



## Nightmares and Associations with Sleep Quality and Self-Efficacy among University Students

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### Abstract

Sleep problems are a common complaint among adults. In university students international studies showed prevalence rates between 4.7 and 36.2% for sleep difficulties and 2-3% of students report nightmares. Previous studies show that nightmares are often associated with insomnia and mental strain, but also with gender. The goal of this study was to outline nightmares, associations with sleep disturbances and mental strain as well as self-efficacy among university students. An amount of 2196 students (70.9% women; mean age 24.16 years) participated in the study. Sleep characteristics, nightmares, mental strain and self-efficacy were assessed by self-report questionnaires. Analyses revealed that more than 24.3% of surveyed students suffered from nightmares, 18.5% reported nightmares more often than once a week and 5.8% suffered from nightmares at least 3 times a week. Moreover, nightmares were associated with symptoms of insomnia and low self-efficacy was significantly associated with an increased rate of nightmares. Besides, a total of 52% of students reported fitful sleep.

### Keywords

University students, Nightmares, Self-efficacy, Sleep characteristics, Sleep problems, Sleep disturbances

### Introduction

Nightmares are typically defined as extremely unpleasant dreams with a strong negative emotional response, usually fear or anxiety but also sadness or despair leading often to awakening and mood disturbance, sleep resistance, cognitive impairments, daytime sleepiness, impaired educational or interpersonal function (see international classification of sleep disorders-3rd version (ICSD-3) or DSM-5). In the general population 2-3% suffers from frequent nightmares [1-3] whereas studies with adolescents refer nightmare prevalence rates up to 8.3% [4] showing that age plays a significant role in prevalence rates with children and adolescents suffering more often from nightmares than older individuals (Lewin & Nielsen, 2007).

However, frequency should also be taken into account as the results of Sweileh and colleagues showed with 12.8% of the students having nightmares 1-2 times a week, 2.5% having nightmares 3-4 nights a week, whereas 3.5% of students suffered from nightmares almost every night [5]. In the study of Schredl (2003) 52.2% of students experienced nightmares once a month or more often, whereas 12.1% reported that nightmares occur at least once a week. This broad range of prevalence rates is often based on question type and the absence of the awakening criterion [6].

Various other factors are associated with nightmares and nightmare frequency. Over all, woman report more often nightmares than men also in students [7-9]. Mental disorders as anxiety or post traumatic stress disorder are often associated or the underlying disorder [10,11]. Furthermore, significant correlations between nightmares and insomnia or sleep quality complaints have been reported by various studies also including students [6,4,5] affecting the dreamer [6].

In addition, Schredl (2003) compared the effects of trait and state factors on nightmare frequency in mainly psychology students. Neuroticism and thinness of boundaries were related to nightmare frequency. Beyond that, state factors as well as trait factors affected nightmare frequency; besides the effect of current stress. Students are faced with multiple challenging facets of their lives such as changing their place of residence, new city, new classes, later on exams, work, and relationships. The amount of requirements often leads to stress and sleep problems [12,13].

Besides high school graduation, self-efficacy is a predictor of academic success [14]. Self-efficacy is the ability to manage future behaviour and the expectation that a person has toward actions mastered by self-competence. Bandura, suggests that students' beliefs in their self-efficacy, to regulate their own competence, play a key role in mastering academic demands [15].

Beyond that, Bouchard and colleagues associated low self-efficacy

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with sleep problems [16].

Based on previous research, the aim of this study was to evaluate the relationship between nightmares and mental complaints in a university student sample. More specifically, we investigated whether nightmare frequency is associated with insomnia and mental complaints in students. The goal of this study was to outline the prevalence of nightmares, sleep characteristics and associations with mental complaints and self-efficacy among German university students. Exploratory, we wanted to test if freshmen, who had more changes during the last months, suffer more often from nightmares than students of higher degrees.

## Methods

### Questionnaire

The questionnaire used in the present study was embedded in an online survey about psychosomatic complaints and stress in university students. The online questionnaire consisted of four sections: (i) sociodemographic information (age, gender, number of semesters, place of study), (ii) questions on gastrointestinal symptoms and other somatic complaints, (iii) assessment of sleep characteristics and (iv) assessment of subjective self-efficacy. Requested time for completion of the questionnaire was about 20 minutes. Online information about the goals of the study and confirmation of anonymity of the data were provided. Informed consent was given by all subjects. Results concerning gastrointestinal symptoms and other complaints are reported elsewhere.

