IMAGINATION, COGNITION AND PERSONALITY, Vol. 21(3) 201-219, 2001-2002

THE RELATION OF WAKING FANTASY TO DREAMING

ROSS LEVIN

HUGH YOUNG

Ferkauf Graduate School of Psychology

ABSTRACT

This study investigated the relationship between fantasy immersion (fantasy proneness, absorption, and positive-constructive daydreaming) and qualities of nocturnal dreaming in a large non-clinical community-based sample (n = 288). The results indicate a strong linear relationship between all of the waking fantasy measures, especially positive-constructive daydreaming style, and phenomenal qualities of dreaming. Further, men and women differed significantly, both in how they experience waking fantasy and with regard to which waking fantasy measures predicted to the dreaming measures. These data suggest that waking and dreaming are not discrete states of consciousness with clearly defined parameters but rather represent continuous attentional states which comprise the "stream of consciousness" endemic to human cognition.

INTRODUCTION

Waking and dreaming have traditionally been posited to be discrete forms of cognition, each characterized by distinctive phenomenological and neurochemical correlates [1-3]. These differences were first elucidated by Freud who viewed dreaming as a subjective and emotionally-driven form of cognition marked by

suspension of reason and linear causality and passively experienced through visual-spatial imagery [4]. He thus reasoned that dreaming was cognitively deficient to waking thought.

Despite recent developments in the study of dream cognition [5-7], the perception of marked discontinuity between dreaming and waking remains predominant in the scientific community [2, 8]. Indeed, a deficiency view of dreaming is reflected in three current theories of the etiology of dreaming: Koukkou and Lehmann's state-shift hypothesis [9]; Crick and Mitchison's neural-net theory [10]; and Hobson's AIM model [1, 8, 11]. While these approaches differ fundamentally from each other, they all share the working assumption that dreaming is a regressive, deficit-based, or degraded form of cognition, and as such, markedly distinct from waking mentation.

Contrary to these models, there exists an extensive empirical literature indicating that waking and dreaming mentation are continuous [3, 12-20]. Numerous studies have demonstrated that when waking conditions are altered to reduce both external sensory input and the conscious demand for cognitive process (relaxed wakefulness), the resultant free-floating thought is quite similar to, and may even surpass, dreaming mentation in its imagistic-hallucinatory quality [16, 18-24]. There is also evidence that current waking concerns may be predictably reflected in nocturnal dreams [19, 25]. According to Singer and Bonnano, "night dreams turn out to be largely indistinguishable from the waking thoughts we experience when we let our minds wander in understimulated conditions" [26, p. 438]. Similarly, Kunzendorf et al. have recently demonstrated that waking and dreaming mentation could be viewed on a continuum based upon subjects' waking boundary scores [20].

In addition, experimental work in the area of lucid dreaming, a unique state of consciousness in which the dreamer maintains dual awareness of both the dreaming and sleeping states, has demonstrated that metacognitive activity is empirically observable in the dream state [27]. Higher-order cognitive activity appears to be a regular feature of nonlucid dreams as well [17, 28]. For example, Purcell and associates have demonstrated a significant prevalence of self-reflection and intentionality in dreams and have shown how shifting attention to these processes results in both increases in metacognitive dream behavior and increased dream to waking transfer effects [3].

While there are obvious differences between waking and dreaming thought, we suggest that these discrepancies have been overemphasized due to an erroneous association of waking cognition with goal-directed, stimulus-specific, operant thought. Indeed, the role of fantasy, daydreaming, and imaginative involvement in waking cognition has often been overlooked in this context. Fantasy involvement is a ubiquitous occurrence in waking life [29-31] and may even dominate the waking consciousness of certain individuals, referred to as "fantasy-prone" [32, 33]. While an in-depth discussion of both night dreams and waking fantasy is beyond the scope of the present article (see [29] and [31] for more extensive

reviews on waking fantasy and [13] and [34-36] for reviews on dream function), it is widely accepted that both waking fantasy and night dreams play an integral role in mood-regulation, adaptive information-processing, and maintaining self-cohesion by providing working templates for future goal-directed behavior through the development and maintenance of automatic self-schemas [27, 29, 30, 36, 37]. Day and night dreams share a number of commonalities which would suggest a high level of across-state continuity: heightened cortical activation, significantly lowered conscious demand or focused attention, reduced sensory input, and a temporary suspension of source-monitoring [38].

The question that we address in the present study is whether there is a linear relationship between waking fantasy style and nocturnal dream experience. We were particularly interested in three widely-studied cognitive style variables with robust psychometric properties which relate to the structure of internal experience: fantasy-proneness [32]; absorption [39]; and positive constructive daydreaming [40]. A brief review of these constructs follows.

Fantasy-Proneness

Fantasy-proneness refers to "a unique constellation of personality traits and experiences coalesced around a deep, profound, and a long-standing involvement in fantasy and imagination" [32, p. 35]. Subsequent studies [30, 32, 41-43] report strong associations between fantasy proneness and hypnotizability, creativity and imagistic abilities. Significantly, high fantasy-prone individuals frequently report a history of both physical abuse and early punishment in childhood and report experiencing more isolation and loneliness as children than medium or low fantasy-prone subjects [43, 44]. While the exact genesis of the development of a fantasy style has yet to be determined [30], it has been suggested that for many fantasy-prone individuals, intensive imaginative involvement may represent an adaptive coping mechanism with an early adverse environment.

Absorption

Absorption refers to a state of heightened imaginative involvement in which an individual's attentional capacities are focused in one behavioral domain, often to the exclusion of explicit information-processing in other domains [39, 45]. As measured by the Tellegen Absorption Scale (TAS), absorption has been linked to hypnotic susceptibility, heightened creativity and imagistic processing, dissociation, decreased self-involvement and intensive involvement in imagination-based activities with concomitant alterations in consciousness as well as a heightened openness to experience [45-47]. Absorption and fantasy-proneness are highly

correlated (*r*'s = .68-.75), suggesting considerable conceptual overlap between these constructs [41, 42].

