Dreaming Correlates of Alexithymia Among Sleep-Disordered Patients

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Increasing evidence supports the clinical view that alexithymia is associated with disturbed dreaming. However, a consistent, replicable pattern of relationships between alexithymia and different dreaming components has not yet been identified. Groups of sleep-disordered outpatients (N = 580; 46.0 ± 13.2 years) and nonclinical controls (N = 145; 22.9 ± 4.2 years) were administered the Toronto Alexithymia Scale (TAS-20) and a 14-item Dreaming Questionnaire. Sleep diagnoses were assessed from polysomnography and clinical histories following the American Academy of Sleep Medicine classification system. The Dreaming Questionnaire was reduced by principal-components analysis to a 3-factor solution that distinguishes nightmare distress, dream recall, and dream meaning items. Factor coefficients were correlated with TAS total score and TAS subscales while age was controlled as a covariate. TAS total score was found to correlate positively with nightmare distress and negatively with dream recall for both clinical and nonclinical groups and for both men and women considered separately. TAS total score also correlated negatively with dream meaning for nonclinical participants. TAS subscales were differentially correlated with the 3 dream factors: difficulty identifying feelings (DIF) with increased nightmare distress, difficulty describing feelings (DDF) with decreased dream recall and externally oriented thinking (EOT) with decreased dream meaning. With some exceptions, these patterns were obtained independently for clinical and nonclinical groups and for men and women within these groups. Findings suggest a consistent and replicable pattern of relationships between alexithymia and dreaming components that implicates processes regulating emotion during both wakefulness and dreaming, for example, affect distress, expressive anxiety, and openness to experience.

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Early clinical studies found that alexithymic patients reported both a paucity and an impoverishment of dreaming in addition to their more fundamental disturbances of emotional expression (Apfel & Sifneos, 1979; Sifneos, 1973). Alexithymic individuals were described as recalling dreams only infrequently and as recounting dreams that are short, simplistic, lacking in detail, and unhelpful in psychotherapy (Apfel & Sifneos, 1979; Krystal, 1979; Nemiah, 1977; Sifneos, 1973). Others noted that their dreams are boring, concrete, lacking in fantasy content (Levitan, 1978; Sifneos, 1973; Warnes, 1986), and either containing explicit archaic contents or lacking in color, bizarreness, and symbolism (Nemiah & Sifneos, 1970; Taylor, 1984). Such dream changes were considered a fundamental feature of alexithymia and were reflected in early instruments such as the Beth Israel Questionnaire and the Schalling-Sifneos Personality Scale by single items assessing the frequency or vividness of dream recall, for example, "I often remember the content of dreams very vividly" (Apfel & Sifneos, 1979). However, the more recent Toronto Alexithymia Scale (TAS) contains no such dream-related items (Bagby, Parker, & Taylor, 1994; Bagby, Taylor, & Parker, 1994; Taylor, Bagby, & Parker, 1992).

A growing body of research supports many of these clinical observations about altered dreaming (Parker, Taylor, & Bagby, 2003). One study of patients with skin disorders (Tantam, Kalucy, & Brown, 1982) revealed that the dreams reported by those who were alexithymic contained less participation and emotional involvement than did those reported by nonalexithymics. A laboratory study by our group (Monday, Montplaisir, & Malo, 1987) found that asthmatic patients with alexithymia had more awakenings from REM sleep that were followed by reports of "white dreams" (the impression of having dreamed but without specific recall) as well as shorter overall dream reports than did nonalexithymic patients. A second laboratory study (Ouellet et al., 1996) found a tendency for a group of seven alexithymic patients to have more REM sleep awakenings without dream recall ($M = 26.3\%$) than did a group of seven nonalexithymic patients ($M = 4.9\%$). Also, the alexithymic participants reported fewer dreams with emotional content ($M = 46.3\%$) than did the nonalexithymic participants ($M = 77.8\%$) and evaluated their dream emotions to be less intense on a Likert scale ($M = 3.33$ vs. 4.11 out of 5; $p = .004$). Finally, in a study of asthmatic outpatients (Nielsen et al., 1997), we reported a negative correlation between the Externally Oriented Thinking (EOT) subscale of the TAS and a one-item retrospective measure of dream recall but only among men.

Several studies of nonclinical participants also support the claimed relationships between alexithymia and dreaming. First, a study of 257 adults (Hyyppa, Lindholm, Kronholm, & Lehtinen, 1990) found that fewer alexithymic persons had dreams with color (25%) than did nonalexithymic persons (46%, $p = .006$). Second, a laboratory study (Parker, Bauermann, & Smith, 2000) found that the rapid eye movement (REM) sleep dream content of eight alexithymic undergraduates was less fantastic in nature than that of eight nonalexithymic undergraduates, but also that groups did not differ in the number of reported dreams, mean length of the dreams, and valence of dream emotions. Third, a pair of studies by Lumley & Bazydlo (2000), one retrospective and one prospective, of several hundred under-

graduates found that the three TAS-20 subscales were associated with different dream characteristics: high EOT scores with lower dream recall, shorter dreams, boring dreams, dreams lacking vividness, and low belief in dream meaningfulness; high Difficulty Identifying Feeling (DIF) and Difficulty Describing Feeling (DDF) subscale scores were associated with increased nightmare distress, more frequent nightmares, and more frequent dreams rated as bizarre and aggressive. Fourth, a prospective study (De Gennaro et al., 2003) of 10 alexithymic and 10 nonalexithymic undergraduates who kept home audio diaries found that dream recall frequency and report length were both lower in the alexithymic group but that the emotional content, vividness, and bizarreness of the reports did not differ. Finally, and most recently (Bauermann, Parker, & Taylor, 2008), a retrospective study of 2,045 undergraduates found that alexithymic participants (N = 228) scored higher than nonalexithymic participants (N = 228) on a seven-item scale of nightmare symptomatology and that the TAS-20 total score and DIF and DDF subscale scores all correlated positively with the nightmare measure whereas the EOT subscale scores correlated negatively with it.