Questions on sleep referred to the previous four weeks and most of them were assessed using four answer categories: “never”, “less than once a week”, “once or twice a week”, “three times or more often a week”. This applies to questions about having nightmares, difficulties falling asleep, awaking at night, fitful sleep (toss and turn in bed) and anxiety concerning going to bed. Beyond that, open answer questions were incorporated concerning usual time going to bed, time to fall asleep and overall sleep duration.

Additionally, for the assessment of subjective self-efficacy the general self-efficacy scale (GSE) by Schwarzer & Jerusalem was used [17]. It consists of 10 items and is well validated. Chronbach alpha in our sample was .889.

### Recruitment of participants

Brief information about the study and a hyperlink to the online questionnaire was emailed to all students ( $N = 23222$ ) of the University of Tübingen. To increase the sample size, local students were encouraged to pass the link to the survey to students from other universities.

The study had been approved by the ethics committee of the University Hospital Tübingen. Online information about the goals of the study and confirmation of anonymity of the data were provided. Informed consent was given by deliberately clicking a respective statement on the webpage.

### Participants

In total,  $N = 2399$  students (1701 females, 696 males, 2 unknown) participated in the study. The mean age of participants was  $M = 24.16$  years ( $SD = 3.89$ ) with a minimum of 17 and a maximum of 65 years. The substantial range in age is caused by single individuals: Only 5.4% of the sample was above 30 years and 0.8% was above 40 years. The averaged duration of studies in the complete sample (2 semesters = 1 year) was  $M = 6.18$  semesters ( $SD = 3.58$ ) with a minimum of 1 and a maximum of 27 semesters.

Of all 2399 students, 2196 fully completed the questionnaire (91.6%). Non-completing participants did not differ significantly from completers regarding age, gender or number of semesters.

### Statistics

Questionnaire data were analyzed using the Statistical Package for the Social Sciences 19.0 (SPSS, Chicago, USA). Frequencies are

reported as percentages. Comparisons between frequency-based data were performed using  $\chi^2$ -tests and calculating unadjusted odd ratios. Continuous variables were compared using two-tailed independent-sample t-tests or Univariate analyses of variance (ANOVA). For comparisons, the statistical level of significance was  $p < .05$ ,  $p < .01$  or  $p < .001$ . If not noted explicitly, analyses were executed adjusting for gender using a weighting factor, because of unequal gender ratio in the present sample. Furthermore, not weighted analyses were calculated to allow gender-specific conclusions. Multivariate logistic regression models were performed to calculate adjusted odd ratios (adj. OR) for associations of nightmares with demographic information and other sleep disturbances. All logistic regression results are reported as odds ratios with 95% confidence intervals (CI).

## Results

### Prevalence of frequent nightmares

Adjusted for unequal gender ratio, 18.5% of participants reported to have nightmares once or twice a week and 5.8% three times or more a week (Table 1). Thus, 24.3% students experienced nightmares at least once a week, though women suffered significantly more often from weekly nightmares than men  $\chi^2(1) = 29.706$ ,  $p \leq .001$  (unadj. OR = 1.87, 95%-CI = 1.49-2.35). Women did also suffer significantly more often from frequent nightmares ( $\geq 3x/week$ ) than men  $\chi^2(1) = 21.017$ ,  $p \leq .001$  (unadj. OR = 2.99, 95%-CI = 1.83-4.88).

Weekly nightmares did not occur more often in beginner students (26.0% beginner vs. 23.9% others),  $\chi^2(1) = 0.621$ ,  $p > .05$ , neither in long term students (long term 18.0% vs. 24.5% other),  $\chi^2(1) = 2.219$ ,  $p > .05$ . This finding also applied to the subgroup with frequent nightmares ( $\geq 3x/week$ ).

### Associations of nightmares with sleep latency and sleep duration

Students reporting no nightmares in the past four weeks showed the shortest sleep latency ( $M = 21.78$  min,  $SD = 24.37$ ), whereas students experiencing nightmares at least once a week (weekly nightmares) needed more time to fall asleep ( $M = 30.57$  min,  $SD = 26.75$ ). Suffering from nightmares at least three times a week (frequent nightmares) went along with a prolonged delay falling asleep ( $M = 38.72$  min,  $SD = 33.12$ ). Hence, it can be assumed that sleep latency increases with reported frequency of nightmares,  $F(3,2823) = 34.597$ ,  $p \leq .001$ .