Positive Constructive Daydreaming (PCDD)

Positive constructive daydreaming is one of the three subfactors to emerge from Singer and Antrobus's Imaginal Processes Inventory (IPI) [48], a measure of various aspects of daydreaming and waking fantasy experiences. A shortened version of the IPI (SIPI) was developed by Huba, Aneshensel, and Singer [49]. This daydreaming style taps positive responses and attitudes toward daydreaming and correlates with self-awareness, waking sexual and nonsexual fantasies, imagery vividness, fantasy-proneness, absorption, and various facets of personality [41, 46, 50-52].

Despite this recent interest in fantasy and imagistic processing, little attempt has been made to integrate this work with the study of nocturnal dreaming. With few exceptions, previous research investigating the connection between daydreaming and nocturnal dreaming have been marred by a number of significant methodological shortcomings including inadequate and often nonrepresentative samples [53-55]. Furthermore, these studies were largely conducted prior to the development of psychometrically-sound measures of private experience and often relied on a simple dream recall frequency tally as the sole measure of dreaming while not examining other aspects of the dream experience. In addition, the bulk of this work has been conducted with college students, thus limiting the generalizability of the findings. Last, there has been no published report of the relationship between dreaming (other than simple recall frequency) and absorption or fantasy-proneness.

The present study sought to rectify these deficits by examining the relationships between dreaming and absorption, fantasy-proneness and positive constructive daydreaming in a multivariate design with a large non-clinical community sample. Consistent with previous work, we predict that individuals whose waking life is characterized by high levels of fantasy-access, absorption in imaginative activities and who exhibit a positive-constructive daydreaming style would also report having greater access to their dreaming consciousness as manifested by increased dream recall and dream saliency (such as rating dreams on scales of vividness, colorfulness, coherence or bizarreness, and how much meaning the individual attributed to the dream). We were particularly interested in examining whether males and females demonstrate similar patterns as sex differences have often been reported in the interrelationships between hypnotizability and fantasy measures as well as in sensitivity to dreams [46, 56, 57]. Given the significant overlap between the fantasy measures, we further sought to identify through multiple regression analyses which waking fantasy variables contribute independently toward the prediction of the frequency and quality of nocturnal dreaming beyond their shared variance.

METHOD

Participants and Procedure

Participants were volunteers in the New York City metropolitan area who were recruited by first year doctoral graduate students in clinical psychology completing an assessment practicum. Volunteers were solicited by word of mouth by students and asked to complete a packet of self-report questionnaires tapping various aspects of waking and nocturnal fantasy in addition to being administered either the WAIS-R or the Rorschach and MMPI-2. Of a total of 455 individuals sampled across six academic semesters, 290 (174 females, 111 males, five subjects did not indicate sex) agreed to participate in the study. Participants were asked to sign consent forms and all research protocols were coded to maintain confidentiality. The sample was diverse in age (age range 18-77, $M = 29.8$, $SD = 11.0$) and ethnicity (70 percent White, 22 percent African American, 8 percent other). The questionnaires and psychological testing took approximately two and one-half hours to complete.

Measures of Waking Fantasy

Inventory of Childhood Memories and Imaginings (ICMI) [33]

The ICMI is a 52-item self-report questionnaire which was designed to classify fantasy proneness. The ICMI has been used extensively in research and has demonstrated high test-retest reliability and construct validity [32, 44].

The Tellegen Absorption Scale (TAS) [39]

The TAS is a 34-item self-report measure which assesses an individual's openness to a variety of cognitive, perceptual, and imagistic experiences. As reviewed above, the TAS demonstrates excellent construct validity, and internal and test-retest reliability [45].

Short Imaginal Processes Inventory (SIPI) [49]

The SIPI is a 45-item self-report questionnaire designed to measure the three second-order factors which characterize ongoing thought: positive-constructive daydreaming (PC), guilty fear-of-failure daydreaming (GFF), and poor attentional control daydreaming (PAC). The SIPI demonstrates adequate test-retest reliability and construct validity for the three subfactors [40, 58].

Measure of Dream Fantasy

Dream Questionnaire (DQ) [56]

The DQ is a 20-item self-report Likert-scale questionnaire which assesses a variety of dream experiences. For the present study, only the dream recall frequency item (with nine frequency options ranging from "I never remember my dreams" to "More than once per night") and the dream saliency composite measure, a summed score of eight 7-point Likert items tapping the following dimensions of dream experience: bizarreness, vividness, colorfulness, realism, movement, coherence, the degree to which one is affected by their dreams the following day, and the extent to which meaning is attributed to dreams, were used. The DQ has been utilized in a number of investigations of frequent nightmare individuals [56, 59, 60] as well as more general studies of dreaming and personality [18, 61] and has demonstrated adequate reliability and validity [56].

RESULTS

The results are reported in three sections: a) correlations between waking and nocturnal fantasy measures; b) multiple regressions of waking fantasy measures with nocturnal dream measures as the criterion variables; and c) sex differences in the interrelationships between waking and nocturnal fantasy.

Bivariate Correlations

Correlations were conducted between the three waking fantasy measures (fantasy-proneness, absorption, and PCDD) and the two dreaming measures (dream recall and composite dream saliency). A 2-stage 2-tailed Bonferroni procedure [62] was used to control for potential Type I error inflation due to the number of calculated correlations yielding a corrected alpha level of $p < .005$ for obtained correlations. As seen in Table 1, all 10 correlations exceed the Bonferroni-adjusted alpha. As predicted, all three waking fantasy measures (fantasy proneness, absorption, and positive-constructive daydreaming) were associated with dream recall and the composite dream saliency measure. Most notably, dream saliency was correlated with fantasy proneness ($r = .45$), absorption ($r = .49$), and PCDD ($r = .53$).

