



# Lucid dreaming frequency and personality

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Received 17 April 2003; received in revised form 3 January 2004; accepted 4 February 2004

Available online 19 March 2004

## Abstract

The term lucid dream designates a dream in which the dreamer is—while dreaming—aware that she/he is dreaming. Within an unselected student sample, 82% of the participants reported the occurrence of at least one lucid dream. In this sample, lucid dreaming frequency was not associated with the Big Five personality factors and, thus, theories linking lucid dreaming with introversion or well-being, that is, low neuroticism scores have not been supported. However, substantial but small correlations have been found for two openness facts (“fantasy”, “ideas”) and for dimensions which are associated with the openness to experience factor: Thin boundaries, Absorption and Imagination. Since these correlations are similar to corresponding correlations to dream recall frequency and the relationships between lucid dreaming frequency and these personality dimensions are mediated by dream recall frequency, it might be concluded that the direct relationship between lucid dreaming frequency and personality is rather small. Other variables such as meditation experience, field independence on a perceptual level, performance of the vestibular system should be included in future models explaining interindividual differences in lucid dreaming frequency. Nightmare frequency was moderately associated with lucid dreaming frequency. Although partialling out dream recall frequency reduced the magnitude of the correlation, the still significant partial correlation supports the reports of lucid dreamers that nightmares can trigger lucidity. Controlled studies investigating the effect of training the technique of lucid dreaming on nightmare frequency have not yet been carried out.

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**Keywords:** Lucid dreaming; Dream recall; Nightmares; Personality

## 1. Introduction

The term lucid dream designates a dream in which the dreamer—while dreaming—is aware that she/he is dreaming (LaBerge & Rheingold, 1990; Tholey & Utecht, 1987). Although in the early

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period of sleep research it was assumed that this state of consciousness reflects brief waking periods in the night (e.g., Hartmann, 1975); Hearne (1978) and LaBerge (1980) have demonstrated—using the technique of eye movements signaling in the sleep laboratory—that lucid dreaming is a REM sleep phenomenon.

In a representative survey in Austria ( $N = 1000$ ), 26% of the participants stated that they had experienced a lucid dream at least once (Stepansky et al., 1998). For student samples, the figures are markedly higher; 57.5% (Gackenbach, 1991), 73% (Blackmore, 1982) or 80% (Palmer, 1979). Similar percentages were found for selected samples, e.g., members of a parapsychological association (70%, Kohr, 1980). In contrast to dream recall frequency for which stable gender differences of medium effect size has been demonstrated (overview: Schredl & Piel, 2003), large-scaled surveys (Gruber, Steffen, & Vonderhaar, 1995; Stepansky et al., 1998; Watson, 2001) did not reveal differences in lucid dreaming frequency between the sexes.

Several studies (Belicki, Hunt, & Belicki, 1978; Blackmore, 1982; Hearne, 1978; Watson, 2001; Wolpin, Marston, Randolph, & Clothies, 1992) showed a substantial relationship between lucid dream frequency and dream recall frequency; a finding which seems plausible since the chance of recalling a lucid dream is heightened by overall higher dream recall. Thus it is necessary to control for dream recall frequency in the relationship of lucid dreaming frequency and influencing factors.

In addition, a significant correlation between lucid dreaming frequency and nightmare frequency was reported (Glicksohn, 1989; Spadafora & Hunt, 1990; Stepansky et al., 1998). This also seems plausible since a marked portion of lucid dreamers reported that nightmares, especially recurrent nightmares, triggered lucidity within their dreams (Galvin, 1990; Wolpin et al., 1992). These above mentioned studies, however, have not controlled for dream recall frequency which might mediate the relationship between nightmare frequency and lucid dreaming frequency.

In the following, the findings regarding factors explaining interindividual differences in lucid dreaming frequency will be reviewed. The overview focuses on personality variables; other factors such as vestibular balance, intelligence, and creativity are discussed extensively in Snyder and Gackenbach (1988).

