

# Sleep, dreams and emotion regulation in higher education students

Beatriz Parrochinha and Joana Pires

Polytechnic University of Castelo Branco, Portugal

**Summary.** Higher education students are particularly susceptible to factors that compromise emotional wellness, including stress, anxiety, and sleep disorders. Sleep is a reversible, natural and cyclical process during which dreams emerge, mental events comprising hallucinatory images. Emotion regulation, through strategies such as cognitive reappraisal and expressive suppression, is vital for psychological adjustment. This study aimed to correlate sleep, dreams, and emotion regulation in students. A total of 44 students completed the Pittsburgh Sleep Quality Index, the Emotion Regulation Questionnaire, and a Dream Diary for 14 consecutive days. To all of the reported dreams, the Hall and Van Castle quantitative and systematic dream content analysis technique was applied and compared to published normative Hall and Van Castle data. Almost half of the sample demonstrated poor sleep quality. Sleep quality was significantly associated with cognitive reappraisal but not with expressive suppression. Female participants recalled more dreams, which were longer and characterised by a predominance of negative emotions, whereas male participants experienced more positive emotions in dreams. Compared to the normative USA data, Portuguese female students dreamed more frequently about family and also showed higher rates of aggression, friendliness and misfortune. Male Portuguese students had a greater frequency of dreams involving animals, as well as higher rates of aggression, friendliness, sexuality, misfortune, and good fortune.

**Keywords:** Sleep, Dreaming, Emotional Regulation, University, Students

## 1. Introduction

In an increasingly demanding and competitive academic context, the emotional well-being of higher education students has drawn growing attention from the scientific community. Higher academic pressures (Farren & Dariyo, 2021), changes in lifestyle (Wang, F. & Bíró, 2021), and the intrinsic challenges of transitioning to adulthood (Farren & Dariyo, 2021) make this population particularly vulnerable to anxiety, stress and sleep disorders (Farren & Dariyo, 2021).

Of the various factors influencing students' well-being, the quality of sleep is paramount. It is defined as subjective perception of the experience of sleeping and is influenced by latency, continuity, duration, and the feeling of revitalisation upon awakening (Tsfaye et al., 2024). When interrupted, sleep quality is most frequently associated with deficits in memory, motivation, attentional capacity and reaction time. It contributes to reduced productivity and increased fatigue and irritability. In the long and medium term, sleep deprivation can cause depression, metabolic disorders, obesity, immune deficiency, and cardiovascular disorders (Tsfaye et al., 2024).

Sleep, as a physiological state, is characterized by a cyclical, natural, and reversible process, with suppression of sensory perception, reduced consciousness (Tubbs et al., 2019), and decreased responsiveness to external stimula-

tion (Brinkman & Sharma, 2018). Dreams, mental events composed of hallucinatory and formed images, mainly visual, but also possibly with auditory, tactile, and movement-related components (Hobson, 2001), take place in this state. Most individuals perceive them as real during the time they are happening, although, when they wake up, they are usually recognised as unreal or imagined (Hobson, 2001). Dreams typically incorporate fragments of everyday life, combining memories of past experiences, recent events, or even anticipated future scenarios to create novel narratives (Picard-Deland et al., 2023).

Dream recall refers to the ability to remember dreams upon awakening, varies considerably across individuals and can fluctuate within the same individual depending on specific conditions (Bloxham, 2018). Sleep deprivation can substantially reduce dream recall, and recall rates also differ depending on the sleep stage at awakening. Awakenings after REM sleep are more frequently associated with higher dream recall (Tselebis et al., 2021; Bloxham, 2018; Vitali et al., 2022). Furthermore, dream recall tends to decline progressively with advancing age (Bloxham, 2018). Sex differences are evident in dream recall, with females generally reporting dreams more frequently, longer narratives, and a higher number of characters than males (Schredl & Reinhard, 2008; Schredl, 2010), while males' dreams tend to feature more physical aggression, physical activities, sexuality, and tool-related elements (Schredl, 2010; William Domhoff & Schneider, 2008). Female dreams, in contrast, often include clothing, household objects, and social interactions, particularly conversations (Schredl, 2010; William Domhoff & Schneider, 2008). These differences may reflect both socialization patterns and biological factors (Mathes & Schredl, 2013).