Altogether, early clinical reports that alexithymia is associated with altered dreaming have been largely supported by more recent questionnaire and laboratory studies of clinical and healthy undergraduate populations. Although not completely consistent, findings suggest that dream recall is less frequent and more impoverished among alexithymic individuals and that nightmares are more frequent or distressing. There is also evidence that the component processes of alexithymia, assessed by the DIF, DDF, and EOT subscales, may be associated with different alterations, such as poor dream recall and increased nightmare frequency.

In light of this accumulating evidence, we decided to investigate relationships between alexithymia and dreaming in both clinical and undergraduate samples. We used the TAS-20 battery of measures, which has become the gold standard in this type of research, as well as a multidimensional, self-report questionnaire to assess several components of dreaming. The reviewed literature led us to hypothesize that different components of dreaming—dream recall and nightmare frequency, in particular—would be associated with TAS total score and the TAS subscale scores.

METHOD

Participants

Participant characteristics are shown in Table 1. The clinical group consisted of 580 outpatients (275 men, 305 women) referred for assessment and treatment to the Montreal Sleep Disorders Center between December 2004 and August 2008. Mean age of the group was 46.0 (SD = 13.2). Reasons for exclusion were absence of an AASM diagnosis; presence of mental, neurologic, or other medical disorders; and being under age 18. Diagnoses were primarily psychophysiological insomnia, sleep apnea syndrome, narcolepsy, idiopathic hypersomnia, restless legs syndrome, REM parasomnias, and nonrapid eye movement (NREM) parasomnias. Participants gave written consent and were not compensated monetarily. Procedures were approved by the hospital ethics committee and the ethics board for research on human participants of the Université de Montreal.

T1

Table 1. Consistency, Age, and TAS Total Scores of Clinical and Nonclinical Groups

	Men age			Women age			Total age			TAS total	
Clinical group	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*M*	*SD*
Psychophysiological insomnia	67	45.0	12.0	106	46.3	11.2	173	45.8	11.5	47.6	10.3
Sleep apnea syndrome	91	52.5	9.8	22	55.0	9.6	113	53.0	9.8	52.4	10.8
Narcolepsy	15	29.4	9.0	14	33.4	11.4	29	31.3	10.2	51.4	9.2
Idiopathic hypersomnia	25	39.9	13.7	43	34.5	11.3	68	36.5	12.4	50.7	11.3
Restless legs syndrome	52	48.7	11.7	85	52.5	12.5	137	51.0	12.3	49.9	10.1
REM parasomnias	8	56.9	8.7	7	43.0	11.2	15	50.4	12.0	49.0	7.4
NREM parasomnias	17	35.5	10.4	28	35.8	10.6	45	35.6	10.4	50.2	11.7
Total	275	46.6	12.8	305	45.4	13.5	580	46.0	13.2	49.9	10.3
Nonclinical group 1st-year undergraduates	16	21.6	3.5	73	22.0	4.6	89	21.9	4.4	43.0	9.6
Young adults	11	24.6	4.0	45	24.6	2.9	56	24.6	3.1	41.5	9.1
Total	27	22.8	3.9	118	23.0	4.2	145	22.9	4.2	42.4	9.4

The nonclinical group consisted of 145 participants (27 men, 118 women) with a mean age of 22.9 ($SD = 4.2$). It included 2 subgroups; the first, 89 university students (16 men, 73 women; $M_{age} = 21.9$, $SD = 4.4$) enrolled in an introductory psychology class at the Université de Montréal; and the second, 56 young adults (11 men, 45 women; $M_{age} = 24.6$, $SD = 3.1$) recruited by written advertisements and telephone. The latter were participants in a separate laboratory study of virtual reality and dreaming during which they completed the questionnaires. Nonclinical participants reported no sleep disorders and did not meet any other exclusion criterion.

Procedures

All participants completed the TAS-20 and Dreaming Questionnaires and an additional 10-item social anxiety and imagination questionnaire (not reported here). Clinical patients completed the questionnaires on the evening before sleeping in the laboratory whereas nonclinical participants completed them either in class (undergraduates) or during a laboratory visit (laboratory participants).

Measures

Toronto Alexithymia Scale–20 Items (TAS-20)

Alexithymia was assessed with the TAS-20, a self-report measure that uses 5-point Likert scales ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) and provides a global score (TAS score) that ranges from 20 to 100. Several studies support the scale's reliability and factorial validity (Taylor, Bagby, & Parker, 2003). Its three-factor structure is assumed to capture three facets of alexithymia: (a) DIF (scores 7 to 35), (b) DDF (scores 5 to 25), and (c) EOT (scores 8 to 40; Parker et al., 2003). A validated French Canadian version of the TAS-20 was used (Nielsen et al., 1997).

