How Dream Recall Frequency Shapes People's Beliefs About the Content of Their Dreams

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Questionnaire studies often rely on self-report evaluations of past dream experiences to assess people's dream content. This approach, however, assumes that there exists a valid relationship between self-reported information on the content of one's everyday dreams and the dream experiences themselves. The goal of the present study was to test the idea that the way people construct beliefs about the content of their dreams depends on their level of dream recall frequency (DRF). Specifically, it was hypothesized that a) when memories of past dreams are readily available (i.e. when DRF is high), people's beliefs about their general dream content are closely related to their actual dream experiences, and b) when such memories are not easily available (i.e. when DRF is low), people's beliefs about their dream content is influenced by their affective state. Participants' (n = 84) affective state and belief about the degree of anxiety in their everyday dreams were assessed via self-reported questionnaires while DRF and dream content variables were calculated from a daily dream log. The results support the hypotheses and suggest that the beliefs people hold about the content of their dreams are not necessarily valid reflections of their actual dream experiences.

Questionnaire studies have played and continue to play an important role in the scientific tradition of inquiry into dream content (e.g. Jacka, 1990). In these kinds of studies, participants' retrospective self-reported information concerning their dream experiences is viewed as a modest but valid way of assessing different aspects of the dream experiences themselves. But to what extent are our beliefs about various characteristics of our dream life an accurate portrayal of our everyday dream experiences? Are we correct in assuming that correlates of these beliefs are also correlates of the actual dream experiences?

One important problem in studying dream content is the dissociation between dreaming and waking states. While dreaming occurs during sleep, active dream recall as well as the recording or sharing of one's dream occurs upon awakening. This implies that beliefs, attitudes and judgements about one's dream content are rarely constructed at the same

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time that the dream material is actually experienced. It can thus be argued that the continuity between dream experiences and the beliefs about them cannot be taken for granted. Since beliefs about the general content of everyday dreams are formed retrospectively, factors such as memory, personality, and individual biases can influence their construction. For instance, one recent study (Beaulieu-Prévost & Zadra, 2005) found that self-reported evaluations of dream recall frequency (DRF) are affected by attitudinal and mnemonic factors and that they show little relation to actual (prospective) measures of dream recall. Similar processes may be involved when people are asked to describe the general content of their dreams.

Over 100 empirical studies have been published on dream recall (for reviews, see Blackgrove & Akehurst, 2000; Goodenough, 1991; Schredl & Montasser, 1996-97a; 1996-97b) and an overwhelming majority of them were aimed at identifying correlates of DRF. In most cases, the studies focused on explaining inter-individual variance in DRF instead of examining its role as an independent variable. It is our contention that dream recall represents not only a variable that needs to be adequately explained in and of itself, but also an important link between actual dream experiences and waking life factors such as attitudes, beliefs, estimates, and judgements about one's dreams. If the influence of dream experiences on waking life factors occurs primarily through the memories of these experiences, then the magnitude of the influence should be proportional to the availability of these memories. Two important characteristics of dreams are that they are easily forgotten upon awakening and that the frequency of recall varies greatly across individuals. DRF cannot be viewed as representing the availability of all memories of dream experiences at the time waking life factors (e.g., beliefs) are measured since other social and cognitive processes (e.g., normal forgetting between each morning recall of a dream and the moment a belief is expressed) influence that availability. However, the number of dreams recalled on a daily basis is a close representation of the maximum number of dreams that could have been recalled. In essence, the greater the level of dream recall, the greater the possibilities for dream experiences to affect the waking state. Consequently, DRF can be viewed as a moderator variable for relations between actual dream experiences and waking life factors if, and only if, the dream experiences are causal agents in these relations (a higher correlation being found for a high DRF).

One advantage of this paradigm is that it may serve to clarify the issue of directionality when relationships between dream content and long-lasting waking life variables such as beliefs, traits, or psychopathology are observed. For instance, a positive correlation has

been reported between the occurrence of a masochistic content in dreams and the presence of major depression (e.g. Cartwright & Wood, 1993). However, the directionality of the relation, if any, is difficult to specify. The proposed paradigm could help resolve this problem. Specifically, if the correlations between measures of dream content and waking variables are moderated by DRF (with high recallers obtaining higher correlations than low recallers), then it can be argued that the correlations probably reflect the influence of dream experiences on the waking life variables. However, if the correlations are not moderated by dream recall, it can be argued that the correlations probably do not reflect the influence of dream experiences on the waking life variables. In the latter case, observed relations may reflect the influence either of waking life factors on dream content or of a third variable on both dream content and the waking life variables of interest.

