Dreams and extraversion: A diary study

Nina König, Jonas Mathes, & Michael Schredl

Central Institute of Mental Health, Medical Faculty Mannheim, Heidelberg University, Germany

Summary. Dreams have always been fascinating and were interpreted according to cultural norms and beliefs. Based on the continuity between waking and dreaming, one would expect that personality traits are related to dream content. In the present study, of the 108 participants, mostly psychology students, 91 reported at least one dream in a dream diary for 14 days and all participants completed a questionnaire concerning socio-demographic variables, dream recall frequency and extraversion assessed by the NEO-FFI. As expected, extraverted persons had a higher dream extraversion, thus, confirming the continuity hypothesis of dreaming. In addition, extraverted persons had more physical interactions in their dreams and included more positive emotions. Further research might investigate, for example, how modern social networks including social media affect dream content.

Keywords: Dreams, extraversion, personality, continuity hypothesis

1. Introduction

Jung (1921) was the first to popularize the extraversion and introversion personality traits while Eysenck (1985) continued this line of investigation: Extraverted persons are said to be more outgoing, energetic and talkative while introverted persons tend to be more reserved. He found a biological explanation for the two different personality types in the ARAS (Eysenck, 1985). Following the continuity hypothesis of dreaming (Hall & Nordby, 1972), stating that activities in waking are incorporated into dreams, this relation might be found for extraversion as well: Persons with many friends in their waking-life might be extraverted in their dreams as determined by their having more social contacts with more dream characters.

Previous research indicated that social activities in dreams are highly important, for example the Social Stimulation Theory (Revonsuo, Tuominen, & Valli, 2015) suggests that dreams are a specialized training for social skills that are needed in the waking-life since humans are a social species. Talking with friends was found as being the most frequent dream activity (Schredl & Hofmann, 2003), while reading, writing and calculating in dreams rarely occurred, even in students who spend a lot of time with cognitive activities during waking.

Several studies support the correlation between extraversion and dream content (Bernstein & Roberts, 1995; Hall & Domhoff, 1968; Lang & O'Connor, 1984; Samson & De Koninck, 1986). While there was only a marginally significant relation between waking extraversion and dream extraversion (Samson & De Koninck, 1986), waking extraversion was positively associated with the number of dream characters (Lang & O'Connor, 1984) and with the number of social interactions in dreams (Bernstein & Roberts, 1995). Since the results are partly conflicting, further empirical studies are necessary to investigate the relation of extraversion and dreams.

The present study investigated the hypothesis – based on the continuity hypothesis of dreaming (Hall & Nordby, 1972) – that extraverted persons are also more extraverted in their dreams. This will also imply that more characters will occur in the dreams of extraverted persons and that extraverted participants will have more verbal and physical interactions in their dreams. Lastly, we expected more positive emotions in the dreams of extraverted persons as "positive emotions" is a sub-factor of extraversion in the Big Five personality model (Ostendorf & Angleitner, 2004).

2. Method

2.1. Participants

Overall, 108 persons (87 women and 21 men) with a mean age of 23.94 ± 10.47 years (range: 18 to 86 years) participated in the present study; 98 are psychology students and 10 from the personal environment of the author. The students (78 women and 20 men) with a mean age of 21.79 ± 2.98 (range: 18-35 years) were recruited by a mailing list and received course credit for participating. As some dream diaries haven't been returned and two participants failed to recall a dream during the study period, the sample finally included 91 persons reporting at least one dream in two weeks.

2.2. Measurement Instruments

The participants had to answer a three-page questionnaire concerning socio-demographic variables, dream recall frequency and the extraversion personality trait as assessed by the NEO-FFI. The questionnaire concerning dream recall frequency was generated by Schredl (2004). The scale ranged from 0 = no dream recall, 1 = less than once a week, 2 = once a month, 3 = 2 to 3 times a month, 4 = once a week, 5 = several times a week, to 6 = almost every morning. The retest reliability was r = .85 with an mean interval duration of 55 days (Schredl, 2004). The NEO Five-Factor-Inventory (NEO-FFI) is a multidimensional measure of the

Big Five factors of personality (Borkenau & Ostendorf, 1993), only the extraversion items (N = 12) were presented. The internal consistency of the extraversion scale was r = 0.812 (Cronbach's alpha) in the present sample (N = 108). To be informed about the social network, the persons had to state how many friends and how many close friends they have. Second, the participants had to report their dreams in a structured dream diary for 14 continuous days. If able to recall at least one dream, participants were asked to write down their dreams as completely as possible (on a maximum of five days per person). They were explicitly asked to describe the social interactions and their perceptions of the surroundings. They also had to rate the intensity of positive and negative emotions occurring in the dreams, measured by a four-point-scale (0 = no emotion, 1 = mild, 2 = moderate, 3 = strong).