Dreaming Questionnaire

Fourteen items were administered to tap four features of dreaming (see Table 2) T2 that past studies suggest are disturbed in alexithymia: nightmares (Lumley & Bazydlo, 2000; Parker et al., 2000), macabre dream content (Levitan, 1976; Levitan, 1981a; Levitan, 1981b), dream recall frequency and memorability (De Gennaro et al., 2003; Nielsen et al., 1997), and dream meaning (Lumley & Bazydlo, 2000). All items were scored with the same Likert scales used for the TAS-20.

Clinical patients spent at least one night in the sleep laboratory undergoing polysomnographic recordings conducted by trained polysomnographic technicians. A different polysomnographer scored the recordings using standard criteria (Rechtschaffen & Kales, 1968) and applied in-house programs to summarize sleep architectural details, such as minutes and percentage of sleep stages, as well as levels of blood oxygen saturation, and frequencies of sleep apneas–hypopneas and periodic limb movements. Physicians knowledgeable in application of the American Academy of Sleep Medicine (AASM) classification system established patient diagnoses from these reports and patient histories (American Academy of Sleep Medicine & Task Force Chair, 2005).

Statistical Analyses

Dreaming Questionnaire responses were reduced to orthogonal factors by principal-components analysis (SPSS 16.0 for Windows); factor extraction was performed using Kaiser's recommendation of eigenvalues ≥ 1 and varimax rotation. Appropriateness of factor solutions was based on eigenvalues, total variance explained (VE), and scree plots. The Kaiser-Meyer-Olkin (KMO) index verified the sampling adequacy for analyses with all KMO values above the acceptable limit of 0.5. Bartlett's tests of sphericity were sufficiently large for principal-components analysis on both clinical and nonclinical groups.

Table 2. Dreaming Questionnaire Items and Categories

Item	Content	Category
D1	I remember my dreams very often	dream recall
D2	I am frequently troubled by bad dreams or nightmares	nightmare distress
D3	I dream, but I never remember my dreams when I wake up	dream recall
D4	When I remember dreaming, the images are very clear	dream recall
D5	When I remember dreaming, the images are usually in color	dream recall
D6[a]	I have dreamt several times about death, destruction or catastrophes	macabre dreams
D7[a]	I have several dreams with macabre content	macabre dreams
D8[b]	The themes of my dreams do not make any sense	dream meaning
D9	I have nightmares that wake me up	nightmare distress
D10[b]	I have bad dreams that don't wake me up	nightmare distress
D11	My bad dreams and nightmares are causing me distress	nightmare distress
D12	I think that dreams are important and meaningful	dream meaning
D13	In the right hands, dreams can be useful	dream meaning
D14	My dreams give me a glimpse of my problems and worries	dream meaning

[a] Item added to nightmare distress factor as result of factor analysis. [b] Item dropped as result of factor analysis.

Table 3. Principal Components Analysis Factor Solutions for the Dreaming Questionnaire (Varimax Rotation With Kaiser Normalization)

	Clinical group components			Nonclinical group components		
Item	1	2	3	1	3	2
D7 Macabre dream content	**0.781**	0.080	−0.037	**0.773**	0.103	0.017
D11 Distressing nightmares	**0.778**	0.040	0.190	**0.678**	−0.002	0.237
D2 Troubled by nightmares	**0.757**	0.205	0.170	**0.797**	0.144	0.184
D6 Dreams of death, destruction	**0.742**	0.168	0.023	**0.726**	0.114	-0.066
D9 Nightmares wake me up	**0.712**	0.185	0.102	**0.753**	0.112	0.040
D1 Remember dreams often	0.231	**0.782**	0.113	0.280	**0.785**	0.203
D4 Remember clear dream images	0.125	**0.779**	0.070	0.021	**0.803**	0.146
D3 Dream, but don't remember	−0.211	**−0.711**	0.022	−0.162	**−0.697**	−0.235
D5 Dream images are in color	0.007	**0.628**	0.273	0.028	**0.683**	0.015
D13 Dreams can be useful	0.089	0.037	**0.879**	0.076	0.095	**0.888**
D12 Dreams important, meaningful	0.056	0.113	**0.870**	0.088	0.147	**0.855**
D14 Dreams reflect problems	0.176	0.200	**0.758**	0.108	0.290	**0.807**
Variance explained (%)	25.0	19.1	19.0	24.3	19.9	19.9

Relationships between alexithymia and dreaming were examined by calculating two-tailed Pearson correlations between principal-components analysis factor coefficients on the one hand and TAS total and subscale scores on the other. To control for age, partial correlations holding age constant were calculated and compared to the original correlations.

