

# Dream recall frequency: Stability and changes assessed in a longitudinal design

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**Summary.** Dream recall frequencies exhibit large inter-individual differences, ranging from recalling a dream almost every morning to recalling a dream almost never. Although dream recall has been conceptualized as a stable trait, longitudinal studies in this area are scarce. Within the framework of a complex study, 279 women (mean age:  $31.76 \pm 4.73$  yrs.) completed a brief sleep questionnaire three times (last trimester of their pregnancy, 6 month postpartum, and 4 years postpartum) that included a dream recall frequency scale. The findings indicate that dream recall frequency is quite stable over the four-year period, although the correlation coefficients were somewhat smaller compared to previous studies – probably reflecting the effect of major life transitions (pregnancy, giving birth, caring for small children). The lowest dream recall at 6 month postpartum was not explained by sleep variables (sleep duration, nocturnal awakenings) and favors the hypothesis that interest in dream that might have been low while caring for very small children and this might explain long-term changes in dream recall.

**Keywords:** Dream recall frequency, stability, sleep duration

## 1. Introduction

Despite the current view that dreaming is an integral part of sleep (everyone dreams every night), dream recall is quite variable. For example, about 31% of a representative sample ( $N = 1841$ ) reported no dream recall at all whereas about 23% recall a dream once a week or more often – with the other participants having in-between frequencies (Schredl & Göritz, 2017). Schonbar (1965) hypothesized that recalling dreams is part of an “inner-acceptance” life-style, i.e., this variable should be stable over time. This is supported by a significant relationship between openness to experience and dream recall frequency (Schredl & Göritz, 2017). However, longitudinal studies directly addressing the stability of dream recall frequency are scarce. Three studies (Giambra, Jung, & Grodsky, 1996; Schredl, Braband, Gödde, Kreicker, & Göritz, 2019; Schredl & Göritz, 2015) with time intervals ranging from 3 to 8 years found a remarkable high stability ( $0.66 < r < .75$ ) between the two measurement points. These studies also report a slight decrease of dream recall frequency over the years (very small effect sizes [ $d$ ] of about 0.100). On the other hand, dream recall frequency can dramatically increase if participants are asked to keep a dream diary (Cohen, 1969; Zunker et al., 2015), especially in low dream recallers (Schredl, 2002). Even simple encourage-

ment to recall dreams can increase dream recall (Halliday, 1992; Redfering & Keller, 1974). But outside these experimental manipulations little is known as to whether some life events might affect dream recall frequency; with one exception: Starting psychotherapy, especially psychoanalytic treatment, also increases dream recall (Myers & Solomon, 1989; Schredl, Bohusch, Kahl, Mader, & Somesan, 2000). The three longitudinal studies (Giambra et al., 1996; Schredl et al., 2019; Schredl & Göritz, 2015) reported a slight decrease of dream recall frequency over the years (very small effect sizes [ $d$ ] of about 0.100) but did not elicit possible factors related to that decrease in dream recall with age.

The aims of the present study were twofold: 1) assess the stability of dream recall frequencies over a four and a half year period and 2) study whether sleep-related factors might explain changes in dream recall frequency.

## 2. Method

### 2.1. Participants

Overall, 406 pregnant women participated in the study. The questionnaires at T1 were administered on average within the gestation week:  $36.49 \pm 2.38$  weeks (27 to 40 weeks). At T2 (6 months after giving birth), 357 women completed the questionnaires, and 302 women were tested again about three and a half years later (T3). Dream recall data from all three measurement points were available from 279 women. Their mean age was  $31.76 \pm 4.73$  yrs. at T1. The women completed all three measurement were slightly older at T1 than the other 127 women ( $31.76 \pm 4.73$  yrs. vs.  $30.72 \pm 5.74$  yrs.,  $t = 1.8$ ,  $p = .0760$ ), but dream recall frequency did not differ ( $3.62 \pm 1.67$  ( $N = 279$ ) vs.  $3.67 \pm 1.75$  ( $N = 119$ ), Mann-Whitney-U test:  $z = -0.3$ ,  $p = .7373$ ).

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Table 1. Dream frequency scale for all three measurement points (N = 279)

Category	T1	T2	T3
	Pregnancy	6 month postpartum	4 years postpartum
Almost every morning	12.54%	10.04%	10.75%
Several times a week	22.22%	11.11%	20.43%
About once a week	22.94%	17.92%	21.86%
Twice or three times a month	19.35%	32.62%	16.13%
About once a month	7.17%	17.92%	9.68%
Less than once a month	11.47%	8.60%	13.62%
Never	4.30%	8.60%	7.53%

2.2. Sleep and dream questions

Sleep duration was elicited as follows. “How many hours have you slept per night during the last 4 weeks (effective total sleep without the time of being awake)?” In addition, the number of nocturnal awakenings per night should be estimated. Lastly, the participants were asked to rate their dream recall frequency over the previous months on a 7-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, 6 = almost every morning). The retest reliability of the scale (mean retest interval: 54.8 ± 44.8 days; N = 198) was high: r = .83 (Schredl, 2004).