Emotional regulation (ER) represents an essential process for psychological balance and social adaptation. It is the mechanism of processes by which individuals adapt their

Corresponding address:

Beatriz Parrochinha, Leiria, Portugal

Email: beatriz.parrochinha@ipcabcampus.pt

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emotions to environmental demands (McRae & Gross, 2020). Among the most commonly examined strategies are cognitive reappraisal, wherein one reinterprets how he or she experiences a specific situation or how he or she manages to deal with it (Kozubal et al., 2023) and expressive suppression, wherein one inhibits the outward expression of emotion, such as crying or facial expressions (Liu et al., 2023; Santos & Brandão, 2022), and, possibly, the suppression of thoughts and feelings associated with the experienced emotion (Kozubal et al., 2023).

Recent evidence suggests a link between sleep quality, dream activity, and emotion regulation. REM sleep, the stage during which dreams are most vivid, has been associated with emotional processing. Biologically, this hypothesis is supported by the identification of widely overlapping neural networks involved both in dream activity (particularly during REM sleep) and in emotional processing (Conte et al., 2021).

Conte et al. (2021) aimed to investigate how sleep quality influences emotions experienced during wakefulness and in dreams. Several instruments were used: the PSQI to assess sleep quality; the Modified Differential Emotions Scale, which measures the frequency and intensity of 22 emotions (positive and negative) at three distinct time points, over the past two weeks, in the last remembered dream, and during the 24 hours prior to the dream; and the Mannheim Dream Questionnaire, which collects data on dream recall frequency and the occurrence of nightmares and lucid dreams. Participants completed the Modified Differential Emotions Scale daily, recording the emotions experienced throughout the day before going to sleep. On days when they recalled a dream, they completed the questionnaire reporting the emotions associated with that dream. Results revealed that sleep quality is associated with differences in emotional expression during both wakefulness and dreaming, suggesting a direct impact on emotion regulation. Participants with good sleep quality showed results reflecting efficient emotional regulation, indicating that dreams may serve as a space for processing negative emotions accumulated during the day, promoting emotional balance. Conversely, participants with poor sleep quality showed potential difficulties in emotion regulation. The absence of a predominance of negative emotions in dreams may reflect less effective functioning of emotional processing mechanisms (Conte et al., 2021).

Thus, it becomes relevant to understand how sleep and dreams relates to emotional regulation processes, especially during a life stage marked by personal, social, and academic changes. Therefore, the aim of this study is to correlate sleep, dreams, and emotional regulation in higher education students. We expect that this group of students will present higher PSQI scores, indicating poor sleep quality. It is hypothesized that students with poor sleep quality will report more negative emotions in dreams, demonstrate lower emotional regulation, and show differences in the types and frequency of emotion regulation strategies employed.

## 2. Materials and Methods

### 2.1. Sample

This study is observational, prospective, and descriptive, with a quantitative approach. All data were collected from

students at Escola Superior de Saúde Dr. Lopes Dias (ES-ALD) between September 2024 and January 2025.

The sampling was non-probabilistic by convenience,  $N = 44$  participants. The inclusion criteria were 18 years and above, being an ESALD student, having signed the informed consent form, and filled up the Pittsburgh Sleep Quality Index (PSQI), the Emotion Regulation Questionnaire (ERQ), and the dream diary. The exclusion involving participants over 25 years of age, students from other institutions, medically and/or psychiatrically known condition, or under medication affecting the central nervous system.

### 2.2. Procedure

After obtaining ethical approval from the Ethics Committee of the Polytechnic Institute of Castelo Branco, data were collected through the Google Forms® platform. Links to the forms were distributed directly to students through their institutional email accounts. Two forms were used: the first included the informed consent, demographic questions to apply the inclusion and exclusion criteria, and the PSQI and ERQ questionnaires; the second form was used to complete the dream diary. Only participants who completed the first form received access to the second form. The dream diary was organised by days, from Day 1 to Day 14. Participants were asked to record each day whether they had a dream or not. On the days they reported having dreams, they were instructed to describe them in as much detail as possible.