RESULTS

Data Reduction

Principal-components analysis for the clinical group indicated that two Dreaming Questionnaire items (D8, D10) either did not load strongly on any factor (D10: maximum $r = .410$) or cross-loaded on more than one factor (D8) and could be discarded. Reanalysis with the 12 remaining items produced a three-factor solution (63.1% VE), consisting of nightmare distress (D2, D6, D7, D9, D11; 25.0% VE), dream recall (D1, D3–D5; 19.1% VE), and dream meaning (D12–D14; 19.0% VE) factors. Analysis of the nonclinical group indicated that the same two items (D8, D10) had either weak loadings (D10: maximum $r = .411$) or loaded on more than one factor (D8) and should be removed. Reanalysis with 12 items produced a four-factor solution (73.3% VE) similar to the previous solution except that the nightmare distress factor now separated into nightmare (D2, D9, D11) and macabre dreaming (D6, D7) factors. Because the macabre dreaming items also loaded moderately on the nightmares factor (D6: $r = .319$; D7: $r = .360$), a new solution was forced to three factors. This resulted in the same three-factor groupings observed for the clinical group (64.1% VE). These solutions for the clinical and nonclinical groups were deemed acceptable parallel reductions of the Dreaming Questionnaire (see Table 3). Factor score coefficients were then calculated by using the regression method for each of the three dreaming factors for each participant and used as dependent measures in subsequent analyses. These coefficients have a mean of 0 and variance equal to the squared multiple correlation

between estimated and true factor values; the scores may, thus, be correlated even though the factors are orthogonal.

TAS × Dreaming Relationships

Figure 1 and Table 4 show correlations between TAS-20 and dreaming factor scores for the nonclinical and clinical groups (top row); highly similar patterns are evident for the two groups. Higher TAS total scores were associated with higher nightmare distress scores for both nonclinical ($r_{145} = .320$, $p < .0000001$) and clinical ($r_{546} = .216$, $p < .0000001$) groups and with lower dream recall scores (nonclinical, $r_{145} = -.234$, $p = .005$; clinical, $r_{546} = -182$, $p < .0000001$). Only for nonclinical participants were higher TAS total scores associated with lower dream meaning scores (nonclinical: $r_{144} = -.203$, $p = .015$; clinical: $r_{546} = -.049$, $p = .252$). Partialing out age did not diminish any of these relationships. F1, T4

Dreaming factor coefficients correlated differentially with TAS subscale scores. First, higher DIF scores were associated primarily with higher nightmare distress for both groups (nonclinical, $r_{144} = .482$, $p < .0000001$; clinical, $r_{546} = .315$, $p < .0000001$). Second, higher EOT scores were associated primarily with lower dream meaning (nonclinical, $r_{144} = -.348$, $p < .0000001$; clinical, $r_{546} = -.284$, $p < .0000001$). Third, higher DDF scores were associated primarily with lower dream recall (nonclinical, $r_{144} = -.210$, $p = .012$; clinical, $r_{546} = -.191$, $p < .0000001$). Most of the previous relationships remained highly significant even if a per-sample error correction of $p = .05/12 = .004$ was applied.

Controlling for age minimally affected two relationships, both for the nonclinical group. The positive correlation between nightmare distress and DDF was reduced from $r_{144} = .172$ ($p = .039$) to $r_{141} = .159$ ($p = .059$) and the negative correlation between dream recall and DDF from $r_{144} = -.186$ ($p = .026$) to $r_{141} = -.154$ ($p = .066$).

For the clinical group, calculation of the TAS × Dreaming factor correlations separately by gender revealed the same patterns for both women and men (Figure 1, right middle and bottom rows). All correlations that were significant for the whole group remained so (at least $p < .05$) for both sexes except for the correlation between DIF and dream meaning, which remained as a trend (both $p < .07$). For the nonclinical group, the same patterns, too, were observed for both women and men (Figure 1, left middle and bottom rows) although due to small N for men the only significant correlation was between DIF and nightmare distress ($r_{27} = .642$, $p < .0000001$). For women, 4 of the 6 subscale correlations remained significant and 2—both for dream recall—appeared only as trends.

Controlling for age in the men and women subgroups resulted only in one minor decrease in a correlation between dream recall and EOT for men in the clinical group, from $-.125$ ($p = .045$) to $-.118$ ($p = .059$) but two minor increases in correlations between nightmare distress and TAS total score for men in the nonclinical group (from .319, $p = .104$ to .393, $p = .047$) and between dream meaning and DDF for women in the nonclinical group (from $-.178$, $p = .055$ to $-.187$, $p = .045$).

Additional correlational analyses revealed relationships between age and some dreaming and TAS subscale scores. For the clinical group, increasing age was