With regard to personality—based on the findings of Eysenck on extraversion—Hearne (1978) formulated the hypothesis that the higher cortical arousal, measured during lucid dreaming, in comparison to non-lucid REM dreams (e.g., LaBerge, 1992) is associated with introversion. His study and subsequent studies (Snyder & Gackenbach, 1988; Watson, 2001) did not support this hypothesis. Only the findings of Glicksohn (1989) and Phillips (1995) may be interpreted along these lines.

Gackenbach, Heilman, Boyt, and LaBerge (1985, 1986b) have investigated the field independence construct and were able to demonstrate—using perception paradigms for measuring field independence—positive correlations to lucid dreaming frequency, although their results are mixed (see review of Snyder & Gackenbach, 1988). These studies are based on the hypothesis formulated by Gackenbach et al. (1985, 1986b) that lucid dreamers more often rely on internal stimuli than non-lucid dreamers (parallel to the awareness of the current state of consciousness). One study (Blagrove & Tucker, 1994) did not find a substantial relationship between field independence measured via questionnaire and lucid dreaming frequency.

Moffitt et al. (1988) pointed out the parallels between meditation and lucid dreaming along a self-reflective continuum and several studies (Gackenbach, 1978, 1981, 1990; Gackenbach, Cranson, & Alexander, 1986a; Hunt, 1991; Levitan, 1993) reported a correlation between medi-

tation frequency and lucid dreaming frequency. This is congruent with the findings (Blagrove & Hartnell, 2000; Blagrove & Tucker, 1994) regarding internal locus of control (the belief in one's own control over events and outcome) which is assumed by these authors to be related to meditating. One study (Wolpin et al., 1992), however, was not able to demonstrate a positive relationship between lucid dreaming frequency and internal locus of control. For a small sample, Prescott and Pettigrew (1995) reported a relationship between lucid dreaming frequency and an 8-item scale termed "search for control over common situations in waking life". The assumption formulated by Gackenbach (1978) that lucid dreamers are or feel in better control of their waking life lead to the hypothesis that lucid dreamers are well-adjusted and score low on neuroticism scales. Several findings (Gackenbach, 1978; Gackenbach, Walling, & LaBerge, 1984; Gruber et al., 1995) support this hypothesis whereas the majority of the studies (Brussington & Hicks, 1996; Hearne, 1978; Stepansky et al., 1998; Watson, 2001; Wolpin et al., 1992) found neuroticism or wellbeing unrelated to lucid dreaming frequency.

Personality dimensions such as hypnotizability (Hoyt, Kihlstrom, & Nadon, 1992) and thin boundaries (Galvin, 1990; Hicks, Bautista, & Hicks, 1999) which can be conceptualized as subdimensions of the Big Five personality factor "openness to experience" (cf. McCrae, 1994) were positively related to lucid dreaming frequency. In these studies, dream recall frequency which is also related to these dimensions (cf. Schredl, 1999) was not statistically controlled. Watson (2001) reported a small but significant correlation coefficient ( $r = 0.14$ ,  $p < 0.01$ ) for lucid dream frequency and openness to experience in one sample, but the correlation ( $r = 0.08$ , ns) in a second sample was not significant. In this study, the correlations were also not controlled for dream recall frequency. Another methodological problem of several studies (e.g., Blagrove & Hartnell, 2000; Gackenbach, 1978; Galvin, 1990; Wolpin et al., 1992) is the sampling procedure: these researchers looked specifically for lucid dreamers via advertisements, flyers, etc. It might be possible that their samples were biased in a direction in which only "well-adjusted" lucid dreamers who are willing to report their experiences participated voluntarily in such lucid dreaming studies.

The aim of the present study was to compare the correlations between lucid dreaming frequency and various personality measures (Big Five personality factors, thin boundaries, absorption, imagination) to the respective coefficients of dream recall frequency. Additionally, partial correlations were computed in order to test whether the relationship between lucid dream frequency and specific personality dimensions is mediated by dream recall frequency. This analysis was also done for nightmare frequency. In view of the mixed results summarized above, the only hypothesis underlying the present study was a positive relationship between openness to experience and its related constructs and lucid dreaming frequency.