Consistent with previous research, the waking fantasy measures were highly intercorrelated. Thus, fantasy proneness correlated with absorption ($r = .68$) and PCDD ($r = .49$). Similarly, absorption was highly correlated with the PCDD factor ($r = .57$). The two dreaming measures were also highly associated ($r = .57$).

Table 1. Bivariate Correlations between Fantasy Proneness, Absorption, Positive Constructive Daydreaming and Dream Recall and Dream Saliency (n = 288)

	ICMI	TAS	PCDD	DR	DS
ICMI	—				
TAS	.68***	—			
PCDD	.48***	.57***	—		
DR	.28***	.30***	.34***	—	
DS	.43***	.49***	.53***	.57***	—

Note: ICMI = Inventory of Childhood Imaginings Inventory; TAS = Tellegen Absorption Scale; PCDD = Positive-Constructive Daydreaming; DR = Dream recall frequency; DS = Composite dream saliency.

***$p < .005$ (Bonferroni-adjusted alpha)

Multiple Regression Analyses

The three waking fantasy measures (TAS, ICMI, PCDD) were then independently regressed onto each of the two dream measures to determine whether they contributed additional predictive variance, above and beyond their shared variance. While multicollinearity was a concern, particularly given the relationship between fantasy proneness and absorption, the results demonstrate different predictive value for these measures, justifying their inclusion in the multiple regressions.

As seen in Table 2, PCDD, fantasy proneness and absorption all added additional variance to the prediction of dream saliency while only the PCDD measure added significant additional variance to dream recall. Together, the waking fantasy measures accounted for 35 percent and 14 percent of the variance for dream salience and dream recall respectively.

As PCDD was the strongest waking fantasy predictor of dreaming, a second standard multiple regression was conducted to determine which aspects of this scale account for its relationship with nocturnal fantasy. This was done by breaking down the PCDD factor into its five subfactors [49] and regressing them separately onto each of the dream measures. As seen in Table 3, Acceptance of Daydreaming and Positive Reactions to Daydreaming each contributed independent variance in predicting dream salience while none of the subfactors contributed additional variance to dream recall frequency. In all, the subfactors of the PCDD scale accounted for 32 percent of the overall variance to dream salience and 12 percent of the variance of dream recall.

A similar standard multiple regression was conducted for fantasy proneness by breaking down the ICMI into three subfactors based on a content analysis of the

Table 2. Standard Multiple Regression of Fantasy Proneness, Absorption, and Positive Constructive Daydreaming on Dream Saliency and Dream Recall

Dream saliency					
Variables	B	B	T	p	sr^2
PCDD	.28	.35	5.68	.000	.28
TAS	.17	.18	2.43	.016	.12
ICMI	.14	.16	2.32	.021	.11
$F(5, 272) = 29.56$, $R^2 = .35$, $R = .59$, $p < .001$					
Dream recall					
Variables	B	B	T	p	sr^2
PCDD	3.419E-02	.22	3.19	.002	.18
ICMI	2.499E-02	.15	1.90	.059	.11
TAS	1.574E-02	.09	1.04	ns	.06
$F(5, 273) = 9.21$, $R^2 = .14$, $R = .38$, $p < .001$					

Note: PCDD = Positive-Constructive Daydreaming, TAS = Tellegen Absorption Scale, ICMI = Inventory of Childhood Memories and Imaginings.

items by the experimenters and regressing these separately to dream recall and dream salience. The ICMI item breakdown resulted in: 1) childhood fantasies (items 8, 10-11, 13, 15-18, 20-22, 24-27, 29, 32); 2) adult fantasies (items 5, 7, 9, 12, 14, 19, 23, 30); and 3) altered sensory-perceptual experiences (items 28, 31, 33-52). The first two categories are based on statements describing fantasies experienced during childhood and adulthood respectively. The third category contains items which assess heightened sensory-perceptual experiences (e.g., precognition, dissociation, out-of-body experiences, drug-induced altered states of consciousness, and episodes of depersonalization). As seen in Table 3, only the altered sensory-perceptual factor significantly predicted to both dream salience and recall, indicating that the overall association between fantasy proneness and the dreaming measures are due to these particular items.

Sex Differences across the Waking and Nocturnal Fantasy Measures

In order to determine the presence of sex differences between the various waking and dreaming fantasy measures, a Hotelling T^2 was conducted on the five waking and dreaming measures with gender as the independent variable. With the

Table 3. Standard Multiple Regression of Positive-Constructive Daydreaming Subfactors and ICMI Subfactors on Dream Saliency and Dream Recall

	Dream saliency				
Variables	B	B	T	*p*	sr^2
Pos. Constructive Daydreaming					
PRD	.69	.25	4.17	.000	.21
AD	.71	.26	3.23	.001	.16
PSD	.31	.13	1.75	.08	.09
FOD	.13	.05	.88	ns	.04
VIVD	4.780E-03	.00	.03	ns	.00
Fantasy Proneness					
FPS	.78	.47	6.32	.000	.33
FPC	2.866E-02	.01	.15	ns	.01
FPA	2.700E-02	.01	.09	ns	.01

PCDD Scale: $F(5, 273) = 25.68$, $R^2 = .32$, $R = .57$, $p < .001$
ICMI Scale: $F(3, 281) = 27.89$, $R^2 = .23$, $R = .48$, $p < .001$

	Dream recall				
Variables	B	B	T	*p*	sr^2
Pos. Constructive Daydreaming					
PRD	6.331E-02	.12	1.76	.08	.10
AD	8.113E-02	.15	1.70	.09	.10
PSD	4.797E-02	.10	1.24	ns	.07
VID	3.129E-02	.05	.86	ns	.05
FOD	1.134E-02	.02	.34	ns	.02
Fantasy Proneness					
FPS	9.911E-02	.31	3.94	.001	.22
FPC	–3.526E-02	–.08	–.91	ns	–.05
FPA	5.556E-02	.08	.93	ns	.05

PCDD Scale: $F(5, 274) = 7.62$, $R^2 = 12$, R .35, p < .001
ICMI Scale: $F(3, 282)$ 10.55, $R^2 = .10$, $R = .32$, $p < .001$

Note: PRD = Positive Reactions to Daydreaming, AD = Acceptance of Daydreaming, PSD = Problem Solving Daydreaming, FOD = Future Orientation in Daydreaming, VID = Vividness of Imagery in Daydreaming. FPS = Fantasy Proneness Sensory, FPC = Fantasy Proneness Childhood, FPA = Fantasy Proneness Adulthood.