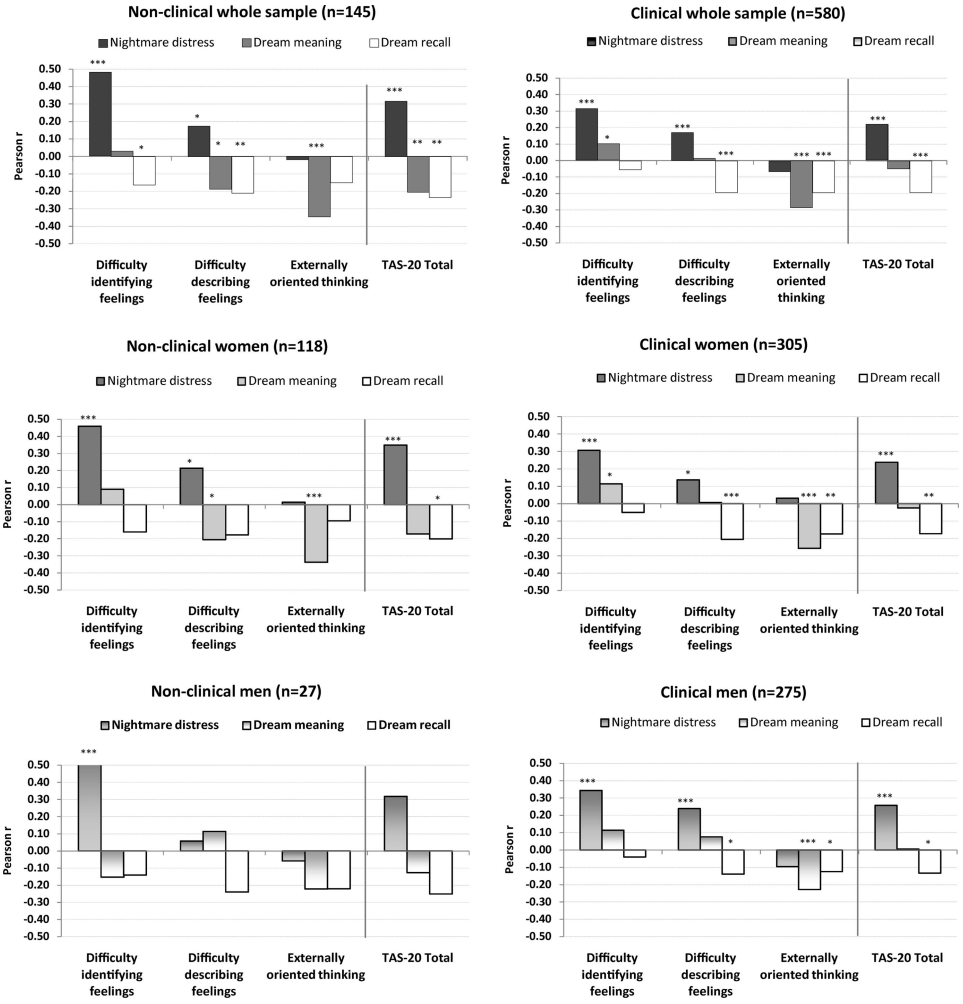

Figure 1. Pearson correlations between TAS-20 scores and the 3 dreaming factor score coefficients. Nonclinical participants are shown in the 3 left panels; clinical participants in the 3 right panels. Whole group correlations are shown in the top panels, women in the middle and men in the bottom. Consistent patterns of correlations are seen for all groups: Difficulty Identifying Feelings is associated primarily with increased nightmare distress, Difficulty Describing Feelings is associated primarily with decreased dream recall, and Externally Oriented Thinking is associated primarily with decreased dream meaning. $^{*}\,p < .05$. $^{**}\,p < .01$. $^{***}\,p < .001$.

correlated only with lower dream recall ($r_{546} = -.160$, $p = .0002$), a finding that obtained both for men ($r_{258} = -.122$, $p = .049$) and women ($r_{288} = -.184$, $p = .002$).

For the nonclinical group, increasing age was associated with higher dream meaning ($r_{144} = .234$, $p = .005$) and lower DIF ($r_{144} = -.168$, $p = .044$) and DDF ($r_{144} = -.163$, $p = .050$) scores. When the latter findings were assessed separately by gender, women showed only the Age $\times$ Dream Meaning relationship ($r_{117} = .296$, $p = .001$) and men only the Age $\times$ DDF relationship ($r_{27} = -.436$, $p = .023$).

Table 4. Zero-Order Pearson Correlations Between Dream Factor Coefficients and TAS-20 Scores for Nonclinical and Clinical Groups and Women and Men Separately

	Nonclinical group			Clinical group		
Group	Nightmare distress	Dream meaning	Dream recall	Nightmare distress	Dream meaning	Dream recall
Whole						
DIF	.482	.027	−.164	.315	.103	−.053
p	.000000	.745000	.050000	.000000	.016000	.215000
DDF	.172	−.186	−.210	.167	.012	−.191
p	.039000	.026000	.012000	.000000	.774000	.000000
EOT	−.015	−.348	−.150	−.063	−.284	−.190
p	.855000	.000000	.073000	.144000	.000000	.000000
TAS20	.320	−.203	−.234	.216	−.049	−.182
p	.000000	.015000	.005000	.000000	.252000	.000000
Women						
DIF	.459	.090	−.160	.307	.114	−.050
p	.000000	.335000	.084000	.000000	.053000	.401000
DDF	.213	−.205	−.178	.137	.006	−.206
p	.021000	.027000	.055000	.020000	.925000	.000000
EOT	.015	−.337	−.094	.031	−.258	−.174
p	.869000	.000000	.316000	.596000	.000000	.003000
TAS20	.349	−.172	−.201	.238	−.025	−.173
p	.000000	.063000	.030000	.000000	.676000	.003000
Men						
DIF	.642	−.152	−.141	.344	.115	−.040
p	.000000	.450000	.482000	.000000	.066000	.524000
DDF	.058	.114	−.239	.239	.076	−.139
p	.774000	.570000	.230000	.000000	.223000	.026000
EOT	−.058	−.222	−.220	−.096	−.227	−.125
p	.776000	.266000	.270000	.125000	.000000	.045000
TAS20	.319	−.126	−.251	.258	.006	−.134
p	.104000	.531000	.208000	.000000	.926000	.032000

Note. DIF = Difficulty Identifying Feelings; DDF = Difficulty Describing Feelings; EOT = Externally Oriented Thinking; TAS-20 = Toronto Alexithymia Scale (20 items) total score.