These points suggest that when, but only when, memories of one's dream experiences are readily available, beliefs about the general content of one's dreams are based on actual dream experiences through the memories of these experiences. This hypothesis is supported by research showing that questionnaire and diary measures of dream content have smaller correlations in low recallers than in high recallers (Schredl, 2002). If this is correct, then the unanswered question becomes how people go about constructing beliefs about the content of their dreams when memories of dream experiences are not readily available.

Social psychology has shown that when memories are hazy, current feelings guide our recall of past events (Myers, 2002). For instance, Holmberg and Holmes (1994) discovered that when newlywed couples where resurveyed after a two year period, those whose marriage had soured recalled that things had always been bad even though the first survey indicated that the majority of them reported being very happy at that time. Can this particular understanding of belief construction be applied to the context of people's beliefs about the content of their dreams? If yes, then it can be suggested that these beliefs tend to be based on current affective states, especially when the availability of actual dream memories is limited (i.e., when DRF is low).

The goal of the present study was to evaluate the influence of DRF on how people construct their beliefs about their everyday dream experiences. Specifically, we examined self-reported assessments of the frequency of anxious experiences in dreams. The following two predictions were made:

The relation between dream experiences and beliefs about dreams is hypothesized to be moderated by the availability of memories of dreams. It was thus predicted that people's belief about the presence of anxious feelings in their dreams would be correlated to the usual affective tone

present in their everyday dreams in individuals with high DRF but not in individuals with low DRF.

When memories of one's dream experiences are not readily available, beliefs about dreams are hypothesized to be based on the participant's current affective state. It was thus predicted that people's beliefs about the presence of anxious feelings in their dreams would be correlated to the participant's current affective state for individuals with low DRF but not for individuals with high DRF.

METHOD

Participants

Participants were 112 undergraduate students (100 females and 12 males) who were recruited as non-paid volunteers from an undergraduate psychology class.

Procedure

Participants completed two research protocols. The first contained a *Sleep and Dream Questionnaire* (Brown & Donderi, 1986), the *State Trait Anxiety Inventory* (STAI: Spielberg, Gorsuch & Lushene, 1970) and other psychological measures included as part of a separate study.

The second research protocol began immediately after the completion of the first protocol and required participants to complete a short daily dream log upon awakening for 2 to 5 consecutive weeks. Each morning, participants had to note if they recalled one or more dreams, if they had a white dream (defined as the certainty of having dreamt without any memory of the dream), or if they had no dream recall. For each remembered dream, participants were required to provide a brief written description of the dream (descriptive title, main emotion, intensity of the emotion) and to indicate whether the dream was an erotic dream, a flying dream, a bad dream, a nightmare, or a sleep terror. Participants were provided with definitions for each type of dream category and were instructed to complete and return the first protocol before beginning the dream recording set.

Participants' belief about the presence of feelings of anxiety in their dreams was assessed with an item from the *Sleep and Dream Questionnaire* which asked them to indicate on a 5-point Likert scale to what extent they agreed with the following item: 'In my dreams, I tend more often to be anxious than calm.'

The trait scale of the STAI, which measures feelings of general anxiety, was used as a measure of participants' current affective state. Since the dream content variables were measured during the weeks following the completion of the STAI, the trait scale was seen as a more

valid and more stable measure of the affective state for the following weeks than the state scale.

Actual dream recall frequency (DRF) was calculated from the dream log. The number of dreams reported in the daily log was tabulated and the duration of the log determined by counting the number of days during which the log was completed. The total number of dreams reported was then divided by the duration of the log (in days) and converted to number of dreams/week. Participants who failed to complete the dream log for at least 14 consecutive days were excluded from the analyses.

Three variables were used to measure the usual affective tone of the participants' everyday dreams: the proportion of negative emotions in the dream log, the proportion of dreams reported that were nightmares (highly unpleasant dreams that awaken the sleeper), and the proportion of dreams reported that were bad dreams (highly unpleasant dreams that do not awaken the sleeper). The proportion of negative emotions in the dreams was calculated by first classifying the main emotion reported by the participant for each dream recorded in the log as being positive (e.g., happiness, joy, calmness), negative (e.g., anxiety, anger, sadness, disgust) or neutral (e.g., no emotion reported). The dream reports for which the main emotion could not be confidently classified were eliminated from the analyses. The classification was performed independently by two raters. Cohen's Kappa ($K = 0.81$) indicated that the inter-rater reliability for the classification of emotions was very good. Since the belief question taken from dream questionnaire referred to a proportion of anxious experiences and not the intensity of these experiences, the intensity ratings for the emotions reported in the dream logs were not taken into account. For each participant, the number of dream reports whose main emotion was negative was then divided by the total number of dreams reported in the log (excluding any unclassifiable dreams). The proportion of dreams reported that were nightmares or bad dreams was also calculated for each participant by dividing the number of nightmares and bad dreams by the total number of dreams reported in the log. Participants with fewer than three dream reports in their log were excluded to avoid non-valid (non-representative) estimates.