2.3. Procedure

The pregnant women were approached during their application visit prior to delivery in three obstetric hospitals in Mannheim and Ludwigshafen. They were informed about the study’s goals. The study was entitled: “Pre-, Peri- and Postnatal Stress: Epigenetic impact on Depression; POSEIDON” The following inclusion criteria were applied: Caucasian descent, main caregiver, German-speaking, and age 16 – 40 years. Exclusion criteria were: maternal hepatitis B, hepatitis C or HIV-infection, any current psychiatric disorders requiring inpatient treatment, a history or current diagnosis of schizophrenia/psychotic disorder, or any substance dependency other than nicotine during pregnancy. Based on numbers of deliveries per year within the three hospitals, it could be estimated that about 33% of all the mothers

who met the inclusion/exclusion criteria participated in the study. The recruiting period lasted from October, 2010 to March, 2013. Participation was reimbursed with 120 Euros. The study protocol was approved by the Ethics Committee of the Medical Faculty Mannheim of the University of Heidelberg and the study was conducted in accordance with the Declaration of Helsinki. All mothers provided written informed consent prior to participation. The sleep and dream recall items were completed at T1 (last trimester of pregnancy) and at T2 (six months after delivery).

For the follow-up study PEZ-PSYCHE (Psychoepidemiologisches Zentrum – PreSchooler: Young Children’s Health and Environment) all mothers were contacted again after about three and a half years (T3). Within this assessment, the mothers completed the sleep and dream recall items again.

The statistical analyses were carried out with SAS 9.4 for Windows software. As the dream recall frequency scale was ordinal, logistic regressions and Spearman Rank correlations were computed.

3. Results

The distributions of dream recall frequencies for all three measurement points are depicted in Table 1. Roughly 50% of the women are high dream recallers with dream recall at least once a week whereas women who never recalled their dreams were very rare. Dream recall frequency was highest during pregnancy and lowest 6 months after giving birth (see Table 2). A similar U-shaped pattern was found for

Table 2. Dream recall frequency and sleep measures over the course of the study (comparisons between each measurement point)

Category	Mean ± SD			Statistical tests <sup>1</sup>		
	T1	T2	T3	Difference	z/t	p-Wert
Dream recall frequency (N = 279)	3.62 ± 1.67	3.16 ± 1.66	3.35 ± 1.79	T1-T2 T1-T3 T2-T3	-4.7 -2.6 2.1	< .0001 .0010 .0330
Sleep duration (N = 277)	6.41 ± 1.61	6.07 ± 1.31	6.23 ± 1.31	T1-T2 T1-T3 T2-T3	-3.1 -1.9 1.8	.0020 .0550 .0690
Nocturnal awakenings (N = 279)	3.08 ± 1.73	3.09 ± 1.82	2.29 ± 1.79	T1-T2 T1-T3 T2-T3	0.1 -7.2 -5.9	.9080 < .0001 < .0001

<sup>1</sup>Wilcoxon Signed Ranked test for dream recall frequency, paired t-tests for sleep parameters

Table 3. Correlations of dream recall frequency and sleep variables between measurement points

Category	Correlations		
	T1 – T2	T1 – T3	T2 – T3
Dream recall frequency <sup>1</sup> (N = 279)	.567	.548	.485
Sleep duration <sup>2</sup> (N = 275 to N = 277)	.263	.379	.398
Nocturnal awakenings <sup>2</sup> (N = 277 to N = 279)	.209	.369	.246

all  $p < .0001$ , except Nocturnal awakenings T1-T2:  $p = .0005$ ;  
<sup>1</sup>Spearman rank correlations, <sup>2</sup>Pearson correlations

sleep duration whereas frequency of nocturnal awakenings dropped only between T2 and T3 (see Table 2). The stability of dream recall frequency ranged from .485 to .567 and was higher when compared with the stability indices of the two sleep variables (see Table 3). The difference in dream recall frequency from T1 to T2 was not related to the difference in sleep duration ( $r = .048, p = .4216, N = 272$ ) nor to the difference in the frequency of nocturnal awakenings ( $r = .013, p = .8323, N = 274$ ). Similarly, the differences between T2 and T3 were not correlated: Dream recall frequency – Sleep duration ( $r = -.007, p = .9135, N = 277$ ) and dream recall frequency – frequency of nocturnal awakenings ( $r = -.040, p = .5056, N = 277$ ). Eighteen women were pregnant at T3 but this variable was also not related to the dream recall difference between T2 and T3 ( $r = .050, p = .4029, N = 279$ ). In addition, the pregnant women did not differ in regard to dream recall at T3 from the non-pregnant women ( $3.11 \pm 1.53$  (N = 18) vs.  $3.37 \pm 1.81$  (N = 261), Mann-Whitney-U test:  $z = -0.8, p = .4319$ ). The presence of younger siblings (4 children had two younger siblings, 84 children had one younger sibling), i.e., giving birth once or twice between T2 and T3 was also not related to the difference in dream recall frequency ( $r = .050, p = .4078, N = 279$ ).