Table 4. Bivariate Correlations between Fantasy Proneness, Absorption, Positive Constructive Daydreaming and Dream Recall and Dream Saliency for Males (n = 107) and Females (n = 171)

	ICMI	TAS	PCDD	DR	DS
ICMI	—	.64***	.45***	.32***	.37***
TAS	.75***	—	.53***	.32***	.46***
PCDD	.54***	.64***	—	.30***	.50***
DR	.27***	.27***	.37***	—	.56***
DS	.57***	.53***	.59***	.46***	—

Note: Correlations for females are presented above the diagonal.
ICMI = Inventory for Childhood Memories Inventory; TAS = Tellegen Absorption Scale; PCDD = Positive-Constructive Daydreaming; DR = Dream recall frequency; DS = Composite dream saliency.
***p < .005 (Bonferroni-corrected alpha)

use of Wilks' criterion, there were no significant differences between men and women for any of the fantasy measures, $F(7, 141) = .66$, ns.

Bivariate correlations between the waking and nocturnal fantasy measures with the Bonferroni correction (adjusted alpha = .005) were also conducted separately for males and females and are presented in Table 4. Overall, the pattern of findings is consistent with the results for the overall sample with 13 correlations reaching significance for males and 10 for females. Once again, the composite dream salience measure correlated highest with the fantasy measures for males and females.

In order to determine whether men and women demonstrated similar patterns of waking-dreaming continuity, separate standard multivariate analyses were conducted for each group by regressing the three waking fantasy measures to each dream variable. Table 5 summarizes these results by presenting the semipartial correlations for each of the composite waking measures with dream saliency and dream recall separately for men and women, controlling for shared variance. While PCDD remained the strongest predictor to dream salience for both groups, absorption added significant additional variance for women but not for men. Conversely, fantasy proneness added significantly additional predictive variance for men but not for women. Furthermore, the PCDD added predictive information for dream recall but only for the men. Overall, the waking fantasy measures explain 45 percent of the variance for dream salience for men but only 31 percent of the variance for women, a difference approaching significance using Fisher's Z transformation for comparisons between independent correlations, $Z = 1.46$, $p < .07$. There were no sex differences in the degree of variance explained for dream recall (15 percent and 16 percent for men and women).

Table 5. Semipartial Correlations of Waking Fantasy Measures to Dream Saliency and Dream Recall Controlling for Shared Variance for Males and Females

	Dream saliency		Dream recall	
Variable	Males	Females	Males	Females
ICMI	.22**	.06	.08	.14
TAS	.00	.17**	−.03	.10
PCDD	.27***	.27***	.24**	.13
R^2	.45	.31	.15	.16
F	16.49***	14.44***	3.57**	6.32***

Note: ICMI = Inventory for Childhood Memories and Imaginings, TAS = Tellegen Absorption Scale, PCDD = Positive Constructive Daydreaming.
**$p < .01$; ***$p < .001$

Table 6. Semipartial Correlations of Waking Fantasy Measure Subfactors to Dream Saliency and Dream Recall Controlling for Shared Variance in Males and Females

	Dream saliency		Dream recall	
Variables	Males	Females	Males	Females
Pos. Constructive Daydreaming				
PRD	.29***	.17**	.14	.07
AD	.12	.20**	.08	.11
VID	.06	.01	.09	.04
PSD	.04	.08	.04	.06
FOD	.09	.05	.01	.05
R^2	.39	.30	.15	.11
F	13.00***	13.73***	3.44**	4.17***
Fantasy Proneness				
FPS	.39***	.32***	.28**	.23***
FPC	.03	−.06	−.17	−.02
FPA	.03	.00	.11	.04
R^2	.37	.17	.12	.12
F	21.23***	11.28***	4.80**	7.59***

Note: PRD = Positive Reactions to Daydreaming, AD = Acceptance of Daydreaming, VID = Vividness of imagery in daydreaming, PSD = Problem solving daydreaming, FOD = Future orientation in daydreaming. FPS = Fantasy Proneness Sensory, FPC = Fantasy Proneness Child, PFA = Fantasy Proneness Adult.
**$p < .01$; ***$p < .001$

In order to provide a clearer picture of these relationships, standard multiple regressions were conducted separately for men and women for each of the composite waking fantasy measures. Absorption was not included here as the TAS does not break down into subfactors. As seen in Table 6, a number of striking sex differences were again noted. Overall, there was greater explanatory power for all measures, with more specific information from the subfactors and with a greater proportion of the variance explained for men than women on all measures. Furthermore, these findings were considerably stronger for the dream salience measure than the dream recall measure.

Within the PCDD, the Positive Reactions to Daydreaming subfactor predicted to dream salience for men and women but Attitudes to Daydreaming added significant predictive information only for women. Further, altered sensory-perceptual experiences on the ICMI added significant predictive variance for both dream measures for men and women.