## 2. Method

### 2.1. *Measurement instruments*

#### 2.1.1. *Lucid dreaming frequency and dream recall frequency*

For measuring lucid dreaming frequency, an eight-point rating scale was presented within a self-developed dream questionnaire ("How often do you experience so-called lucid dreams (see

definition)?" 0 = never, 1 = less than once a year, 2 = about once a year, 3 = about two to four times a year, 4 = about once a month, 5 = about two to three times a month, 6 = about once a week, 7 = several times a week). In order to ensure a clear understanding of the phenomenon, a short definition was also presented: "During lucid dreaming, one is—*while* dreaming—aware of the fact that one is dreaming. It is possible to deliberately wake up or to control the dream action or to observe passively the course of the dream with this awareness". For the importance of a clear definition see Snyder and Gackenbach (1988). Nightmare frequency was measured by a similar eight-point scale ("How often do you experience nightmares?"). In order to obtain units in frequency per month, the scales were recoded 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 → 18.0).

Dream recall frequency was measured by a seven-point rating scale (0 = never, 1 = less than once a month, 2 = about once a month, 3 = twice or three times a month, 4 = about once a week, 5 = several times a week and 6 = almost every morning). The retest reliability of this scale for an average interval of 70 days is high ( $r = 0.83$ ,  $n = 39$ ; Schredl, 2002). In order to obtain units of mornings per week, the scale was recoded using the class means (0 → 0, 1 → 0.125, 2 → 0.25, 3 → 0.625, 4 → 1.0, 5 → 3.5, 6 → 6.5).

### 2.1.2. *Personality measures*

The German version of the NEO-PI-R (Ostendorf & Angleitner, 1994) comprises 240 five-point items (coded: 0 to 4) measuring the Big Five personality measures (neuroticism, extraversion, openness to experience, agreeableness and conscientiousness). The sum scores (48 items) can range from 0 to 192. The internal consistencies of the scales are high ( $r = 0.89$ – $0.92$ ) and confirmatory Multitrait-Multimethod analyses replicated the findings of the English version (Ostendorf & Angleitner, 1994).

The Absorption scale (subscale of Tellegen and Atkinson's personality inventory; Tellegen & Atkinson, 1974) consists of 34 Yes/No-items which measure the capacity to become absorptively involved in imaginative and aesthetic experiences, e.g., "I can be greatly moved by eloquent or poetic language". Sum scores were computed. Since all absorption items were scored in one direction (Yes-answers), 32 unrelated items measuring other personality dimensions were included in the questionnaire (as done in previous studies: e.g., Belicki & Bowers, 1981). The internal consistency of the German version amounted to  $r = 0.854$  ( $N = 51$ ; 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, was derived by summing the ratings (ranging from 0 to 4) of 138 items, with item reversals when appropriate. The internal consistency of the German scale was  $r = 0.93$  ( $N = 152$ ), the same as reported by Hartmann (1991) for the English version ( $r = 0.93$ ,  $N = 966$ ). For measuring visual imagination, a subtest of the "Erfassungssystem Veränderter Bewusstseinszustände" (Test battery for altered states of consciousness; Queckelberghe, von Schreiber, Peter, & Caprano, 1992) was applied. The internal consistency of the 18 five-point items is high ( $r = 0.92$ ; Queckelberghe et al., 1992).

## 2.2. Procedure and participants

Participants were recruited at the universities of Mannheim, Heidelberg and Landau for a study entitled “Sleep, dreams, and personality”. They were paid for participation. The participants completed the questionnaires over a 2-week period and returned them to one of the experimenters. Of 457 participants, 444 persons returned their materials.

Statistical analyses were carried out with the SAS 8.02 software package for Windows. Since the self-developed scales were ordinal prior to transformation, Spearman Rank correlations were computed. The difference between the original correlation and the partial correlation was tested by the formula given by Olkin and Finn (1995).

The sample included 444 persons whose mean age was  $23.5 \pm 5.7$  years. There were 376 women and 68 men who were mainly psychology students.