#### 4. Discussion

This longitudinal study showed that dream recall frequency is quite stable over a four-year period, although the correlation coefficients were somewhat smaller compared to those of previous studies (Giambra et al., 1996; Schredl et al., 2019; Schredl & Göritz, 2015) – probably reflecting the effect of major life transitions (pregnancy, giving birth, caring for small children). Whereas the decrease in dream recall frequency from pregnancy to 6 months postpartum might be explained by heightened dream recall as nightmare frequency is elevated during the last trimester of pregnancy,

the increase in dream recall from 6 month postpartum to about 4 years postpartum indicates that caring for very small children might affect dream recall. Interestingly, sleep parameters like sleep duration and frequency of nocturnal awakenings were not helpful in explaining the changes in dream recall frequency over time.

Due to the specific sample characteristics, several methodological issues have to be addressed. As pregnant women report higher nightmare frequency (Lara-Carrasco, Simard, Saint-Onge, Lamoureux-Tremblay, & Nielsen, 2014; Schredl et al., 2016) there is an overrepresentation of women with high dream recall: 57.7% of the present sample recalled a dream once a week or more often compared to 23% of the participants of a representative sample (Schredl & Göritz, 2017). This bias affected the overall dream recall frequency distribution but should have negligible effects on the within-subject longitudinal analyses. The response rate of about 33% was not very high and is probably explained by the high time expenditure requested by the POSEIDON study protocol. But the selection was not related to dreaming, e.g., attracting women with very high interest in dreams, as the dream recall item was a very minor part of a sleep questionnaire and was not specifically mentioned in the information about the study.

The stability of dream recall frequency over the four-year period supports the notion of dream recall as a part of a life-style (Schonbar, 1965), i.e., a stable trait. This is even more astonishing as the women underwent dramatic changes in their lives. Despite this stability of inter-individual differences, the major life events have affected dream recall; especially interesting is the increase in dream recall from 6 month postpartum to 4 years postpartum as slight decreases with age have been reported in two longitudinal studies (Schredl et al., 2019; Schredl & Göritz, 2015). As inter-individual differences are preserved, the theoretic basis would be that state factors act independently from trait factors on dream recall frequency. Despite the shorter sleep duration 6 months postpartum, changes in dream recall frequency were not associated with changes in sleep duration. Interestingly, short-term changes in sleep duration from night to night did show marked effects on dream recall (Schredl & Fulda, 2005; Schredl & Reinhard, 2008) but seems not to explain long-term changes. Similarly, frequency of nocturnal awakenings are related to dream recall frequency in cross-sectional studies (Schredl, Schäfer, Weber, & Heuser, 1998; Schredl, Wittmann, Ciric, & Götz, 2003; Vallat et al., 2017) – see also the analysis for pregnant women in this study – but changes in frequency of nocturnal awakenings were not related to changes in dream recall frequency. Although pregnancy at T3 or the number of small siblings were not associated with changes in dream recall over time, one might hypothesize that young mothers with a 6-months old child have to focus on a lot of things among

Table 4. Ordinal regressions of the effect of sleep variables on dream recall frequency (cross-sectional analyses)

Variable	T1 (N = 277)			T2 (N = 275)			T3 (N = 275)		
	SE	Wald $\chi^2$	$p$	SE	Wald $\chi^2$	$p$	SE	Wald $\chi^2$	$p$
Age	.0382	0.4	.5158	.0126	0.0	.8311	.1349	5.2	.0228
Sleep duration	.0908	2.1	.1455	-.0229	0.1	.7063	-.0020	0.0	.9746
Nocturnal awakenings	.1463	5.4	.0199	-.0519	0.7	.3911	.0628	1.0	.3175

SE = Standardized estimates

which dreams presumably play only a very minor role. One study (Schredl et al., 2019) indicated that changes in dream recall frequency are associated with changed in the attitude towards dreams. It would be very interesting to include attitude towards dreams measures in future study. Moreover, we did not know whether the participants underwent some form of psychotherapy which might have stimulated dream recall, i.e., including questions asking about life events that might have affected dream recall would be desirable.

To summarize, the findings clearly indicated that dream recall showed trait-like features but so far the effects of life events other than participating in a dream study or undergoing psychotherapy (events that are relatively rare within the general population) on dream recall are not well understood and warrant further research.

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