### 2.3. Materials

The PSQI is one of the most widely used instruments to assess subjective sleep quality over the past month. It consists of 19 self-report items, complemented by 5 optional questions intended for a roommate or bed partner, if applicable. Each question is rated on a scale from 0 to 3, with the global score obtained by summing the scores of the 19 self-rated items. The five additional questions are not included in the total score, serving only for clinical information purposes. The global score can range from 0 to 21 points, where  $PSQI \leq 5$  indicates good sleep quality and  $PSQI > 5$  suggests poor sleep quality (Marques et al., 2021).

The ERQ is an instrument composed of ten items that assesses the habitual use of two emotion regulation strategies: cognitive reappraisal and expressive suppression. Each item is rated on a Likert scale ranging from 1 to 7 (Preece & Mehta, 2023). Cognitive reappraisal is evaluated through the odd-numbered items, with the total score being the sum of those responses. The use of this strategy is classified into three levels: low use when the score is  $\leq 10$ , moderate when it is between 11 and 18, and high when it is  $\geq 19$  (Preece & Mehta, 2023). Expressive suppression is evaluated through the even-numbered items, with the total score obtained by summing those responses. Its classification follows the same criteria as cognitive reappraisal: low use when the score is  $\leq 7$ , moderate between 8 and 16, and high when it is  $\geq 17$  (Preece & Mehta, 2023).

### 2.4. Dream Content Analysis

One of the most widely used scales for analysing dream content is the Hall and Van de Castle Scale, which objectively evaluates dreams using a coding system based on published standards. Eight categories are analysed: characters, social interactions, activities, occurrences, emotions,

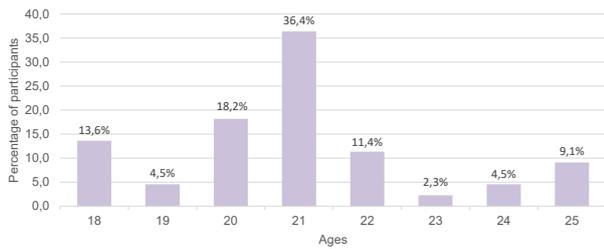


Figure 1. Distribution of participants by age.  
Legend: % – percentage

settings, objects, and descriptive elements (Schredl, 2010). The emotions present in the dream reports included anger, apprehension, sadness, and confusion, considered negative emotions and happiness, considered a positive emotion. This distinction allowed the analysis of the prevalence of negative and positive emotional valence in the participants' dreams (Schredl, 2010). Proportions were analysed using significance tests and effect sizes based on Cohen's  $h$  statistic (arcsine transformation of percentages), which accounts for the inability to calculate standard deviations of proportions and corrects for the different distributions of percentages at the extremes or centre of the distribution. The analysis was performed automatically using the spreadsheet developed by Schneider and Domhoff (2001) in the DreamStat program. The dream content of the study group was compared with the normative data for men and women published by Hall and Van de Castle (Schredl, 2010).

Participation in the study was entirely voluntary, allowing participants to refuse or withdraw at any time, even after signing the informed consent form, without any consequences.

### 2.5. Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics® (Statistical Product and Service Solutions). A descriptive analysis was conducted for qualitative variables, and mean, standard deviation, and percentages were calculated for quantitative variables. The normality of the data was assessed using the Shapiro-Wilk test. Due to the non-normal distribution of the sample, non-parametric tests were applied to all variables. The Moses Extreme Reactions Test was used to analyse the relationship between sleep quality and dream recall rate, as well as the relationship between sleep quality and emotional regulation strategy (cognitive reappraisal) and the distribution of negative emotions