DISCUSSION

A Consistent and Replicable Pattern of Relationships

This study uncovered a robust, consistent pattern of relationships between distinct components of dream experience and the standard battery of TAS-20 measures. The core measure of alexithymia—TAS total score—was strongly and positively correlated with the nightmare distress factor. It was also negatively correlated with dream recall and, for the nonclinical group only, with dream meaning. The relative consistency of the first two of these relationships for clinical and nonclinical groups and for men and women considered separately attests to the prominent reliability of the pattern. The third relationship with dream meaning also proves to be quite consistent when assessed in relation to the TAS subscales (see later).

Consistency of the TAS total score–nightmare distress relationship is further demonstrated by marked similarities with two previous studies of university undergraduates (Bauermann et al., 2008; Lumley & Bazydlo, 2000); results are displayed in Figure 2 for ease of comparison. In one of these studies (right panel), TAS total F2

scores from 2,045 students were positively correlated with a seven-item nightmare symptom scale ($p < .001$) which, like the present nightmare distress measure, contains items tapping both nightmare frequency (e.g., "I often have frightening dreams") and nightmare distress ("I am troubled by my dreams") (Bauermann et al., 2008). In the second study (Figure 2, left panel), TAS total scores from 853 students correlated positively with scores on a single item ("a dream that was disturbing enough to wake you up"), measuring nightmare frequency over the last 30 days (Lumley & Bazydlo, 2000).

Correlations between dreaming and TAS subscale scores in the present study are also consistent with some of these previous findings (cf. Figure 2 with Figure 1). First, the most salient and consistent finding, that of positive correlations between nightmare distress and DIF scores, is quite analogous to the positive correlations observed between nightmare symptoms and DIF scores ($p < .0001$) in the Bauermann (Bauermann et al., 2008) study and between nightmare frequency and DIF scores in the Lumley and Bazydlo (Lumley & Bazydlo, 2000) study. In fact, these correlations were the largest effects of the latter two studies—as they were in our study. Our finding of secondary, smaller scale correlations between nightmare distress and DDF scores was also echoed in both of the other studies. Second, our finding of negative correlations between dream meaning and EOT scores directly mirror a negative correlation ($r = -.14, p < .001$) between EOT scores and a dream meaningfulness item ("I think that dreams are meaningful and important") from the Lumley and Bazydlo study (Lumley & Bazydlo, 2000).

In sum, this study conceptually replicates many of the major findings from two previous studies of young healthy individuals that used similar dreaming measures. Most prominent among these findings is the association between nightmares and

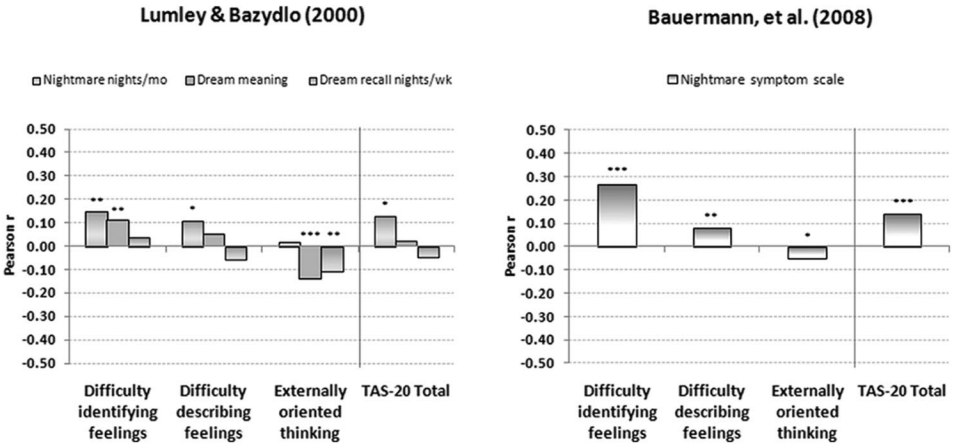

Figure 2. Pearson correlations between TAS-20 scores and dreaming items for 2 previous studies that used similar dependent measures. A pattern of correlations highly consistent with the one shown in Figure 1 was reported by Lumley and Bazydlo (2000) (left panel); nightmare frequency is correlated positively with TAS total score, Difficulty Identifying Feelings and Difficulty Describing Feelings scores, whereas dream meaning is correlated negatively with Externally Oriented Thinking. The same pattern of correlations between nightmares, TAS total score, DIF, and DDF was also reported by Bauermann et al., (2008) (right panel). $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

alexithymia—especially the DIF component of alexithymia. This study also extends these observations to a population of clinically diagnosed sleep-disordered patients and demonstrates generalizability of the findings to women and, to a lesser extent, men.

Nonetheless, some previous findings were not replicated in every respect. The TAS Total Score × Dream Meaning negative correlation that we observed for the nonclinical group was not reported for healthy participants with the Lumley and Bazydlo (2000) dream meaningfulness measure. In that study, the DIF and EOT scales correlated with dream meaningfulness in opposite directions (see Figure 2), thereby cancelling out the overall correlation for TAS total score. In fact, our clinical group displayed this same pattern of opposing correlations between DIF–EOT and dream meaning (see Figure 1, top right) and consequently a near-zero correlation with TAS total score. This pattern did not obtain for our nonclinical group because a positive correlation between dream meaning and DIF was absent.