In contrast, no systematic effect could be found between overall sleep duration and nightmare frequency. Although the main effect reached significance,  $F(3,2808) = 3.475$ ,  $p \leq .05$ , the distribution of the means and range of values did not lead to an unambiguous effect. For details see table 1.

### Associations with other frequent sleep disturbances

Following results were adjusted for gender because of the unequal gender ratio in the surveyed sample. Reported sample sizes vary due to the used weighting factor. 24% of students suffering from nightmares at least once a week reported to have difficulties falling asleep ( $> 30$  min) three times a week, whereas students without nightmares were affected by trouble falling asleep in only 12.0% of cases,  $\chi^2(1) = 45.922$ ,  $p \leq .001$ . Nocturnal awakenings at least three times a week were also more frequent in students with weekly nightmares (28.0% vs. 13.2%;  $\chi^2(1) = 62.946$ ,  $p \leq .001$ ). A corresponding effect can be

**Table 1:** Prevalence of nightmares and overall sleep duration separated for reported nightmare frequencies.

	Prevalence		Sleep Duration	
	Percent	M	SD	
Nightmares				
Never	38.9%	453.23	66.96	
Less than once a week	36.9%	462.08	67.90	
Once/twice a week (weekly nightmares)	18.5%	454.77	77.34	
3 times or more per week (frequent nightmares)	5.8%	450.05	90.53	

observed regarding fitful sleep (tossing and turning in bed three times a week or more often), which affects 31.6% of students with nightmares at least once a week and only 9.6% of students without nightmares,  $\chi^2(1) = 152.896, p \leq .001$ . Anxiety concerning going to bed at least three times a week was reported significantly more often students with nightmares than by students without nightmares (5.1% vs. 0.8%,  $\chi^2(1) = 41.562, p \leq .001$ ). Students suffering from nightmares went to bed after midnight more often than students without frequent nightmares (30.8% vs. 25.3%;  $\chi^2(1) = 6.407, p \leq .05$ ). An overview and unadjusted odd ratios for the associations between nightmares once a week and other frequent sleep disturbances are displayed in [table 2](#).

Two additional logical regression models were conducted to clarify the adjusted associations between sleep variables based on results of Schredl (2003). In multivariate analysis all included variables achieved significance and adjusted odd ratios were between 1.34 and 3.99. Strongest associations with nightmares at least once a week were reached by “frequent anxiety concerning going to bed” (adj. OR = 6.01) and “frequent fitful sleep” (adj. OR = 3.99), weakest by self efficacy “GSE” (adj. OR = 0.92). Details are depicted in [table 3](#).

Furthermore, students who are affected by frequent nightmares ( $\geq 3x/week$ ) (n = 126) were compared to students without suffering from nightmares in the last four weeks (n = 853).

Frequent difficulties falling asleep (26.2% vs. 11.8%), frequent awaking at night (46.8% vs. 11.4%), frequent anxiety about going to bed (0.5% vs. 11.9%) and frequent fitful sleep (53.2% vs. 8.1%) were significantly more prevalent in the nightmare group compared to the

group without nightmares. Going to bed after midnight did not apply especially to one of the groups. For details see [table 4](#).

Based on the two groups, additional logistic regression models ([Table 5](#)) were performed to calculate multivariate adjusted associations. The variable „usually going to bed after midnight” was not included in the logistic regression models because of not revealing group differences in previous calculations. Detailed results of multivariate analysis see [table 5](#). Especially “frequent anxiety concerning going to bed” (adj. OR = 26.57) and “fitful sleep” (adj. OR = 13.27) were the strongest predictors for frequent nightmares.

### Associations of nightmares with general self-efficacy

Students reporting no nightmares in the past four weeks showed the highest score on the GSE scale. self-efficacy decreased significantly with increasing frequency of nightmares,  $F(3,2823) = 34.597, p \leq .001$ . Means and standard deviations can be depicted from [table 6](#).

### Discussion

Few studies have examined patterns of risk for sleep disorders among university students. In this study we focused on prevalence of nightmares and the association to sleep problems and self-efficacy among university students. Results show, that 18.5% of students reported to have nightmares at least once a week, whereas 5.8% suffer from frequently nightmares. This percentage is higher than previous reported frequencies for students. Belicki and colleagues stated one nightmare per month as mean nightmare frequency [18]. However, Schredl found a prevalence rate with 52.2% of students experiencing

**Table 2.** Group differences and prevalence of sleep disturbances in students with nightmares at least once a week and students reporting nightmares less than once a week.