In sum, six variables were used to evaluate four concepts. First, beliefs about the content of one's dreams were measured with a question concerning the *Belief about the Presence of Anxiety in Dreams*. Second, the availability of dream memories was operationalised as the log based *DRF*. Third, the usual affective tone of participants' everyday dreams was primarily assessed by the *Proportion of Negative Emotions in the Dream Log* while the *Proportion of Nightmares* and the *Proportion of Bad Dreams* served as secondary operationalisations. Finally, scores on the *STAI* were used to measure the participants' current affective state.

RESULTS

Descriptive

Twenty nine participants had missing data or did not complete the protocol as requested (e.g., failed to complete the dream log or a questionnaire) while two others reported fewer than three dream reports in their log. Consequently, 84 participants (75 females and 9 males) were included in the analyses. Participants' ages ranged from 20 to 38 (M = 22.0; SD = 2.6). Descriptive statistics for all six variables are presented in Table 1. The distributions of *DRF*, *Proportion of Nightmares* and *Proportion of Bad Dreams* had positive skewness and kurtosis. None of the other variables had significant skewness or kurtosis. There was one outlier (i.e., more than 3 SD away from the mean) for *Proportion of Nightmares* and two for *DRF*. The outliers were replaced by their nearest value and the analyses performed both with the original and the replaced values. Since the results were not significantly affected by this transformation, only the analyses computed with the original data are presented.

TABLE 1 Descriptive statistics for the Belief, Dream Content, Current State and DRF variables (n = 84).

	Mean	S.D.	Range
Belief (anxiety)	2.89	1.06	1-5
Proportion negative dreams	0.51	0.16	0.0-0.8
Proportion nightmares	0.02	0.04	0-0.2
Proportion bad dreams	0.11	0.15	0-0.6
STAI	39.60	9.80	20-63
DRF	6.10	4.20	0.8-25.0

Belief, Dreaming and Waking State

To evaluate if DRF was a moderator for the relations between *Belief about Anxiety in Dreams*, the three variables related to *Usual Affective Content in Dreams*, and the *STAI*, participants were evenly divided into Low DRF and High DRF (median split at 4.9 dreams/week). Pearson's correlations were calculated between the Belief variable, the three Dream Content variables, and the *STAI* for both groups. Unless specified, the threshold of statistical significance was set at 0.05 and the tests were two-tailed.

The hypothesis that the relation between dream content and beliefs about dreams depends on the availability of dream memories was

confirmed except for one of the secondary operationalizations of dream content. As shown in Table 2, none of the correlations between the three measures of *Usual Affective Content in Dreams* and the Belief variable achieved statistical significance in the Low DRF group. However, two out of the three possible correlations did achieve statistical significance in the High DRF group. If the *Proportion of Negative Emotions in Dreams* is taken as an index of affective tone in dreams, then 18.5% of the variance in the *Belief about the Presence of Anxiety in Dreams* can be explained by the *Usual Affective Content in Dreams* in the High DRF group while no statistically significant amount of variance can be explained in the Low DRF group. Furthermore, if both the *Proportion of Negative Emotions in Dreams* and the *Proportion of Nightmares* are used in a linear regression to predict the *Belief about the Presence of Anxiety in Dreams*, an additional 8.7% of the variance can be explained in the High DRF group (total adjusted $r^2 = 27.2\%$) while no significant amount of variance can be explained in the Low DRF group (the threshold of statistical significance is at $r^2 = 9.3\%$, i.e., $r = 0.31$ for $n = 42$).

TABLE 2 Correlations Between Belief about Anxiety and the Dream Content and Current State Variables

	Belief About Anxiety in Dreams	
	Low DRF (n=42)	High DRF (n=42)
Dream Content variables		
- *Proportion of Negative Dreams*	0.15	0.43**
- *Proportion of Nightmares*	-0.01	0.47**
- *Proportion of Bad Dreams*	0.14	-0.20
Current State variable		
- *STAI*	0.34*	0.05

*$p < 0.05$ **$p < 0.01$

The hypothesis that beliefs about dreams are based on the current affective state if and only if memories of dreams are not readily available was also confirmed, but only for the main operationalization. As shown in Table 2, the correlation between the Belief variable and the *STAI* achieved statistical significance in the Low DRF group ($r^2 = 11.6\%$) but not in the High DRF group.

