyses that separated out the detachment/depersonalization items from other types of dissociative tendencies. These results indicated that the detachment/depersonalization items are not clearly distinguishable from schizotypy, with factor correlations of .90 and .99 in Samples 1 and 2, respectively. In contrast, the factor correlations using the nondetachment items—although still quite strong (rs = .77 and .75 in Samples 1 and 2, respectively)—nevertheless reflected a much better level of differentiation; it is important to note, moreover, that factor correlations of this magnitude typically are interpreted as establishing the discriminant validity of related constructs (see Kline, 1998). Thus, these data establish that at least some types of dissociative content can be distinguished from schizotypy.

As discussed previously, the strong correlations that were observed in the current study are consistent with other evidence establishing a substantial link between psychotic and dissociative phenomena. For instance, patients with dissociative identity disorder actually report more positive symptoms of schizophrenia and more Schneiderian first-rank symptoms than do schizophrenics (Ellason & Ross, 1995; Kluft, 1987; Ross et al., 1990); conversely, schizophrenics report prominent symptoms of dissociation (Haugen & Castillo, 1999; Spitzer et al., 1997). Clearly, the association between dissociation and schizotypy is quite robust and is not limited to self-ratings.

Still, the extremely high correlations that emerged in the initial analyses are a significant cause for concern. All of the dissociation measures in this study contain content that overlaps with that included in the schizotypy scales, and it is apparent that

discriminant validity (vis-à-vis schizotypy) was not a primary concern in item development and selection. The current results suggest that the discriminant validity of these dissociation measures can be significantly improved by (a) focusing assessment more on the general themes of obliviousness/amnesia and imagination/absorption and (b) deemphasizing the detachment/ depersonalization content that also is prominent in markers of schizotypy. This is an important issue for future research.

Limitations and Conclusions

I conclude by acknowledging two important limitations of this study. First, the current data are based entirely on the responses of college students, who generally report relatively low levels of psychopathology. Although these results are broadly consistent with data from clinical patients establishing significant links between (a) dissociation and psychosis and (b) narcolepsy and schizophrenia, certain key findings might not generalize well to other types of respondents. For example, it would be interesting to conduct confirmatory factor analyses to determine whether measures of dissociation and schizotypy show a similarly strong association in a large clinical sample.

Second, the current data are based entirely on the respondents' self-ratings, and it obviously is important to consider other types of data as well. In this regard, it would be particularly informative to assess each of the key constructs in this study (including dissociation, schizotypy and sleep experiences) using multiple methods (e.g., self-ratings, clinicians' ratings). This multi-trait, multi-method design would permit powerful analyses of convergent and discriminant validity.

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Table 1

The Items Comprising the ISES Scales

General Sleep Experiences (15 items)

Upon awakening during the night, I am unsure whether I actually experienced something or only dreamed about it.

Lying in bed, I sense the presence of someone who actually isn't there.

I experience intense, dreamlike images as I begin to fall asleep.

I experience intense, dreamlike images as I begin to awaken.

While awake, I experience a sudden weakness in my body muscles during states of strong emotion such as anger or excitement.

I remember my dreams.

I have a dream that is so vivid it influences how I feel the following day.

I have nightmares.

I have dreamed that I was falling.

I have dreamed that I was flying.

I have dreamed that I woke up (that is, waking up was part of the dream experience).

I have recurring dreams.

I have dreamed about something that later actually happened.

I have died in a dream.

A dream helped me to solve a current problem or concern.

Lucid Dreaming (3 items)

I am aware that I am dreaming, even as I dream.

I am able to control or direct the content of my dreams.

I am able to wake myself out of dreams that I find unpleasant or disturbing.

Table 2

Correlations among the General Dissociation and Schizotypy Measures

Scale	1	2	3	4	5	6
Dissociation Measures						
1. DES	--	.63	.58	.53	.53	.52
2. QED	.61	--	.75	.63	.65	.58
3. DPS	.61	.73	--	.51	.51	.52
Schizotypy Measures						
4. Magical Ideation	.57	.66	.51	--	.68	.56
5. Perceptual Aberration	.51	.62	.50	.70	--	.54
6. Schizotypal Personality	.49	.54	.48	.57	.54	--

Note. $N = 471$ (Sample 1), 457 (Sample 2). Correlations for Sample 1 are shown below the diagonal; correlations for Sample 2 are shown above the diagonal. All correlations are significant at $p < .01$, two-tailed. DES = Dissociative Experiences Scale. QED = Questionnaire of Experiences of Dissociation. DPS = Dissociative Processes Scale.

Table 3

Fit Indices for the One- and Two-Factor Models in the Confirmatory Factor Analyses

Model	*df*	χ^2	NFI	CFI	GFI	SRMR	RMSEA
Sample 1							
1-Factor Model	9	110.43	.928	.933	.921	.044	.155
2-Factor Model	8	38.05	.975	.980	.975	.030	.089
Sample 2							
1-Factor Model	9	86.91	.942	.948	.935	.040	.138
2-Factor Model	8	30.98	.979	.985	.978	.029	.079

Note. N = 471 (Sample 1), 457 (Sample 2). *df* = degrees of freedom. NFI = Normed Fit Index. CFI = Comparative Fit Index. GFI = Goodness-of-Fit Index. SRMR = Standardized root-mean-square residual. RMSEA = Root-mean-square error of approximation.

Table 4

Correlations between the Dissociation and Schizotypy Factors in the Two-Factor Models

Analysis	Sample 1	Sample 2
Basic Scale Analyses	.85	.87
Subscale Analyses		
Detachment Items	.90	.99
Nondetachment Items	.77	.75

Note. N =471 (Sample 1), 457 (Sample 2).

Table 5

Correlations between the ISES Scales and the Big Five, Dissociation and Schizotypy

	General Sleep Experiences		Lucid Dreaming	
Variable	Sample 1	Sample 2	Sample 1	Sample 2
BFI Scales				
Neuroticism	.28**	.24**	.02	.03
Extraversion	.06	.06	.01	.13**
Openness to Experience	.15**	.26**	.14**	.08
Agreeableness	-.15**	-.16**	-.11*	-.09*
Conscientiousness	-.17**	-.13**	-.10*	-.15**
Dissociation Measures				
Dissociation Composite	**.53****	**.54****	.24**	.22**
Obliviousness/Amnesia	**.42****	**.47****	.14**	.19**
Imagination/Absorption	**.57****	**.52****	.29**	.24**
Detachment/Depersonalization	**.42****	**.44****	.17**	.19**
Schizotypy Measures				
Schizotypy Composite	**.47****	**.43****	.21**	.17**
Magical Ideation	**.43****	**.45****	.20**	.22**
Perceptual Aberration	.36**	.33**	.12**	.17**
Schizotypal Personality	**.42****	.31**	.22**	.05

Note. N = 471 (Sample 1), 457 (Sample 2). Correlations of |.40| or greater are highlighted.

ISES = Iowa Sleep Experiences Survey. BFI = Big Five Inventory.

*$p < .05$, two-tailed. **$p < .01$, two-tailed.