	Nightmares < 1x/week (n = 1663)	Nightmares ≥ 1x/week (n = 532)	$\chi^2$ -Test	Unadj. OR (95%-CI)
Frequent difficulties falling asleep (3x/week more than 30 min)	12.0% (200/1663)	24.1% (128/532)	$\chi^2(1) = 45.922, p \leq .001$	OR = 2.32 (1.80-2.97)
Frequent awaking at night (3x/week or more often)	13.2% (220/1663)	28.0% (149/532)	$\chi^2(1) = 62.946, p \leq .001$	OR = 2.55 (2.01-3.23)
Frequent fitful sleep (3x/week or more often)	9.6% (160/1663)	31.6% (168/532)	$\chi^2(1) = 152.896, p \leq .001$	OR = 4.34 (3.49-5.54)
Frequent anxiety concerning going to bed (3x/week or more often)	0.8% (13/1663)	5.1% (27/532)	$\chi^2(1) = 41.562, p \leq .001$	OR = 6.79 (3.48-13.26)
Usually going to bed after midnight	25.3% (420/1663)	30.8% (164/532)	$\chi^2(1) = 6.407, p \leq .05$	OR = 1.32 (1.06-1.64)

**Table 3:** Logistic regression models on associations between gender, sleep disturbances and nightmares at least once a week.

	Minimal multivariate logistic regression models (gender adjusted estimates)		Multivariate logistic regression model of all variables	
	adj. OR	95%-CI	adj. OR	95%-CI
Gender (female)	-	-	1.74*	1.36-2.23
Frequent difficulties falling asleep (3x/week more than 30 min)	1.87*	1.49-2.36	1.46*	1.11-1.91
Frequent awaking at night (3x/week or more often)	2.24*	1.79-2.81	1.41*	1.07-1.82
Frequent fitful sleep (3x/week or more often)	3.99*	3.14-5.07	2.71*	2.08-3.53
Frequent anxiety concerning going to bed (3x/week or more often)	6.01*	3.24-11.15	2.83*	1.45-5.57
Usually going to bed after midnight	1.34#	1.07-1.68	1.33#	1.05-1.70
GSE	0.92*	0.90-0.93	0.92*	0.92-0.96

\* p < .001, + p < .01, # p < .05

**Table 4:** Group differences and prevalence of sleep disturbances in students with nightmares at least three times a week and students reporting no nightmares in the past four weeks.

	Nightmares < 3x/week (n = 853)	Nightmares ≥ 3x/week (n = 126)	$\chi^2$ -Test	Unadj. OR (95%-CI)
Frequent difficulties falling asleep (3x/week more than 30min)	11.8% (101/854)	26.2% (33/126)	$\chi^2(1) = 19.192, p \leq .001$	OR = 2.65 (1.69-4.14)
Frequent awaking at night (3x/week or more often)	11.4% (97/853)	46.8% (59/126)	$\chi^2(1) = 103.016, p \leq .001$	OR = 6.86 (4.56-10.33)
frequent fitful sleep (3x/week or more often)	8.1% (69/853)	53.2% (67/126)	$\chi^2(1) = 186.556, p \leq .001$	OR = 12.90 (8.41-19.79)
Frequent anxiety concerning going to bed (3x/week or more often)	0.5% (4/853)	11.9% (15/126)	$\chi^2(1) = 75.442, p \leq .001$	OR = 28.68 (9.35-87.95)
Usually going to bed after midnight	25.4% (217/853)	25.4% (32/126)	$\chi^2(1) = 0.000, p > .05$	

**Table 5:** Logistic regression models on associations between gender, sleep disturbances and nightmares at least three times a week.