DISCUSSION

Dreaming and Waking Fantasy Measures

The results are consistent with previous research demonstrating considerable association between fantasy-proneness, absorption and a positive-constructive daydreaming style [30, 41, 46, 51], and support our overall hypothesis that these states are continuous with each other. Thus, our correlations between fantasy-proneness and absorption ($r = .68$) and fantasy proneness and PCDD ($r = .49$) were identical to that reported by Council and Huff [41] while the obtained correlation between absorption and PCDD ($r = .57$) was also identical to that reported by Hoyt et al. [51]. In addition, our data are consistent with recent evidence that individuals with thin boundaries demonstrate greater overlap between their waking and dreaming mentation than do individuals with thick boundaries [20]. Taken together, these data provide further evidence for a distinct cognitive style based in intensive and absorptive imaginative involvement which predicts a host of other phenomena including hypnotizability, openness to experiences, and heightened access to dreaming consciousness.

Our finding that dream recall frequency was significantly related to fantasy-proneness is also consistent with Tonay [63] but should be considered a stronger finding as Tonay did not use the ICMI to measure fantasy-proneness. Starker also reported consistent structural relationships between day and night dreaming [64]. Our results partially confirm this work, particularly with regards to dream recall and PCDD. This pattern was substantiated in subsequent analyses utilizing an item-by-item breakdown of the dream saliency composite measure. Here, all eight dream variables save dream realism and dream coherence (notably the two ratings which by definition assess non-dreamlike phenomena) correlated

significantly (p's < .005) with fantasy-proneness, absorption, and positive-constructive daydreaming.

Our data have parallels in the hypnosis literature. For example, a number of studies have demonstrated heightened dream sensitivity in highly hypnotizable subjects [65-67]. Gibson found that women who reported greater involvement and interest in their dreaming processes (e.g., reported greater creative insights in their dreams, dreams foretell the future) scored higher on the HGSHS:A than women who did not report similar dreaming experiences and attitudes [68]. Nadon et al. also found that vividness of dreams and daydreams significantly differentiated high from low hypnotically susceptible subjects [69]. In their study, women's self-reported ability to control their dreaming along with beliefs in paranormal experiences and scores on the TAS were the best predictors of hypnotic susceptibility. Two additional studies also found a significant relationship between dream involvement (self-reported dream recall frequency) and absorption [57, 70]. Consistent with our data, both studies found this relationship to be considerably stronger for females than males. Interestingly, the connection between absorption and dreaming was strongest in these studies for subjects who also reported an incidence of paranormal dream phenomena (experiencing pre-cognitive and out-of-body and flying dreams). Similar to Nadon et al., Zamore and Barrett suggested that dissociative abilities may represent a central aspect of this relationship. Their finding that most of the dreaming items which correlated with hypnotic susceptibility contained significant elements of dissociation (e.g., out-of-body dream experiences, flying dreams) is consistent with this formulation. While we did not directly assess dissociation in our study, our content breakdown of the fantasy proneness scale indicates that anomalous sensory-perceptual experiences were responsible for most of this measure's association with dreaming.

On the surface, it is not surprising that individuals who report greater immersion in waking fantasy and an ability to become deeply absorbed in their own imaginative processes would also report a higher recall of nocturnal dreams and a heightened sensitivity to the phenomenological qualities of their dreams than individuals who do not report these experiences. What remains unanswered is whether the witnessed across-state individual differences may be attributed to real differences in processing capacities or instead, reflect stable sociocognitive factors related to response style variables.

Sex Differences

While males and females did not differ from each other on any of the waking or dreaming variables, there were a number of substantial sex differences in both the strengths of the correlations and in the patterns of the multivariate analyses, particularly in the relationship between the composite dream saliency score and the waking fantasy measures. While dream saliency significantly correlated with fantasy-proneness and absorption in the overall sample, these relationships were

generally stronger for men, a pattern similarly noted by Crawford [46]. An analysis of the eight individual dream saliency items with the waking fantasy measures revealed an identical pattern with the obtained correlations reaching greater predictive strength for males than females. For example, while females' rating of the meaningfulness of their dreams was not related to fantasy-proneness ($r = .09$, ns) or absorption ($r = .20$, $p < .06$) and marginally correlated with PCDD ($r = .27$, $p < .009$), all three correlations were highly significant for males ($r = .54$, $r = .54$, and $r = .52$, $p < .0001$ respectively). Consistent with Crawford, PCDD and absorption were significantly more associated for males than females.

Males and females also differed as to which waking fantasy measures significantly predicted to the dreaming measures on the multiple regression analyses. While PCDD was the strongest independent predictor of dream saliency for both sexes, absorption was a significant independent predictor of dream salience for women but not for men while fantasy proneness predicted dream salience for men but not for women. In addition, PCDD added significant independent prediction for dream recall for men but not for women. Our data suggest that the attitudinal subfactors of the PCDD (acceptance of daydreams, positive reactions to daydreams) were responsible for the additional prediction to the dreaming measures for the women. The attitudinal daydream category, which measures an openness to daydream mentation, may well be related to attitudes regarding night dreaming which in turn, may motivate the individual to allocate sufficient waking attentional resources to recall dreams upon awakening. Indeed, there is evidence that positive attitudes and beliefs regarding dreaming predict such factors as overall dream recall frequency, dream report length, the utilization of dreams in everyday-life, and even waking creativity [56, 71, 72]. Thus, females' positive attitudes toward waking fantasy and their willingness to engage in this type of mentation appeared to strongly influence the reported saliency of their dream mentation. These findings are generally consistent with Hoyt et al., who found positive-constructive daydreaming to be the strongest predictor of hypnotizability [51]. Similarly, when Hoyt et al. analyzed these correlations more closely by breaking down the PCDD into subfactors, Acceptance of Daydreaming, Positive Reactions to Daydreaming, and Problem-Solving Daydreaming proved to be responsible for its association with hypnotizability. However, as Hoyt et al. did not break down their data by sex, it is difficult to compare their data to ours.

