

Self-Reported Effects of Dreams on Waking-Life Creativity: An Empirical Study

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ABSTRACT. The authors studied the self-rated effect of dreams on creativity in participants who were not selected for creative abilities. Students ($N = 444$) and online respondents ($N = 636$) answered a questionnaire about dreams and creative dreams. In addition, the students completed several personality measures and creativity scales. Results indicated that dreams that stimulated waking-life creativity played a considerable role in the lives of ordinary people (about 8% of all dreams). Examples reported by the online participants fell into 4 categories: (a) dream images used for art, work, or similar areas; (b) dreams that solved a problem; (c) dreams that provided the impetus to do something that the dreamer otherwise had difficulty doing; and (d) dreams containing emotional insights. The main factors influencing frequency of creative dreams were dream recall frequency and the thin boundaries personality dimension. Future researchers should use diary techniques to study the effects of dreams on waking life and should develop techniques to increase the frequency of creative dreams that might be valuable as aids for people in creative jobs.

Key words: creativity, dreaming, dream recall

HOW DREAMS INSPIRE CREATIVE INDIVIDUALS has been studied by many researchers. Barrett (2001) and Van de Castle (1994) described many examples of this phenomenon. For example, artist Salvador Dali claimed that dreams stimulated his work. Similarly, filmmakers such as Ingmar Bergmann (*Wild Strawberries*), Carlos Saura, and Federico Fellini directly transformed their own dream images into film sequences. A famous example is *The Strange Case of Dr. Jekyll and Mr. Hyde*, by Robert Louis Stevenson, who dreamed about this metamorphosis from one character into the other. Paul McCartney heard the melody of the song “Yesterday” within a dream and could not believe it was a yet unknown song. However, these are anecdotal accounts that cannot be validated.

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In addition to the creativity of artists, dreams contribute to problem solving in science. Auguste von Kekule discovered the ring structure of the benzene molecule by thinking about a dream in which a snake seized hold of its own tail, although this report is subject to doubt because Kekule reported the dream long after its occurrence (Strunz, 1993). Other dream solutions have been reported for Dmitri Mendeleev's categorization of chemical elements, Elias Howe's invention of the sewing machine, and Herman V. Hilprecht's deciphering of ancient Babylonian hieroglyphs (Van de Castle, 1994).

Another category comprises dreams that stimulate dreamers to think or do something new in their waking life. William C. Dement, one of the pioneers of modern sleep and dream research (Dement, 1974) and a heavy cigarette smoker, dreamed that he was diagnosed with inoperable lung cancer. He "experienced the incredible anguish of knowing my life was soon to end, that I would never see my children grow up" (p. 102). "I will never forget the surprise, joy, and exquisite relief of waking up. I felt I was reborn," he said (p. 102), and after this dream, he quit smoking.

Despite the many famous examples of the inspiring effects of dreams, empirical research is scarce in the area of investigating dreams in people with normal levels of creativity. Kuiken and Sikora (1993) and Schredl (2000) found that 20% and 28% of students, respectively, reported that dreams gave them artistic ideas at least twice a year. Schredl (2000) found a strong relationship between frequency of creative dreams and dream recall frequency ($r = .43$, $N = 85$) and found no gender differences in this variable, despite the well-known gender difference in dream recall frequency (Schredl & Piel, 2003). Pagel, Kwiatkowski, and Broyles (1999) studied individuals in creative careers (e.g., actors, screenwriters, editors). Filmmakers reported higher mean values than did a control sample of the general population recruited at a family practice clinic on the question, "Do your dreams affect your creative activities?"

Other researchers investigated the relationship between dreaming and creativity from the perspective of how creative people differ from others (Schredl, 1995). With regard to dream content, Livingston and Levin (1991) challenged Sladeczek and Domino's (1985) finding of more bizarre dreams in creative individuals. Livingston and Levin reported that this effect might be explained by dream length (i.e., creative individuals report longer dreams, which are more bizarre due to the length of the report). Whether consistent dream features can be associated with creativity in waking life is an open question for future research.

We studied the self-reported effect of dreams on creativity in samples not selected for creative ability. First, we aimed to determine how often participants reported having creative dreams. Second, we investigated influential factors such as gender, personality traits, creative attitudes, and creative activities in waking life. We expected that personality dimensions associated with openness to experience and measures of creativity would correlate positively with the occurrence of creativity-stimulating dreams. We derived this hypothesis from previous findings

indicating a strong relationship between these waking-life measures and positive attitudes toward dreams (Schredl, Wittmann, Ciric, & Götz, 2003) and from the idea that a positive attitude is related to a higher probability of focusing on the positive effects of dreams on waking life. Last, we classified examples of creative dream effects after the fact to determine how dreams affect waking-life creativity.