	Minimal multivariate logistic regression models (gender adjusted estimates)		Multivariate logistic regression model of all variables	
	adj. OR	95%-CI	adj. OR	95%-CI
Gender (female)	-	-	3.05*	1.71-5.44
Frequent difficulties falling asleep (3x/week more than 30 min)	2.42*	1.57-3.74	0.91	0.51-1.60
Frequent awaking at night (3x/week or more often)	5.24*	3.56-7.71	2.49*	1.54-4.00
Frequent fitful sleep (3x/week or more often)	13.27*	8.71-20.23	8.24*	5.12-13.26
Frequent anxiety concerning going to bed (3x/week or more often)	26.57*	8.67-81.41	9.50+	2.54-35.58
GSE	0.88*	0.85-0.91	0.91*	0.87-0.94

\* p < .001, + p < .01, # p < .05

**Table 6:** Means and standard deviations for general self-efficacy separated for reported nightmare frequencies.

Nightmare frequency	GSE score	
	M	SD
Never	29.55	4.88
Less than 1x per week	28.22	4.89
1 or 2 time per week (weekly nightmares)	26.72	5.23
3 times or more per week (frequent nightmares)	25.56	5.85

nightmares once a month or more often, and 12.1% suffering from nightmares at least once a week [6]. In line with our results addressing students, various studies reported that female students are more likely to report nightmares [6-9,19]. However, freshmen did not suffer significantly more often than higher grades.

Our results show that students suffering from nightmares reported more sleep related problems (e.g. problems falling asleep and impaired sleep quality) are in line with previous studies showing that students suffering from nightmares rated their sleep quality as poorer [6], and were more affected by their dreams and nightmares, than did controls [7]. Also, Muneza was stated that nightmares are associated with insomnia and that these factors are associated with each other [20]. However, suffering from nightmares and sleep problems may be a stress factor itself for students, leading to an enhanced risk for psychological burdens or learning problems [21].

One of the topics in focus was the role of self-efficacy in the relationship of university academic demands, nightmares and sleep complaints. Results showed a significant relationship between self-efficacy and nightmares: Self-efficacy was lower in students suffering from nightmares. Moreover, self-efficacy significantly correlated with the frequency of nightmares. These results are in accordance with the outcomes of Bouchard and colleagues [16]. One could anticipate that high self-efficacy might be a protective factor for sleep problems; in contrast, low self-efficacy seems to be a risk factor. Beyond that, disturbed sleep due to nightmares may have an impact on academic functioning, as women without sleep disorder had on average higher grades than those who reported at least one sleep disorder [9].

Furthermore, frequent nightmares may be an indicator for stressors and inadequate coping strategies [22] and often correspond to psychopathology [23]. Levin and Fireman referred to distress associated with nightmares as a predictor of greater levels of psychological disturbance [24]. In addition, nightmares can lead to poor sleep quality and can impair the daily state, the feeling of anxiety, concentration and self esteem [25] and self-efficacy [16]. Beyond that, nightmares and short sleep duration are associated independently with suicidal ideation [26] and behavior [27]. Remarkably, after controlling for the symptoms of anxiety, depression, and PTSD nightmares, but not insomnia symptoms, were related to suicidal ideation [26]. In sum, the results of this study reveal that nightmares are a problem for university students with a broad range of clinical implications.

Overall, some limitations have to be mentioned. One methodological limitation of our study is that the relation of sleep parameters, sleep habits and insomnia symptoms, nightmares and self-efficacy was assessed only cross-sectional and without objective measurements. Thus, it is not possible to answer the question whether

sleep symptoms, especially nightmares and insomnia are a precursor to or consequence of the special life style, work-load or mental health problems of university students. Furthermore, the type of measurement has to be discussed, as reports of nightmare frequencies seem to differ between questionnaires and diaries [28]. Moreover, no internet-based survey, however, can substitute the diagnosis by a sleep specialist. Although the results of the survey could identify participants at risk for a sleep disorder, it was not known whether they had a diagnosable disorder. In the future more longitudinal and objective data are needed to answer these questions.

In summary, our data indicates a substantial number of university students have a risk for suffering from nightmares and from insomnia symptoms. These sleep complaints may have an impact on academic success. One strength of the current study was the high number of participants. Twenty-four percent of the present sample experienced nightmares at least once a week. Risk for nightmares predicted insomnia symptoms and impairment of self-efficacy, which is associated with academic outcome. Identification and successful treatment of sleep problems, e.g. nightmares and insomnia, might increase academic outcome rates. Further studies are needed to see the impact of treatments in university samples in hopes of improving their overall health as well as their academic success. Future research may assess the effectiveness of sleep education among university students suffering from nightmares or insomnia symptoms.

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## Ethical Statement

The study had been approved by the ethics committee of the University Hospital Tübingen.

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