Again, the pattern was different for males in that fantasy proneness also predicted a significant degree of additional variance of dream saliency. Interestingly, a cluster of items on the ICMI which tap altered sensory-perceptual experiences such as drug-induced altered states of consciousness, dissociation, beliefs in precognition, and out-of-body experiences also showed a particularly strong relation to dream recall. These findings suggest that the relation of waking to dreaming for males may involve a wide range of complex cognitive and perceptual processes that affect dream mentation but may not be linked to the same attitudinal processes as women. Thus, while attitudinal factors may be crucial in understanding the

continuity of mental processes across various states of consciousness, there may be a strong dissociative component for men in particular which predicts their willingness or ability to engage in imagistic or fantasy behavior.

Thus, dream saliency for men is best predicted by waking altered sensory-perceptual experiences, while for women a state of high absorption and positive attitudes and reactions to daydreaming best predicts dream salience. Taken together, these measures account for about half the variance for men and about a third for women.

Conversely, waking fantasy measures predict dream recall frequency with considerably lower power and with more consistency between sexes. However, the reliance on a single-item measure for dream recall may be responsible for its lower overall association with the waking fantasy measures.

In summary, these data suggest that waking and dreaming are not discrete states of consciousness with clearly-defined parameters but rather represent continuous attentional states which comprise the James' "stream of consciousness" [73] endemic to human cognition. Our data also indicate that males and females differ in how they experience waking fantasy and suggest that openness to and acceptance of daydreams is more characteristic of females than males. For females, daydreaming seems to be more of a volitional activity in which these types of thoughts are embraced and considered to be valuable, interesting, and engaging. Again, these data are consistent with earlier findings indicating a greater openness to and acceptance of night dreams for women than men [56].

Although our findings are consistent with previous research, a number of methodological limitations suggest caution in interpreting the results. First, our data were based on retrospective self-reports which may be susceptible to such potential confounds as social desirability factors and sociocognitive biases. Second, our investigation did not address the dream content, relying instead on subjects' ratings of saliency characteristics of "typical" dreams. Although this approach is preferable to utilizing an objectively-based content analysis [17] or home dream diaries [74] for capturing phenomenological qualities of dreaming, obtaining reports of ongoing dream data through home recording and comparing these reports to waking fantasy measures would be an invaluable adjunct to our data.

REFERENCES

1. J. A. Hobson, *The Dreaming Brain*, Basic Books, New York, 1988.
2. D. Kahn, E. Pace-Schott, and A. Hobson, Consciousness in Waking and Dreaming: The Roles of Neuronal Oscillation and Neuromodulation in Determining Similarities and Differences, *Neuroscience*, *78*, pp. 13-38, 1997.
3. S. Purcell, A. Moffitt, and R. Hoffmann, Waking, Dreaming, and Self-Regulation, in *The Functions of Dreaming*, A. Moffitt, M. Kramer, and R. Hoffmann (eds.), SUNY Press, Albany, New York, pp. 197-260, 1993.

4. S. Freud, The Interpretation of Dreams, in *The Standard Edition of the Complete Psychological Works of Sigmund Freud (Vols. 4 & 5)*, J. Strachey (ed. and trans.), Hogarth Press, London, 1900/1953.
5. J. Antrobus, Dreaming: Cognitive Processes during Cortical Activation and High Afferent Thresholds, *Psychological Review*, *98*, pp. 96-121, 1991.
6. R. Bootzin, J. Kihlstrom, and D. Schacter (eds.), *Sleep and Cognition,* APA Press, Washington, D.C., 1990.
7. D. Foulkes, Dreaming and Consciousness, *European Journal of Cognitive Psychology*, *2*, pp. 39-55, 1990.
8. J. A. Hobson, E. Pace-Schott, and R. Stickhold, Dreaming and the Brain: Toward a Cognitive Neuroscience of Conscious States, *Brain and Behavioral Sciences*, *23*, pp. 793-842, 2000.
9. M. Koukkou and D. Lehmann, Dreaming: The Functional State-Shift Hypothesis, *British Journal of Psychiatry*, *142*, pp. 221-231, 1983.
10. F. Crick and G. Mitchison, REM Sleep and Neural Nets, *Journal of Mind and Behavior*, *7*, pp. 229-250, 1986.
11. J. A. Hobson and R. McCarley, The Brain as a Dream-State Generator: An Activation-Synthesis, *American Journal of Psychiatry*, *134*, pp. 1335-1348, 1977.
12. R. Cartwright, Dream and Drug-Induced Fantasy Behavior, *Archives of General Psychiatry*, *15*, pp. 7-15, 1966.
13. G. Domhoff, *Finding Meaning in Dreams: A Quantitative Approach*, Plenum Press, New York, 1996.
14. H. Fiss, S. Ellman, and G. Klein, Waking Fantasies Following Interrupted and Completed REM Periods, *Archives of General Psychiatry*, *21*, pp. 230-238, 1966.
15. D. Foulkes, *Dreaming: A Cognitive-Psychological Analysis*, Erlbaum, Hillsdale, New Jersey, 1985.
16. D. Foulkes and S. Fleisher, Mental Activity in Relaxed Wakefulness, *Journal of Abnormal Psychology*, *84*, pp. 66-75, 1975.
17. T. Kahan, S. LaBerge, L. Levitan, and P. Zimbardo, Similarities and Differences between Dreaming and Waking Cognition, *Consciousness and Cognition*, *6*, pp. 132-147, 1997.
18. R. Levin, L. Gilmartin, and L. Lamontanaro, Cognitive Style and Perception: The Relationship of Boundary Thinness to Visual-Spatial Processing in Dreaming and Waking Thought, *Imagination, Cognition and Personality*, *18*, pp. 25-41, 1998-99.
19. R. Saredi, G. Baylor, B. Meier, and I. Strauch, Current Concerns and REM Dreams: A Laboratory Study of Dream Incubation, *Dreaming*, *7*, pp. 195-208, 1997.
20. R. Kunzendorf, E. Hartmann, R. Cohen, and J. Cutler, Bizarreness of the Dreams and Daydreams Reported by Individuals with Thin and Thick Boundaries, *Dreaming*, *7*, pp. 265-271, 1997.
21. D. Foulkes and G. Vogel, Mental Activity at Sleep Onset, *Journal of Abnormal Psychology*, *70*, pp. 231-243, 1965.
22. E. Klinger and W. M. Cox, Dimensions of Thought Flow in Everyday Life, *Imagination, Cognition and Personality*, *7*, pp. 105-128, 1987-88.
23. R. Rados and R. Cartwright, Where Do Dreams Come From? A Comparison of Presleep and REM Sleep Thematic Content, *Journal of Abnormal Psychology*, *91*, pp. 433-436, 1982.