## 3. Results

### 3.1. Lucid dreaming frequency, dream recall frequency and nightmare frequency

In Table 1, the frequencies of the lucid dreaming frequency scale are depicted. Eighty-two percent of the participants stated that they had experienced a lucid dream at least once. The majority are lucid dreamers infrequently, about 36.9% are frequent lucid dreamers (frequency equal or higher than once per month) in the terminology of Snyder and Gackenbach (1988). The average lucid dreaming frequency was  $1.27 \pm 2.94$  lucid dreams per month. No significant gender difference was found (Mann–Whitney *U* Test,  $z = 0.5$ ,  $p = 0.6023$ , Effect size:  $d = -0.06$ ). The mean nightmare frequency amounted to  $1.61 \pm 3.02$  nightmares per month. For dream recall frequency, the participants reported that they recall dreams on average on  $2.80 \pm 2.08$  mornings per week. The correlation coefficient between lucid dreaming frequency and dream recall frequency was  $r = 0.319$  ( $p < 0.0001$ ). Nightmare frequency and lucid dreaming were also significantly related ( $r = 0.238$ ,  $p < 0.0001$ ). This correlation coefficient was reduced but still significantly different from zero if dream recall frequency was partialled out ( $r = 0.154$ ,  $p = 0.0012$ ). The difference between the original correlation coefficient and the partial correlation coefficient was significant ( $z = 4.4$ ,  $p < 0.0001$ ).

Table 1  
Lucid dreaming frequency ( $N = 439$ )

Categories	Frequency	Relative frequency (%)
Never	79	18.0
Less than once a year	33	7.5
About once a year	48	10.9
About two to four times a year	117	26.7
About once a month	71	16.2
About two to three times a month	45	10.3
About once a week	35	8.0
Several times a week	11	2.5

### 3.2. Lucid dreaming frequency, dream recall frequency and personality

In Table 2, the Spearman Rank correlations between lucid dreaming frequency, dream recall frequency and personality are depicted. None of the Big Five personality factors was substantially related to lucid dreaming frequency, the same was valid for dream recall frequency, except for the openness to experience factor with a small but significant coefficient. Out of the six openness to experience two facets correlated (fantasy, ideas) significantly with lucid dreaming frequency (similarly to dream recall frequency). The only difference in correlation coefficients was found for the openness facet “feelings” which correlated significantly with dream recall frequency but was not related to lucid dreaming frequency. Thin boundaries, absorption and imagination correlated with lucid dreaming frequency in the same way as dream recall frequency (there are no significant differences between the correlation coefficients, Table 2, column 5) but the proportion of explained variance of each factor is below 2%.