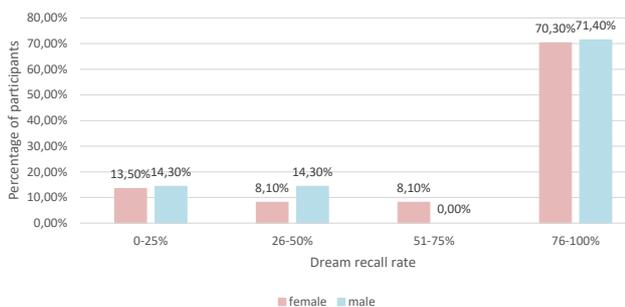


Figure 2. Distribution of female and male participants according to dream recall rate.  
Legend: % – percentage

in dreams according to sleep quality. The Kolmogorov-Smirnov test was applied to examine the relationship between sleep quality and the emotion regulation strategy (expressive suppression) and the distribution of emotions in the dreams of male participants. The Kruskal-Wallis test was used for the distribution of emotions in the dreams of female participants. All analyses were conducted with a 95% confidence interval and a significance level of  $p \leq 0.05$ .

### 3. Results

The sample consisted of 44 individuals, 7 of whom were male (15.9%) and 37 were female (84.1%).

Regarding age distribution, participants were between 18 and 25 years old, with a mean age and standard deviation of  $20.98 \pm 1.935$  years. The most frequent age was 21, with 16 participants (36.4%), whereas the least frequent age was 23, with only 1 individual (2.3%) (See Figure 1).

It was found that 24 individuals (54.5%) reported good sleep quality, while the remaining 20 participants (45.5%) indicated poor sleep quality.

Regarding the emotional regulation strategy of cognitive reappraisal, 8 individuals (18.2%) showed a low level of use, 34 participants (77.3%) an intermediate level, and only 2 participants (4.5%) showed a high level of use.

As for the expressive suppression strategy, 8 participants (18.2%) showed a low level, 25 participants (56.8%) an intermediate level, and 11 (25%) showed a high level of use.

Most female participants were in the highest dream recall category (76–100%), corresponding to 26 individuals (70.3%) (see Figure 2). Only 3 participants (8.1%) recalled between 51–75% of their dreams, 3 individuals (8.1%) recalled between 26–50%, and 5 participants (13.5%) recalled fewer than 25% or no dreams at all. Most male participants were also in the highest dream recall category (76–100%), corresponding to 5 individuals (71.4%). None (0%) recalled between 51–75%, while 1 individual (14.3%) recalled between 26–50%, and 1 participant (14.3%) recalled fewer than 25% or no dreams.

From the 149 dreams reported by female participants, the number of words ranged from 0 to 154, with a mean of  $36.25 \pm 22.889$  words. Most dreams had fewer than 30 words ( $n=67$ ; 45%) (See Figure 3). Next were dreams with 31–50 words ( $n=52$ ; 34.9%), followed by 16 dreams with 51–70 words (10.7%) and 10 dreams with 71–90 words (6.7%). Only 4 dreams exceeded 90 words (2.7%). Among the 27 dreams reported by male participants, word count ranged from 0 to 79, with a mean of  $34.50 \pm 18.546$  words.

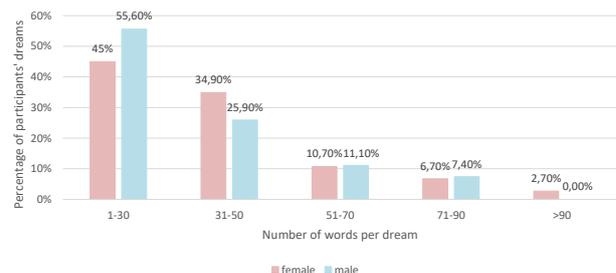


Figure 3. Number of words per dream in female and male participants.  
Legend: % – percentage

Table 1. Relationship between sleep quality and dream recall rate using Moses Extreme Reaction Test.