Method

Participants

The first sample included 444 individuals with a mean age of 23.5 years ($SD = 5.7$ years). These 376 women and 68 men were mainly psychology students. We recruited participants from the universities of Mannheim, Heidelberg, and Landau for a study entitled "Sleep, Dreams, and Personality." We distributed signup sheets during classes. We paid participants 40 DM (about \$20) for participating.

The second sample included 636 individuals (377 women and 259 men) who returned their online questionnaires on lucid dreaming (www.klartraum.de) between January 4, 2004, and August 5, 2004, and whose mean age was 25.5 years ($SD = 9.8$ years). We posted links on psychology research and lucid dreaming sites to inform prospective participants about the study. By eliciting the e-mail addresses of participants, we minimized the possibility of multiple responding. In addition, the possibility that participants of the questionnaire study also completed the online study was very small because there was a 4-year delay between data collections. The mean ages differed between samples ($t = -3.8, p < .0001$), and the gender distribution was also different, $\chi^2(1, N = 1,080) = 78.0, p < .0001$.

Measures

Frequency of creative dreams and dream recall. Participants completed an 8-point rating scale measuring frequency of creative dreams within a dream questionnaire, which we developed on the basis of Schredl's (2000) study. An example question was "How often do your dreams give you creative ideas?" and the scale ranged from 0 (*never*) to 7 (*several times a week*). We used a similar 8-point scale to measure nightmare frequency. We did not provide participants with definitions for the terms *creative ideas* or *nightmares*. To obtain units in frequency per month, we recoded the scales using the class means (0 = 0, 1 = 0.042, 2 = 0.083, 3 = 0.25, 4 = 1.0, 5 = 2.5, 6 = 4.0, 7 = 12.0). We used the recoded values of the scales solely for descriptive purposes and not in statistical analysis.

We measured dream recall frequency using a 7-point rating scale from 0 (*never*) to 6 (*almost every morning*). The test-retest reliability of this scale for an average interval of 70 days is high ($r = .83, N = 39$; Schredl, 2002). To obtain units of mornings per week, we recoded the scale using the class means (0 = 0, 1 = 0.125, 2 = 0.25, 3 = 0.625, 4 = 1.0, 5 = 3.5, 6 = 6.5). For the second sample,

we included these three questions (frequency of creative dreams, nightmares, and dream recall) in an online questionnaire about lucid dreaming. Participants also reported an example illustrating the creative effect of past dreams.

Personality measures. The German version of the NEO Personality Inventory-Revised (NEO-PI-R; Ostendorf & Angleitner, 1994) comprises 240 five-point items (from 0 to 4) measuring the Big Five personality measures (i.e., neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness). Scale scores (with 48 items on each of five scales) can range from 0 to 192. The internal consistencies of the scales are high ($r = .89$ to $.92$), and Ostendorf and Angleitner replicated the findings of the English version with confirmatory multitrait-multimethod analyses.

The Absorption scale, a subscale of the Personality Inventory (Tellegen & Atkinson, 1974), consists of 34 yes-or-no items that measure the capacity of an individual to become absorbed in imaginative and aesthetic experiences (e.g., "I can be greatly moved by eloquent or poetic language"). We computed sum scores. Because we scored all absorption items in one direction (yes answers), we included 32 unrelated items measuring other personality dimensions in the questionnaire (as previous researchers have done; Belicki & Bowers, 1981). The internal consistency of the German version was $r = .85$ ($N = 51$; Schredl, Jochum, & Souguenet, 1997).

The Boundary Questionnaire (Hartmann, 1991), which was translated into German by the Institute of Psychology, University of Zürich, Switzerland, includes 145 five-point scales covering 12 areas (e.g., sleep/dreams, unusual experiences, thought/feeling/mood, interpersonal relationships). The total score, reflective of boundary thinness, is derived by adding the ratings (ranging from 0 to 4) of 138 items, with item reversals when appropriate. Respondents with *thin* boundaries are sensitive, creative, and vulnerable; experience mental in-between states; and involve themselves quickly in relationships. The internal consistency of the German scale was $r = .93$ ($N = 152$; Schredl, Schäfer, Hofmann, & Jacob, 1999), the same as reported by Hartmann for the English version ($r = .93$, $N = 966$). To measure visual imagination, we used a subtest of the Erfassungssystem Veränderter Bewusstseinszustände (Test Battery for Altered States of Consciousness; Quekelberghe, Schreiber, Peter, & Caprano, 1992). The internal consistency of the 18 five-point items is high ($r = .92$; Quekelberghe et al.).