24. R. Reinsel, J. S. Antrobus, and M. Wollman, Bizarreness in Dreams and Waking Fantasy, in *The Neuropsychology of Sleep and Dreaming*, J. S. Antrobus and M. Bertini (eds.), Erlbaum, Hillsdale, New Jersey, pp. 157-184, 1992.
25. C. D. Nikles, D. L. Brecht, E. Klinger, and A. L. Bursell, The Effects of Current-Concern and Nonconcern-Related Waking Suggestions on Nocturnal Dream Content, *Journal of Personality and Social Psychology*, *75*, pp. 242-255, 1998.
26. J. L. Singer and G. Bonnano, Personality and Private Experience: Individual Variations in Consciousness and in Attention to Subjective Phenomena, in *Handbook of Personality: Theory and Research*, L. Pervin (ed.), Guilford Press, New York, pp. 419-444, 1998.
27. S. LaBerge, Lucid Dreaming: Psychophysiological Studies of Consciousness during REM Sleep, in *Sleep and Cognition*, R. Bootzin, J. Kihlstrom, and D. Schacter (eds.), APA Press, Washington, D.C., pp. 109-126, 1990.
28. T. Kahan and S. LaBerge, Lucid Dreaming as Metacognition: Implications for Cognitive Science, *Consciousness and Cognition*, *3*, pp. 246-264, 1994.
29. E. Klinger, *Daydreaming: Using Waking Fantasy and Imagery for Self-Knowledge and Creativity*, St. Martin's Press, New York, 1990.
30. S. Lynn, V. Neufeld, J. Green, D. Sandberg, and J. Rhue, Daydreaming, Fantasy, and Psychopathology, in *Hypnosis and Imagination*, R. Kunzendorf, N. Spanos, and B. Wallace (eds.), Baywood, New York, pp. 67-98, 1996.
31. J. L. Singer, Daydreams, the Stream of Consciousness, and Self-Representations, in *Empirical Perspectives on the Psychoanalytic Unconscious*, R. Bornstein and J. Masling (eds.), APA Press, Washington, D.C., 1998.
32. S. Lynn and J. Rhue, Fantasy Proneness: Hypnosis, Developmental Antecedents, and Psychopathology, *American Psychologist*, *43*, pp. 35-44, 1988.
33. S. Wilson and T. Barber, Vivid Fantasy and Hallucinatory Abilities in the Life Histories of Excellent Hypnotic Subjects ("Somnambules"): Preliminary Report with Female Subjects, in *Imagery: Vol. 2: Concepts, Results and Application*, E. Klinger (ed.), Plenum Press, New York, pp. 133-149, 1981.
34. R. A. Cartwright, Network Model of Dreams, in *Sleep and Cognition,* R. Bootzin, J. Kihlstrom, and D. Schacter (eds.), APA Press, Washington, D.C., pp. 179-189, 1990.
35. M. Kramer, The Selective Mood Regulatory Function of Dreaming: An Update and Revision, in *The Functions of Dreaming*, A. Moffitt, M. Kramer, and R. Hoffmann (eds.), SUNY Press, Albany, New York, pp. 139-196, 1993.
36. R. Levin, Psychoanalytic Theories on the Function of Dreams, in *Empirical Studies of Psychoanalytic Theories (Vol. 3)*, J. Masling (ed.), Analytic Press, Hillsdale, New Jersey, pp. 1-53, 1990.
37. E. Klinger, *Structure and Functions of Fantasy*, Wiley, New York, 1971.
38. M. Johnson, S. Hashtroudi, and D. Lindsay, Source Monitoring, *Psychological Bulletin*, *114*, pp. 3-28, 1993.
39. A. Tellegen and G. Atkinson, Openness to Absorbing and Self-Altering Experiences ("Absorption"), A Trait Related to Hypnotic Susceptibility, *Journal of Abnormal Psychology*, *83*, pp. 268-277, 1974.
40. G. Huba, J. Singer, C. Aneshensel, and J. Antrobus, *The Short Imaginal Processes Inventory*, Research Psychologists Press, Port Huron, Michigan, 1982.