Further, we only partially replicated our own previously reported negative relationship between EOT and recall of dreams by asthmatic men but not women (Nielsen et al., 1997). We report here that the correlation between EOT and dream recall is negative for men as expected ($r = -.125$, $p = .045$) but also significantly negative for women ($r = -.174$, $p = .003$). Finally, our previous finding of a negative correlation between EOT and a single-item nightmare frequency measure for asthmatic men (Nielsen et al., 1997) was also not replicated, although the present correlation was in the expected direction ($r = -.096$, $p = .063$, one-tailed). These discrepancies with our prior findings may be due to the use of less reliable single-item measures of dream and nightmare recall in the prior study, to the different clinical populations participating, or to the different sizes of samples in the studies.

Nightmare Distress and the DIF Subscale

The consistent pattern of correlations between nightmare distress and TAS total score in the present results is largely explainable by a more specific relationship between nightmare distress and the DIF subscale. Highly significant correlations were observed for both clinical and nonclinical groups, for both men and women and, indeed, for the two previous studies that had used similar measures. One explanation for this highly replicable finding is that both the nightmare distress and DIF subscale measures are expressions of an underlying factor that reflects the individual's level of affect distress. This construct, akin to the negative affectivity personality characteristic (Watson & Pennebaker, 1989), has been defined as an individual's long-standing disposition to experience events with distressing, highly reactive emotions (Levin & Nielsen, 2007), and it correlates with a number of measures of negative emotion. This possibility is supported, in the case of alexithymia, by positive correlations between DIF scores and neuroticism (Bagby, Taylor, & Parker, 1994; De Gucht, Fontaine, & Fischler, 2004), depression and anxiety (Kano, Hamaguchi, Itoh, Yanai, & Fukudo, 2007; Marchesi, Brusamonti, & Maggini, 2000; Marchesi, Fonto, Balista, Cimmino, & Maggini, 2005), suicide attempts (Evren & Evren, 2006), increased sensitivity to pain (Kano et al., 2007), the affective distress component of pain (Huber, Suman, Biasi, & Carli, 2009), and other pathology indicators. Similarly, nightmares are correlated with a wide variety of anxiety-based disorders, maladaptive coping styles, health complaints, and other

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psychopathological indicators (see review in Levin & Nielsen, 2007). Thus, elevated DIF and nightmare distress may be parallel expressions of a disposition to react negatively to events, whether these are emotionally arousing situations experienced while awake or frightening dreams experienced while asleep.

A second, possibly related, explanation of this relationship is that both nightmare distress and DIF scores reflect a deficit in emotion regulation processes. Emotional dysregulation has been proposed to be a factor that leads alexithymic individuals to display excessive, unexpected emotional outbursts when awake and bizarre emotional dreams and nightmares when asleep (Taylor, Bagby, & Parker, 1996). Similarly, we have proposed that dysfunctional regulation of sleep-related fear extinction processes is a factor in nightmare generation (Nielsen & Levin, 2007). An emotion dysregulation explanation is consistent with accumulating evidence that dreaming and REM sleep play roles in the cross-night regulation of negative emotions (see review in Nielsen & Lara-Carrasco, 2007) and the consolidation of emotional memories (Nishida, Pearsall, Buckner, & Walker, 2008).

Dream Recall and the DDF Subscale

The Negative Dream Recall × TAS Total Score relationship is partially explainable by a more specific relationship between dream recall and the DDF subscale. In this study, dream recall was negatively associated with DDF for all groups, significantly so for women and men clinical groups but nonetheless in the expected direction for nonclinical women ($r = -.178$, $p = .055$) and men ($r = -.239$, $p = .230$) as well. One explanation for this relationship is that a chronic difficulty in describing emotional events extends also to the recounting of dream content because it is so frequently emotional in nature (Nielsen, Deslauriers, & Baylor, 1991; Schredl & Doll, 1998). Because of their expressive difficulties, high-DDF individuals may be less likely to attempt to remember their dreams and recount them to others; the anxious anticipation engendered by expressive difficulties may be sufficient to reduce interest in, and spontaneous recall of, dream content in the long term. In fact, participants high on the DDF subscale react with large cortisol increases during anticipation of exposure to a stress test (deTimary, Roy, Luminet, Fillee, & Mikolajczak, 2008). High DDF scorers also score high on both emotion suppression and social desirability (Kirmayer & Robbins, 1993).

Another possible explanation for this relationship is that it is mediated by age, because age correlates positively with DDF (Kirmayer & Robbins, 1993) and negatively with dream recall (Schredl, 2008). Indeed, increasing age was associated with lower dream recall for both men and women in our study. When we partialed out age in our analyses, the relationship between dream recall and DDF was diminished to some extent but a trend nonetheless remained ($p = .066$).