Creativity questionnaire. The scale assessing attitude toward creativity contains 12 five-point Likert items (Schredl, 1995) that range from 1 to 5. We used the mean score of these items in our analyses. The internal consistency was $r = .67$ (Schredl). In addition, participants indicated whether they engaged in creative activities, such as painting, playing an instrument, or doing needlework or handicraft, in their leisure time. Last, we used a 5-point Likert scale, with

responses ranging from 1 to 5, to measure participants' subjective estimate of their own creativity.

Design and Procedure

The participants of the first sample completed the questionnaires over a 2-week period and returned them to one of the experimenters. Of 457 participants, 444 returned their materials. The participants of the second sample returned their lucid dreaming questionnaire online between January 4, 2004, and August 5, 2004. We did not administer additional screening instruments to exclude participants with mental disorders or participants taking psychotropic medications. However, we had no reason to believe that students or Web-based samples were nonrepresentative with regard to these characteristics. We used the SAS version 8.02 software package for Windows in our analyses. Because the scales that we developed were ordinal, we computed Spearman rank correlations.

Results

Frequency of Creative Dreams, Dream Recall, and Nightmares

Table 1 presents mean values and standard deviations of the frequency scales. We performed an analysis of covariance (ANCOVA) with study group (i.e., paper or online questionnaire) and gender as independent variables and with age as a covariate and found no significant differences between the two samples in dream recall frequency, $F(1, 1069) = 2.8, p = .10$, nightmare frequency, $F(1, 1068) = 0.2, p = .66$, or frequency of creative dreams, $F(1, 1068) = 2.6, p = .11$.

TABLE 1. Means and Standard Deviations of Dream Variables for Online and Paper Questionnaire Respondents

Variable	Paper questionnaire respondents				Online questionnaire respondents			
	Women		Men		Women		Men	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Dream recall frequency ^a	4.49	1.16	4.16	1.31	4.69	1.33	4.31	1.67
Nightmare frequency ^b	3.66	1.65	2.97	1.73	3.79	2.00	2.68	2.00
Creative dream frequency ^b	2.12	1.65	2.15	1.57	2.40	2.32	2.44	2.35

^aAnswered on a 7-point scale from 0 (*never*) to 6 (*almost every morning*). ^bAnswered on an 8-point scale from 0 (*never*) to 7 (*several times a week*).

We found small but significant gender differences for dream recall frequency, $F(1, 1069) = 10.2, p < .01$, and nightmare frequency, $F(1, 1068) = 43.3, p < .0001$, but not for frequency of creative dreams, $F(1, 1068) = 0.0, p = .88$. Dream recall frequency declined slightly with age, $F(1, 1069) = 4.3, p < .05$, but this age decline was more pronounced for nightmare frequency, $F(1, 1068) = 22.1, p < .0001$. We did not find significant interactions between study effect and gender. In both samples, 71.4% of respondents reported at least one creative dream. Almost half (45.1%) of respondents estimated a frequency of creative dreams over twice a year, and almost 9% of the participants reported effects on their creativity once a week or more. We transformed scale values into their absolute frequencies and found a mean dream recall frequency of 3.11 mornings per week ($SD = 2.32$ mornings per week) and a mean frequency of 1.05 dreams stimulating waking-life creativity per month ($SD = 2.47$ dreams per month). Respondents reported that 7.8% of recalled dreams were creative.

Correlational Analyses

Dream recall frequency was significantly related to frequency of creative dreams ($r = .29, N = 1075, p < .0001$). Table 2 shows Spearman rank correlations for the frequency of creative dreams and dream recall frequency with creativity and personality in the paper questionnaire sample. In contrast to previous findings of low correlation coefficients between waking-life measures and dream recall frequency (Schredl et al., 2003), we found that the variables of openness to experience, boundary thinness, imagination, absorption, attitude toward creativity, and creative activities were related to frequency of creative dreams, with the medium effect size of $r = .3$ for most variables. These coefficients were significantly higher than were the corresponding coefficients for dream recall frequency. Thus, the relationship between waking-life measures and frequency of creative dreams is much stronger than are the relationships involving dream recall frequency and cannot be explained by dream recall frequency as a possible mediating variable. As we expected, of the Big Five factors, only openness of experience was related to frequency of creative dreams.