Table 2

Lucid dreaming frequency, dream recall frequency and personality measures

Personality dimensions	Mean $\pm$ SD	Correlation lucid dreaming		Correlation dream recall		Comparison lucid–dream recall		Partial correlation <sup>a</sup> lucid dreaming		Comparison original corr.–partial corr.	
		<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Neuroticism	99.5 $\pm$ 23.7	0.002	0.9624	0.039	0.4112	−0.7	0.5062	−0.007	0.8784	−0.6	0.5618
Extraversion	112.6 $\pm$ 19.8	0.034	0.4762	0.009	0.8429	0.4	0.6534	0.028	0.5560	−0.4	0.6974
Openness to experience <sup>b</sup>	129.8 $\pm$ 15.7	0.058	0.1140	0.133	0.0027	−1.4	0.1747	0.013	0.3922	−2.8	0.0029
Openness: fantasy <sup>b</sup>	22.0 $\pm$ 4.4	0.115	0.0079	0.178	0.0002	−1.1	0.2505	0.063	0.0963	−3.1	0.0010
Openness: aesthetics <sup>b</sup>	23.5 $\pm$ 4.6	0.038	0.2126	0.091	0.0287	−1.0	0.3395	0.008	0.4355	−1.9	0.0292
Openness: feelings <sup>b</sup>	24.3 $\pm$ 3.7	−0.003	0.5235	0.134	0.0024	−2.5	0.0131	−0.047	0.8350	−2.7	0.0037
Openness: actions <sup>b</sup>	18.2 $\pm$ 3.8	−0.003	0.5288	0.001	0.4838	−0.1	0.9428	−0.009	0.5707	−0.4	0.3487
Openness: ideas <sup>b</sup>	20.2 $\pm$ 4.7	0.108	0.0116	0.086	0.0361	0.4	0.6910	0.085	0.0387	−1.5	0.0716
Openness: values <sup>b</sup>	21.5 $\pm$ 3.6	−0.049	0.8472	−0.003	0.5284	−0.8	0.4085	−0.057	0.8814	−0.5	0.3021
Agreeableness	113.4 $\pm$ 15.8	−0.032	0.4988	−0.083	0.0821	0.9	0.3584	−0.005	0.9116	1.7	0.0870
Conscientiousness	109.0 $\pm$ 19.1	0.015	0.7599	0.015	0.7563	0.0	1.000	0.012	0.8029	−0.2	0.8460
Thin boundaries <sup>b</sup>	289.7 $\pm$ 43.2	0.116	0.0077	0.141	0.0016	−0.5	0.6479	0.076	0.0576	−2.5	0.0068
Absorption <sup>b</sup>	21.6 $\pm$ 5.7	0.131	0.0029	0.126	0.0040	0.1	0.9272	0.096	0.0228	−2.2	0.0144
Imagination <sup>b</sup>	51.0 $\pm$ 10.8	0.133	0.0026	0.165	0.0003	−0.6	0.5573	0.090	0.0299	−2.6	0.0045

<sup>a</sup> Partial correlation with dream recall frequency partialled out.

<sup>b</sup> One-tailed statistical tests for correlation and partial correlation coefficients.

Partialling out dream recall frequency did reduce the correlation coefficients of the relationship between lucid dreaming frequency and the openness to experience factor, its associated dimensions (thin boundaries, absorption, imagination) and the openness facets “fantasy”, “aesthetics” and “feelings” significantly, although the differences is very small. Three of the factors (absorption, imagination, openness facet “ideas”) are still significantly related to lucid dreaming frequency.

#### 4. Discussion

Overall, the findings of the present study indicate that there is a substantial but very small relationship between lucid dreaming frequency and several associated dimensions (thin boundaries, absorption, imagination) and some facets (“fantasy”, “ideas”) of the openness to experience personality factor. Thus, it might be concluded that global personality factors play a minor role in explaining interindividual differences in lucid dreaming frequency but it might be hypothesized that more specific dimensions in the realm of visual imagination, fantasy proneness are associated with lucid dreaming.

First, methodological topics may be of importance. The lucid dreaming frequency scale is very similar to the dream recall frequency scale which possesses a high retest reliability (Schredl, 2002; Schredl, Brenner, & Faul, 2002), i.e., interindividual differences are measured reliably. Previous studies have demonstrated that the retrospectively estimated lucid dream frequency (questionnaire scale) correlated fairly highly with diary measures (e.g., Gackenbach et al., 1984) and signal-verified lucid dreaming in the sleep laboratory (Kueny, 1985). In addition, the observed frequencies (occurrence of lucid dreams at least once: 82%; 37% frequent lucid dreamers) which are comparable to previous findings indicate that systematic biases seem not to have been a relevant problem in this study. The fact that the sample consisted of psychology students who are often high dream recallers (Schredl, 1999) might explain the slightly higher occurrence of lucid dreams in the present study in comparison to the figures reported in the literature (see introduction). Especially in comparison to the figure of 57.5% of the sample experiencing at least one lucid dream reported by Gackenbach (1991), it might also be possible that the lack of verification by eliciting a lucid dream example—as reported by Gackenbach (1991)—yielded a small overestimation of lucid dreaming frequency in the present sample. However, there is no evidence that these methodological issues affect the correlation coefficients between lucid dreaming frequency and personality factors in a substantial way (cf. Snyder & Gackenbach, 1988).