41. J. R. Council and K. Huff, Hypnosis, Fantasy Activity and Reports of Paranormal Experiences in High, Medium, and Low Fantasizers, *British Journal of Experimental and Clinical Hypnosis*, *7*, pp. 9-15, 1990.
42. S. Lynn and J. Rhue, The Fantasy-Prone Person: Hypnosis, Imagination, and Creativity, *Journal of Personality and Social Psychology*, *51*, pp. 404-408, 1986.
43. J. W. Rhue and S. J. Lynn, Fantasy Proneness: Development Antecedents, *Journal of Personality*, *55*, pp. 121-137, 1987.
44. S. Rauschenberger and S. Lynn, Fantasy Proneness, DSM-III-R Axis I Psychopathology, and Dissociation, *Journal of Abnormal Psychology*, *104*, pp. 373-380, 1995.
45. S. Roche and K. McConkey, Absorption: Nature, Assessment, and Correlates, *Journal of Personality and Social Psychology*, *59*, pp. 91-101, 1990.
46. H. Crawford, Hypnotizability, Daydreaming Styles, Imagery Vividness, and Absorption: A Multidimensional Study, *Journal of Personality and Social Psychology*, *42*, pp. 915-926, 1982.
47. R. Pekula, C. Wenger, and R. Levine, Individual Differences in Phenomenological Experience: States of Consciousness as a Function of Absorption, *Journal of Personality and Social Psychology*, *48*, pp. 125-132, 1985.
48. J. L. Singer and J. Antrobus, Daydreaming, Imaginal Processes, and Personality: A Normative Study, in *The Function and Nature of Imagery*, P. Sheehan (ed.), Academic Press, New York, 1972.
49. G. Huba, C. Aneshensel, and J. Singer, Development for Scales for Three Second-Order Factors of Human Experience, *Multivariate Behavioral Research*, *16*, pp. 181-206, 1981.
50. S. Gold and J. Reilly, Daydreaming, Current Concerns and Personality, *Imagination, Cognition and Personality*, *5*, pp. 117-125, 1985-86.
51. I. P. Hoyt, R. Nadon, P. A. Register, J. Chorny, W. Flesson, E. M. Grigorian, and L. Otto, Daydreaming, Absorption, and Hypnotizability, *International Journal of Clinical and Experimental Hypnosis*, *37*, pp. 332-342, 1989.
52. T. Zhiyan and J. L. Singer, Daydreaming Styles, Emotionality and the Big Five Personality Dimensions, *Imagination, Cognition and Personality*, *16*, pp. 399-414, 1996-97.
53. L. Buck, Varieties of Consciousness: Comparison of Some Cognitive Characteristics, *Perceptual and Motor Skills*, *30*, pp. 183-186, 1970.
54. A. Silverstein, Varieties of Conscious Experience: A Factor Analysis, *Journal of Clinical Psychology*, *25*, p. 263, 1969.
55. J. L. Singer and R. Shonbar, Correlates of Daydreaming: A Dimension of Self-Awareness, *Journal of Consulting Psychology*, *25*, pp. 1-6, 1961.
56. R. Levin, Sleep and Dreaming Characteristics of Frequent Nightmare Subjects in a University Population, *Dreaming*, *4*, pp. 127-137, 1994.
57. N. Spanos, H. J. Stam, H. L. Radtke, and M. E. Nightengale, Absorption in Imaginings, Sex-Role Orientation and the Recall of Dreams by Males and Females, *Journal of Personality Assessment*, *44*, pp. 277-282, 1980.
58. J. M. Golding and J. L. Singer, Patterns of Inner Experience: Daydreaming Styles, Depressive Moods, and Sex Roles, *Journal of Personality and Social Psychology*, *45*, pp. 663-675, 1983.
59. R. Levin, Nightmares and Schizotypy, *Psychiatry*, *61*, pp. 206-216, 1998.

60. R. Levin and M. Raulin, Preliminary Evidence for the Proposed Relationship between Frequent Nightmares and Schizotypal Symptomatology, *Journal of Personality Disorders*, *5*, pp. 8-14, 1991.
61. N. Volpe and R. Levin, Attributional Style, Dreaming, and Depression, *Personality and Individual Differences*, *25*, pp. 1051-1061, 1998.
62. R. E. Larzelere and S. A. Mulaik, Single-Sample Tests for Many Correlations, *Psychological Bulletin*, *84*, pp. 557-569, 1977.
63. V. K. Tonay, Personality Correlates of Dream Recall: Who Remembers? *Dreaming*, *3*, pp. 1-8, 1993.
64. S. Starker, Daydreams, Nightmares, and Insomnia: The Relation of Waking Fantasy to Sleep Disturbances, *Imagination, Cognition and Personality*, *4*, pp. 237-248, 1984.
65. F. Evans, Hypnosis and Sleep, *Research Communications in Psychology, Psychiatry, and Behavior*, *7*, pp. 241-256, 1982.
66. R. Kunzendorf, C. Brown, and D. McGee, Hypnotizability: Correlations with Daydreaming and Sleeping, *Psychological Reports*, *53*, p. 406, 1983.
67. C. Perry, Imagery, Fantasy, and Hypnotic Susceptibility: A Multidimensional Approach, *Journal of Personality and Social Psychology*, *26*, pp. 217-221, 1983.
68. H. B. Gibson, Dreaming and Hypnotic Susceptibility: A Pilot Study, *Perceptual and Motor Skills*, *60*, pp. 387-394, 1985.
69. R. Nadon, J. Laurence, and C. Perry, Multiple Predictors of Hypnotic Susceptibility, *Journal of Personality and Social Psychology*, *53*, pp. 948-960, 1987.
70. N. Zamore and D. Barrett, Hypnotic Susceptibility and Dream Characteristics, *Psychiatric Journal of University of Ottawa*, *14*, pp. 572-574, 1989.
71. G. Domino, Attitudes toward Dreams, Sex Differences, and Creativity, *Journal of Creative Behavior*, *16*, pp. 112-123, 1982.
72. G. Livingston, and R. Levin, Replication of the Factor Structure of a Questionnaire about Dreams and Its Relation to Creativity, *Imagination, Cognition and Personality*, *11*, pp. 263-270, 1991-92.
73. W. James, *The Principals of Psychology*, Holt, New York, 1890.
74. D. M. Bernstein and K. Belicki, On the Psychometric Properties of Retrospective Dream Content Questionnaires, *Imagination, Cognition and Personality*, *15*, pp. 351-364, 1995-96.

Direct reprint requests to:

Ross Levin, Ph.D.
Ferkauf Graduate School of Psychology
Albert Einstein College of Medicine Campus
106 Rousso Bldg.
1165 Morris Park Avenue
Bronx, NY 10461
e-mail: rlevin@ymail.yu.edu