We performed an exploratory regression analysis with frequency of creative dreams as the dependent variable and with simultaneous entry of all variables (see Table 2). As shown in Table 3, we identified the following significant variables in order of importance: dream recall frequency, boundary thinness, imagination, and attitude toward creativity. Creative activities and openness to experience were not significantly related to creative dream frequency in the regression analysis because of their intercorrelations with other variables.

TABLE 2. Relationships Among Creative Dream Frequency, Dream Recall Frequency, Personality Measures, and Creativity for Paper Questionnaire Respondents

Personality dimension	Paper questionnaire			Correlation with creative dreaming		Correlation with dream recall		Comparison of correlation coefficients	
	α	<i>M</i>	<i>SD</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>z</i>	<i>p</i>
Neuroticism	.932	99.5	23.7	.024	.62	.039	.41	-0.3	.79
Extraversion	.898	112.6	19.8	.061	.20	.009	.84	0.9	.35
Openness to experience ^a	.859	129.8	15.7	.268	<.0001	.133	<.01	2.5	<.01
Agreeableness	.860	113.4	15.8	.041	.39	-.083	.08	2.2	<.05
Conscientiousness	.900	109.0	19.1	.027	.57	.015	.76	0.2	.83
Thin boundaries ^a	.918	289.7	43.2	.381	<.0001	.141	<.01	4.6	<.0001
Absorption ^a	.827	21.6	5.7	.370	<.0001	.126	<.01	4.6	<.0001
Imagination ^a	.846	51.0	10.8	.319	<.0001	.165	<.001	2.9	<.001
Attitude toward creativity ^a	.755	3.51	0.59	.300	<.0001	.035	.23	4.9	<.0001
Self-rated creativity ^a	—	3.68	1.05	.291	<.0001	.033	.24	4.8	<.0001
Painting ^{a,b}	—	49.5%		.227	<.0001	.105	<.05	2.2	<.05
Playing music ^{a,b}	—	15.8%		.121	<.001	-.022	.68	2.6	<.01
Needlework and handicraft ^{a,b}	—	28.9%		.161	<.001	.036	.22	2.3	<.05

^aWe used one-tailed statistical tests for correlation coefficients. ^bPercentage of respondents who said they participated in the activity.

TABLE 3. Summary of Regression Analysis for Variables Predicting Frequency of Creative Dreams

Variable	<i>B</i>	<i>SEB</i>	β
Dream recall frequency	0.35	0.06	0.26**
Openness to experience	-0.01	0.01	-0.08
Imagination	0.02	0.01	0.11*
Thin boundaries	0.01	0.00	0.25**
Attitude toward creativity	0.37	0.17	0.13*
Self-rated creativity	0.12	0.10	0.08
Painting	0.18	0.16	0.06
Playing music	0.30	0.19	0.07
Needlework and handicraft	0.22	0.16	0.06

Note. Adjusted $R^2 = .27$.

* $p < .0001$. ** $p < .05$.

Content of Creative Dreams

The Appendix presents examples of creative dreams reported by the online sample, which we have classified into four groups: (a) dreams with direct impulses for artwork, (b) dreams that present solutions to problems, (c) dreams that stimulate behavior in waking life, and (d) dreams containing emotional insights.

Discussion

Many participants reported having dreams that stimulated creativity in everyday life. A rough estimate revealed that about 8% of dreams affected creativity. We base this claim solely on the participants' estimates. We cannot use experimental paradigms to validate such claims because dream content cannot be manipulated without conscious knowledge of the person that could also affect subsequent waking-life experiences such as creative ideas. Although the questionnaire did not include a definition of a creative idea within the frequency item, all examples given by the participants of the online study fit in the categories of creative dreams (see Table 4). Thus, problems of understanding the concept of creative ideas as an effect of dreams were negligible.

We divided the examples that were reported by online participants into four categories. Participants used dream images for artwork or similar activities. They also reported dreams that solved problems (most often work-related) and dreams that motivated them to do something that they otherwise had difficulty doing. Future researchers should study whether this categorization of creative dreams fits a conceptual framework of creativity. The fourth category, dreams containing emotional

TABLE 4. Themes of Creative Dreams (*N* = 272)

Theme	Frequency
Creativity	
Painting	30
Literature and writing	25
Music	5
Other (e.g., Web design, recipes, gifts)	24
Problem solving	
Work- or thesis-related	49
Computer	11
Mathematics	11
Motor skills	4
Dreams as impulses (e.g., relationships, travel)	73
Emotional insights	40

insights, was related to dreams within psychotherapy (Schredl, Bohusch, Kahl, Mader, & Somesan, 2000) and personal growth. Hill (2004) demonstrated empirically how effective dream work can be in both contexts, and many other researchers have also studied dream interpretation. We investigated only the self-reported positive effects of dreams on waking life, but dreams, and especially nightmares, can be disturbing and can negatively affect well-being (Köthe & Pietrowsky, 2001).