Another topic is the sampling technique. The participants were recruited for a study entitled “Sleep, dreams and personality” in order to avoid a selection of persons who are specifically interested in lucid dreaming. Previous positive findings, e.g., the relationship between well-being and lucid dreaming (see introduction) may be explained by the specific sampling method (advertising for lucid dreamers) of the study. These arguments lead to the conclusion that the correlation coefficients can not be explained—at least only very minimally—by methodological issues.

Previous findings (e.g., Stepansky et al., 1998) regarding the relationship between lucid dreaming frequency and nightmare frequency were confirmed. A significant portion of this relationship, however, is attributable to the mediator variable “dream recall frequency”, i.e., high

dream recallers report nightmares as well as lucid dreams more often. As the partial correlation is still substantial the findings indicate that nightmares may trigger lucidity as reported by lucid dreamers (Galvin, 1990; Wolpin et al., 1992). An alternative explanation for this relationship might be a heightened physiological arousal during sleep which was reported for nightmares (Schredl, 2000) as well as for lucid dreaming (LaBerge, 1992). Several case reports (Brylowski, 1990; LaBerge, 1990; Schriever, 1934; Zadra & Pihl, 1997) have shown that the technique of becoming lucid within a dream can be used to reduce nightmare frequency; controlled studies which have been, for example, carried out for the imagery rehearsal treatment of nightmares (e.g., Krakow, Kellner, Pathak, & Lambert, 1995), however, have not yet been carried out for the lucid dreaming technique.

The Big Five personality factors did not correlate substantially with lucid dreaming frequency and this is thus largely in line with the findings of Watson (2001). However, two of the six openness to experience facets (“fantasy”, “ideas”) showed small but significant correlation coefficients; a finding which might be interpreted that more specific dimensions which are associated to visual imagination and fantasy proneness are related to lucid dreaming. This is in line with the findings that the dimensions “Thin boundaries”, “Absorption” and “Imagination” were also related to lucid dream frequency (cf. Galvin, 1990; Hicks et al., 1999). Interestingly, the pattern of correlations was almost completely similar to the respective pattern of dream frequency (no significant differences between the magnitude of the correlation coefficients).

In addition, dream recall frequency partly mediates the relationship between lucid dreaming frequency and the personality dimensions associated with the openness factor (significant reduction of the correlation by partialling out dream recall frequency). So it seems plausible that the direct relationship between lucid dreaming frequency and personality is rather small and a substantial part of this relationship is mediated by dream recall frequency which correlated with lucid dreaming frequency (medium effect size)—as reported previously (e.g., Wolpin et al., 1992). This finding underlines the importance for controlling dream recall frequency in such types of studies (cf. Snyder & Gackenbach, 1988).

Despite the significant results, the variance explained by personality factors is rather small and it thus seems promising to include other factors besides personality dimensions in a model explaining interindividual differences in lucid dreaming frequency. Good candidates may be meditation experience (e.g., Hunt, 1991), field independence on a perceptual level and performance of the vestibular system (Snyder & Gackenbach, 1988). Systematic studies regarding stress, sleep behavior or general dream characteristics (emotional intensity, bizarreness) have not yet been carried out and might point to other possible influencing factors.

To summarize, lucid dreaming is a common phenomenon; 82% of the sample reported this experience. Only a small portion of interindividual differences are explained by personality factors. Theories which link introversion to lucid dreaming (cf. Hearne, 1978) or well-being, that is, low neuroticism scores to lucid dreaming (cf. Gackenbach, 1978) have not been supported by the present findings in an unselected student sample. Two facets of the openness to experience factor and the dimensions thin boundaries, absorption and imagination showed substantial but small correlations (of similar magnitude than dream recall frequency) with lucid dreaming frequency. Future models should include variables of different areas which should be tested simultaneously in order to take the intercorrelations between the influencing factors into account.



## Acknowledgement

This study was supported by a grant (SCHR 637/2-1) from the Deutsche Forschungsgemeinschaft (DFG) given to the first author.

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