2.3. Dream content analysis

The dream content analysis was done with a dream manual (Schredl, 1998) including a coding system for different dream content qualities. In the present study the number of dream characters was counted and the number of characters interacting verbally (conversation, being addressed) and physically (touching, fighting) with the dreamer. Extraversion was explained to the external judges by presenting the different sub-factors such as sociability, agreeableness, impulsivity, activity and positive emotions with brief explanations according the Big Five model of personality (Ostendorf & Angleitner, 2004). Afterwards, the judges had to code the dream extraversion by a scale ranging from 1 to 5 based on the social behavior of the dream ego (the dreamer acting within the dream). When extraversion couldn't be assessed (e.g., short dream reports), 0 was coded. Then, a second rating measure was introduced with the instruction to estimate the extraversion of the dream ego despite sufficient information. This was done because a relatively small number of dreams did allow the extraversion based on explicitly mentioned social behavior of the dream ego.

2.4. Procedure

The completed dream diaries and questionnaire were returned at the end of the study period. The dream reports were typewritten, randomized and serially numbered. A rater analyzed the numbered dreams by the scales presented in the "dream content analysis" section. A second rater independently rated 100 dreams in order to compute interrater reliability indices. Statistical analysis was performed using SAS for Windows 9.2. Pearson correlations as well as partial correlations were used to test the one-tailed hypotheses. The correlation between dream recall frequency and extraversion was tested by a Spearman rank correlation. To correlate the data from the dream content analysis and personal data, the mean values for the dreams per person were calculated.

3. Results

The descriptive statistics concerning extraversion, friends and close friends in waking as well as the dream recall frequency are shown in Table 1. The subsample of psychology students had more friends and more close friends, while the value of extraversion was significantly correlated with more friends (r = .371; p = <.0001), as well as with the number of

Table 1. Descriptive statistics for the whole sample and the subsample of psychology students

Variable	Total sample (N = 108)	Psychology students (N = 98)
Extraversion scale	2.56 ± 0.54	2.59 ± 0.53
Number of friends	24.63 ± 19.97 (N = 106)	25.58 ± 20.46
Number of close friends	6.92 ± 5.47	7.19 ± 5.64
Dream recall frequency (Questionnaire)	3.45 ± 1.54	3.39 ± 1.54
Number of dream reports (Dream diary)	3.29 ± 1.49 (N = 93)	3.27 ± 1.50 (N = 83)

close friends (r = .264; p = .0057). A Spearman rank correlation yielded a marginally significant negative relation between dream recall frequency and extraversion (r = -.181, p = .0750 for the psychology students and r = -.125, p = .1984 for the whole sample).

The total number of reported dreams (N = 306) had a mean dream length of 92.42 ± 86.44 words (range: 5-686). The number of reported dreams per participant is depicted in Table 1. For 100 dreams, the external judge estimated that there was enough social behavior of the dreamer to code his or her extraversion. With the additional instruction of coding as many dreams as possible even based on insufficient information, 217 could be coded regarding the extraversion of the dream ego. Descriptive statistics of the dream variables are shown in Table 2, yielding similar results for both samples on the number of dream characters, verbal and physical interactions, dream extraversion and emotions. The interrater reliability for these scales was calculated as Pearson correlations: r = .954 for dream characters, r = .809 for verbal interactions, r = .574 for physical interactions, r = .770 for dream extraversion (N = 11) and r = .513 for estimated dream extraversion (N = 100).

Table 2. Dream content and the average frequency per person

Variable	Total sample (N = 108)	Psychology students (N = 98)
Dream length	87.03 ± 67.51	86.79 ± 68.94
Positive emotions (self-ratings)	1.40 ± 0.78 (N = 88)	1.38 ± 0.80 (N = 79)
Negative emotions (self-ratings)	1.70 ± 0.73 (N = 89)	1.75 ± 0.74 (N = 80)
Number of dream characters	2.18 ± 1,41	2.10 ± 1,30
Number of dream characters verbally interacting with the dreamer	0.53 ± 0.53	0.52 ± 0.52
Number of dream characters physically interacting with the dreamer	0.16 ± 0.24	0.17 ± 0.25
Dream extraversion	3.76 ± 1.12 (N = 56)	3.81 ± 1,11 (N = 50)
Estimated dream extraversion	3.50 ± 0.90 (N = 84)	3.48 ± 0.93 (N = 79)

Table 3. Correlation of dream content and extraversion for the whole sample and a subsample of psychology students