While the two main experimental hypotheses were supported by the data, alternate hypotheses were also evaluated. Specifically, we investigated if the non-significant correlations between the three measures of *Usual Affective Content in Dreams* and the Belief variable in the Low DRF group and those between the *STAI* and the Belief variable in the High DRF group could be explained by: a) a reduced variance in one of these variables for the appropriate group; b) a mean difference between the groups for the same six variables; or c) a correlation between DRF and one or more of the same five variables. To evaluate these hypotheses, *t*-tests and Levene's tests for the equality of variance were calculated between the two DRF groups for each of the five variables (DRF excluded). The High DRF group showed a significantly smaller variance than the Low DRF group for the three Dream Content variables. However, these differences were not in the predicted direction and cannot be used to explain an absence of significant correlations between the Belief variable and the Dream Content variables for the Low DRF group. None of the other tests for the equality of variance and none of the *t*-tests were statistically significant. In addition, DRF was not significantly correlated to any of the other five variables ($n = 84$). Consequently, these alternate hypotheses were rejected as possible explanations for our findings. It might also be argued that the measures of Usual Affective

TABLE 3 Correlations between the Dream Content variables and the Current State variables.

	% Neg. Dreams	% Nightmares	% Bad Dreams
Low DRF ($n = 42$)			
STAI	-0.19	0.22	-0.05
High DRF ($n = 42$)			
STAI	-0.16	0.27	-0.08

$^{*}p < 0.05$ $^{**}p < 0.01$

Content in Dreams potentially included more error variance in the Low DRF group since they were based on fewer dreams per participant than in the High DRF group. However, the Low DRF group still had a mean of 13.3 dream reports (versus 34.6 dream reports for the High DRF group), which is probably sufficient to produce relatively valid measures of dream content for such a group.

The correlations between the three Dream Content variables and the *STAI* were also assessed for each group to evaluate if they could account

for the pattern of correlation with the Belief variable. As shown in Table 3, none of the correlations between the three Dream Content variables and the *STAI* achieved statistical significance in the Low DRF group nor did they in the High DRF group.

DISCUSSION

The results support our main predictions by showing that *Belief about Anxiety in Dreams* is related to *Usual Affective Content in Dreams*, but only in individuals with a high DRF, and to *Current Affective State*, but only in individuals with a low DRF. Furthermore, these differences between the DRF groups could not be accounted for by group differences in terms of means or variance, by a correlation between DRF and one or more of the other variables, or by group differences in the correlations between variables related to *Usual Affective Content in Dreams* and the scores obtained on the STAI.

These results are in line with those reported by Shredl (2002) and support the hypothesis that the beliefs people hold about the content of their dreams are related to their usual dream content only when memories of their dreams are readily available. They also support the hypothesis that when such memories are not readily available, people's beliefs are influenced by their current affective state.

At a theoretical level, the data are consistent with the psychosocial finding that people tend to base their beliefs on their current feelings when their memories are hazy and can be considered an extension of it. Our results suggest that in the context of dream content, beliefs are not necessarily valid reflections of dream experiences and confirm that the relation between beliefs about dream content and actual dream experiences is clearly mediated by autobiographical memory. These conclusions can be related to Bernstein and Roberts' (1995) suggestion that a person's self-concept probably affects the answer to items concerning dream content. Indeed, it could be argued that our measure of subjective state was akin to a measure of self-concept. Thus, beliefs can be said to be constructed through a process implicating one's memories of past experiences and either current subjective state or self-concept: the fewer the memories of past dreams are available, the more the construction of beliefs about one's dreams relies on the individual's current subjective state or self-concept. This indicates that the continuity between dream experiences and beliefs about dreams should not be assumed, especially when dream recall is not taken into account. In addition, beliefs about dream content are cognitive representations of dream experiences, not a summarized replica of these experiences. As such, even though actual dream content (as measured from a dream log) and beliefs about one's dream content share many commonalities,

recognizing that they do not represent the same thing could help us better understand how dream experiences affect waking states.

An experimental paradigm was also proposed to clarify the issue of causality between dream experiences and waking life factors. The results confirmed the rather obvious suggestion that in the relation between the dreams' typical affective tone and the belief about the presence of anxious experiences in dreams, the former was a cause rather than a consequence. While this finding is not surprising, it serves as a validation of the paradigm and suggests its utility in elucidating other questions in the field. For example, one review (Kramer, 2000) suggests that dream content might play a proactive role in the maintenance of depression instead of merely being a consequence of a chronically depressed mood. By examining the impact of DRF on the relation between dream content and waking life symptoms of depression, such a hypothesis could be tested and the processes underlying the disorder clarified.

Finally, by showing that autobiographical memory is an important factor in the construction of beliefs, this study highlights the importance of understanding dream recall not only as a variable to be explained but as an essential link between dream experiences and waking life. It might be time, as suggested by Levin, Fireman and Rackley (2003), to stop trying to predict DRF. Instead, research efforts should be directed towards investigating its role as a moderator of the relation between dream experiences and waking states as well as its impact on waking life factors.

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