Dream Meaning and the EOT Subscale

Although dream meaning was negatively correlated with TAS total score only for the nonclinical group, strong negative correlations with the EOT subscale were obtained for both clinical and nonclinical groups, for both women's groups and for

the men's clinical group. These relationships appear to reflect the literal, utilitarian aspect of thought that is measured by the EOT subscale (Marty & de M'Uzan, 1963). This utilitarian style includes an inability to link one's feelings with one's memories, fantasies, or specific situations (Taylor, Bagby, & Parker, 1991); early French psychoanalysts noted that the alexithymic's mental activity in general was not linked to unconscious imaginal content (Lesser, 1981). Indeed, classical psychoanalytic dream theory stipulated that the forming of such cognitive and affective linkages with dreams, that is, the patient's discovery of the memory sources of their dream content, is precisely the process by which they derive the dream's personal meaning (Freud, 1900). More recent theories (Hartmann, 2007) also suggest a role for the linking of emotional concerns with vivid imagery drawn from the reservoir of past memories as part of dreaming's regulation of emotions by a meaning-building contextualizing process. A deficit in the ability to link feelings with other cognitive contents may thus lead to a devaluation of their meaning—which is presumably reflected in lower scores on the dream meaning questionnaire items.

Such speculative notions about dream meaning have not yet been tested directly. In fact, the EOT subscale is frequently singled out as having the poorest psychometric qualities of the three TAS-20 subscales (Kooiman, Spinhoven, & Trijsburg, 2002; Meganck, Vanheule, & Desmet, 2008). Nonetheless, some correlates of the EOT scale appear to support the notion indirectly. For example, there is a strong negative correlation between EOT and openness to experience (Bagby, Taylor, & Parker, 1994; Wise, Mann, & Shay, 1992), a personality trait defined by an intercorrelated cluster of abilities that includes active imagination, preference for variety, intellectual curiosity, aesthetic sensitivity, and attention to feelings (Costa & McCrae, 1990). Individuals low in openness tend to be conventional, traditional, and practical, preferring familiar routines and holding a narrow range of interests compared with those high in openness. The EOT correlates more strongly ($r = .47$, $p < .001$) than any of the TAS measures on a measure of dysfunctional openness to experience, as reflected in low scores on items that assess interest in other cultures, understanding others' points of view, and having outside interests or hobbies (Piedmont, Sherman, Sherman, Dy-Liacco, & Williams, 2009). Thus, the EOT × Dream Meaning relationship may reflect limitations on an individual's affective and imaginal associative processes and a consequent restriction on their capacity to derive personal meaning from their dreams and, possibly, other aspects of psychological and social life. AQ: 2

Other types of evidence suggest that the deficits reflected by the EOT subscale may be rooted in fundamental physiological changes. Whereas shared environmental factors have been shown to contribute to the DIF and DDF subscales, shared genetic factors contribute to the EOT (Valera & Berenbaum, 2001). Openness to experience, too, has a genetic component (61%), which is the most apparent of all of the five NEO personality inventory factors (Jang, Livesley, & Vernon, 1996). In the same vein, EOT scores show the strongest relationships of the three TAS subscales with sleep architecture changes, even when age, sex, and depression are controlled. Of particular interest to the present findings are EOT correlations with REM latency ($r = -.32$, $p < .05$), #REM periods (partial $r = .31$, $p < .05$), and percentage of Stage 1 sleep that occurs during and immediately after REM sleep ($r = .30$, $p < .05$) (Bazydlo, Lumley, & Roehrs, 2001). The predominance of post-REM Stage 1 sleep (rather than full wakefulness) has been suggested as a AQ: 3 AQ: 4

mechanism that prevents alexithymics from experiencing the abrupt, extended awakenings necessary for successful dream recall (Bazydlo, et al., 2001). However, it might also reflect a problem with dream formation, dream function (e.g., contextualization), or the generation of dream meaning. Further validation of the EOT subscale is needed to discriminate among the previous possibilities.

Study Limitations

Although our study consists of fairly large samples of men and women clinical patients and women nonclinical participants, its sample of nonclinical men is relatively small ($N = 27$). This likely resulted in many of the correlations for this group remaining nonsignificant even though they were similar in direction to those of the other groups. Female-to-male ratios are typically skewed in undergraduate samples that study these variables (e.g., 2.0:1, Lumley & Bazydlo, 2000; 3.6:1, Bauermann et al., 2008), but our own ratio is even more skewed (4.4:1). Assessment of additional nonclinical male participants is thus clearly desirable in future studies. A second limitation is that our nonclinical group was also not screened for sleep and psychiatric disorders. Given the high prevalence of sleep disorders in the general population—56% of the U.S. general population in one study (Leger, Poursain, Neubauer, & Uchiyama, 2008)—such screening is clearly needed to ensure that the group similarities noted in our study are not due entirely to the presence of sleep disorders in both groups. Finally, our use of retrospective measures of dreaming is a methodological weakness. Our introduction of a multi-item dreaming questionnaire improves over single-item prior studies, but retrospective measures of some dreaming attributes (e.g., nightmare frequency) seriously underestimate their frequency relative to prospective measures derived from home logs (Wood & Bootzin, 1990). Even studies that have sampled dream content from laboratory awakenings have reported inconsistent findings; Parker et al. (2000) found no differences in dream recall whereas DeGennaro et al. (2003) found lower recall in alexithymic participants, a finding consistent with the present study. Assessment of group differences with several types of dreaming measurements is thus clearly desirable.

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