Variable	Total sample (N = 91)		Psychology students (N = 81)	
	r	p	r	p
Dream length	-.078	.4633	-.139	.2172
Positive emotions (self-ratings)	.212 (N = 88)	.0238[1]	.232 (N = 79)	.0198[1]
Negative emotions (self-ratings)	-.025 (N = 89)	.4093	-.074 (N = 80)	.2597
Number of dream characters	.075	.2420[1]	.121	.1430[1]
Number of dream characters verbally interacting with the dreamer	.151	.0779[1]	.092	.2070[1]
Number of dream characters physically interacting with the dreamer	.219	.0193[1]	.214	.0282[1]
Dream extraversion	.420	.0007[1]	.426	.0011[1]
Estimated dream extraversion	.284	.0047[1]	.308	.0038[1]

[1]one-tailed

Pearson correlations for the dream length and emotions variables as well as partial correlations partialled out for dream length for the other dream content variables are depicted in Table 3. Waking-life extraversion and the extraversion measures in dreams correlated significantly in both samples. Second, extraverted participants had a larger number of dream characters interacting physically with the dreamer. Third, the total number of dream characters and the number of dream characters with whom the dreamer verbally interacted were not significantly related to waking extraversion. Lastly, there were significantly more positive emotions in the dreams of extraverted participants.

In addition, there was a significant relation between having more friends in waking and the occurrence of dream characters (r = .203; p = .0289 for the whole sample and r = .301; p = .0034 for the psychology students).

4. Discussion

The main finding of the study indicates that extraverted persons are also extraverted in their dreams and have more physical interactions in their dreams, thereby supporting the continuity hypothesis (Hall & Nordby, 1972). Second, there were more positive emotions in the dreams of extraverted participants.

As there have been many investigations on the link between personality and dreams (Blagrove, 2007), different instruments for eliciting dream extraversion have been used: dream questionnaires and dream content analysis of diary dreams (Samson & De Koninck, 1986). Comparing dream content questionnaires and the results from dream content analytic studies yielded conflicting results with positive relations between waking extraversion and number of dream characters and social interaction in dreams measured via questionnaire but non-significant relations with the diary measures (Bernstein & Belicki, 1995). Their explanation was that retrospective measures might be more affected by the participants' self-concepts compared to the recording of dream reports. Furthermore, Schredl (2002) showed that low dream recallers' retrospective estimates of dream content did not correlate well with the content of their diaries. Samson and De Koninck (1986), on the other hand, used only one diary dream per participant thereby increasing the error variance; Schredl (1998) has shown that increasing the number of dreams per participants increased the reliability of the measured dream characteristics.

Regarding the new developed extraversion scale, it should be noted that the correlation between waking extraversion and externally rated dream extraversion was higher when only the dream reports with sufficient information for the extraversion assessment were present in the dream. I.e., the findings clearly support to notion to elicit at least several dreams per participants as not all dreams are suitable for reliable estimates of dream extraversion.

The result that extraversion in dreams was positively related to waking extraversion was partly in line with the Samson and De Koninck (1986) study reporting a small, marginally significant correlation coefficient of r = .14 and, thereby, supporting the continuity hypothesis of dreaming (Hall & Nordby, 1972). Compared to the study from Lang and O'Connor (1984), who reported that extraversion is significantly correlated with more dream characters, the hypothesis was not confirmed in the present study. Nevertheless, the partial correlation for dream characters and number of friends in waking showed a significant relation between more friends in waking and the occurrence of more dream characters, so that the present study is in accordance with the results of Lang and O'Connor (1984).

The positive relationship between the number of dream characters with whom the dreamer interacted physically and waking extraversion partly confirms the results of Bernstein and Roberts (1995) who reported a significant correlation between the number of social interactions in dreams and waking extraversion. However, we found only a small but non-significant correlation for verbal interactions. Maybe, a more accurate recording of the social network, including social media (texting, etc.), might also provide significant results for the number of dream characters and verbal interactions.

The study of Samson and De Koninck (1986) reported an interaction between neuroticism, extraversion, and dream extraversion; for the low neuroticism group (N = 53), the correlation between waking extraversion and dream extraversion was negative (r = -.29, p < .04). As in the present study only the extraversion items of the NEO-FFI were used, we were not able to do similar analysis. It would be interesting for future research to investigate whether mediating factors may have an effect on the continuity between waking extraversion and dream extraversion.

Finally, there were significantly more positive emotions in the dreams of extraverted participants, which might be explained since "positive emotions" are mentioned as a sub-factor of the extraversion personality trait (Ostendorf & Angleitner, 2004) and, again, supporting the relationship between waking personality and dream content.

To conclude, the main finding is that there is a relationship between the extraversion personality trait and dream content and this is in line with the continuity hypothesis (Schredl, 2003). Future research should include social media since not only the number of friends seemed to be important for analyzing extraversion in today's modern world. Comparing the present results with previous findings, we recommend using dream diaries with as many dreams per participant as possible.

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