Taking the effects of dreams on waking life together with the effects of waking life on subsequent dreams (i.e., the continuity hypothesis of dreaming; Schredl, 2003), we hypothesized that there is a stream of consciousness that is always active, both as waking thoughts and feelings and as dreams during sleep.

In comparisons when we controlled for gender and age, we did not find differences between responses to the online and paper questionnaires. However, a major limitation of our study was its retrospective nature. To compliment the present findings, future researchers should use dream diaries in which participants write down their dreams and their dream effects immediately after they occur. We also did not find gender differences in the frequency of creative dreams (Schredl et al., 2000). We found a small gender difference for dream recall frequency, with women reporting having dreams more often than did men. However, we did not find a gender difference in frequency of creative dreams (Schredl, 2000). Because dream recall frequency is strongly related to the frequency of creative dreams, this result is difficult to explain on the basis of the present data.

Personality factors, attitude toward creativity, and creative activities were more closely related to the frequency of creative dreams than to dream recall frequency. On the basis of the lifestyle hypothesis of dream recall, which states that dream recall is part of a general lifestyle including being introverted, independent, and creative (Schredl, 1999), we might have expected a stronger relationship between

creativity and dream recall frequency because other researchers have reported that finding (Schredl, 1995). However, Schredl et al. (2003) found that a positive attitude toward dreams was more closely related to personality factors than to dream recall frequency. This could mean that the probability of recalling a dream in the morning depends on a variety of factors (e.g., memory, sleep parameters, personality, stress), and thus the variance explained by personality dimensions is small. In contrast, attitude toward dreams and frequency of creative dreaming are largely determined by personality factors and, in the case of creative dreaming, by the amount of creative activity performed while awake. The lifestyle hypothesis may apply only to these aspects of dreaming rather than to dream recall frequency.

Through exploratory regression analysis, which we performed to take into account the intercorrelations between the variables, we found that the most important factor explaining differences in frequency of creative dreams was dream recall frequency. This outcome made sense because the probability of having a creative dream increased with the number of dreams recalled. The personality dimensions of thin boundaries, imagination, and positive attitude toward creativity also correlated with frequency of creative dreams. These data match descriptions of people with thin boundaries as being creative and unconventional (Hartmann, 1991). Future researchers should study whether it is possible to increase the frequency of creative dreams through methods such as increasing dream recall frequency (Schredl, 1999) or through special recommendations to tap the creative power of dreams (Tonay, 1995).

In this study, we found that individuals with average levels of creativity reported that dreams stimulated their waking-life creativity. The main influencing factors were dream recall frequency and the personality dimension of thin boundaries. Future researchers should use diary techniques to study the effects of dreams on waking life in more detail. They should also develop techniques to increase the frequency of creative dreams, which would be a valuable aid for people in creative occupations. Participants could increase dream recall by keeping dream journals or using presleep suggestion about successful recall (Redfering & Keller, 1974). Also, participants who perform creative tasks before sleep may have dreams with more creative content.

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APPENDIX

Categories and Examples of Participants' Creative Dreams

Creativity

Within the dream I saw a mermaid that transformed into a butterfly. This image served as a basis for a pastel painting.

I often dream that I can fly. This gave me the idea of writing a book about a man who can really fly. He flies to look for his beloved and causes fear and terror among the people.

Shortly before the birthday of my mother, I dreamed of something that would make a wonderful gift. Within the dream I saw her reaction to the present. Then I actually bought this present and, indeed, she was just as happy about it as was depicted in the dream.

Problem solving

My personal computer was broken, and I dreamed about how I could fix it in the best way. I woke up in the morning, and it was clear to me how to get things going.

Within a dream an error in a computational formula of my master's thesis came to my mind, which I was able to resolve in the dream by creating a new formula.

Impulses

I dreamed of a girl from my school on whom I had a crush. This dream motivated me to approach her.

I dreamed that I was on a theater stage. I was alone on the stage; no audience was there. I sang and heard applause without seeing the listeners. On the basis of this dream, I decided to take voice lessons.

Emotional insight

I was sitting in a railway compartment with a handbag on my lap that opened unintentionally, and everything fell out. A man was willing to help me put the things back, but there were so many items that everything fell out again. Afterward I decided to examine carefully what kind of things or thoughts I should part with (i.e., simplifying my life).

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