Category	Dream recall rate								p (value)
	0% n (%)	50% n (%)	60% n (%)	67% n (%)	78% n (%)	80% n (%)	83% n (%)	100% n (%)	
Good sleep quality	3 (6.8)	3 (6.8)	1 (2.3)	2 (4.5)	0 (0)	0 (0)	3 (6.8)	12 (27.3)	0.003
Poor sleep quality	3 (6.8)	1 (2.3)	0 (0)	0 (0)	2 (4.5)	4 (9.1)	0 (0)	10 (22.7)	

Legend: n – number of participants. % - percentage

Most dreams had fewer than 30 words (n=15; 55.6%), followed by 31–50 words (n=7; 25.9%). Additionally, 3 dreams had 51–70 words (11.1%) and 2 dreams had 71–90 words (7.4%). None exceeded 90 words (0%).

Among participants with good sleep quality, 3 (6.8%) reported no dream recall (0%), 3 (6.8%) recalled 50%, 1 (2.3%) recalled 60%, 2 (4.5%) recalled 67%, 3 (6.8%) recalled 83%, and 12 (27.3%) had full recall (100%). Among those with poor sleep quality, 3 (6.8%) reported no recall, 1 (2.3%) recalled 50%, 2 (4.5%) recalled 78%, 4 (9.1%) recalled 80%, and 10 (22.7%) recalled 100%.

Statistical analysis using the Moses Extreme Reaction Test revealed a statistically significant association between sleep quality and dream recall rate (p=0.003) (See Table 1).

Among participants with good sleep quality, 4 (9.1%) showed a low level of cognitive reappraisal, 19 (43.1%) showed an intermediate level, and 1 (2.3%) showed a high level. Among those with poor sleep quality, 4 (9.1%) showed a low level, 15 (34.1%) an intermediate level, and 1 (2.3%) a high level, as shown in Table 2.

Statistical analysis using the Moses Extreme Reaction Test indicated that this difference is statistically significant (p<0.001).

Among participants with good sleep quality, 6 (13.6%) showed a low level of expressive suppression, 13 (29.5%) an intermediate level, and 5 (11.3%) a high level. Among those with poor sleep quality, 2 (4.5%) showed a low level, 12 (27.3%) an intermediate level, and 6 (13.6%) a high level, as seen in Table 3.

Statistical analysis using the Kolmogorov-Smirnov Test indicated that this difference was not statistically significant (p=0.967).

27 dreams were analysed using the Hall and Van de Castle method (Cohen's h statistic) (See Table 4) The comparison between the male group of the sample and the male norms revealed the following results: higher percentage of family characters (p=0.512), higher percentage of friends

(p=0.357), lower percentage of deceased and/or imaginary characters (p=0.474), and lower percentage of animals (p=0.002). Regarding aggressive interactions, a lower percentage of dreams in which the dreamer is the aggressor was observed (p=0.007), as well as a higher percentage of indoor (p=0.009) and familiar settings (p=0.003). Additionally, a lower percentage of self-directed negativity (p=0.541), bodily misfortunes (p=0.049), negative emotions (p=0.086), and success involving the self (p=0.386) was found. Moreover, a higher percentage of dreams with lucky elements (p=0.046) and a lower percentage of dreams with misfortune (p=0.002), success (p=0.217), and failure (p=0.934) were observed.

A total of 149 dreams were analysed using the Hall and Van de Castle method (Cohen's h statistic) (See Table 5). The comparison between the female group of the sample and the female norms revealed the following results: higher percentage of family characters (p=0.001), lower percentage of friend characters (p=0.535), higher percentage of deceased and/or imaginary characters (p=0.552), and higher percentage of animals (p=0.596). Regarding aggressive interactions, a higher percentage of dreams in which the dreamer is the aggressor was observed (p=0.964), as well as a higher percentage of indoor settings (p=0.297) and a lower percentage of familiar settings (p=0.730). Additionally, a lower percentage of self-directed negativity (p=0.914), bodily misfortunes (p=0.227), and negative emotions (p<0.001), and a higher percentage of success involving the self (p=0.732) were found. Moreover, a lower percentage of dreams with elements of luck (p=0.430) and misfortune (p<0.001), and a higher percentage of dreams with elements of success (p=0.490) and failure (p=0.575) were observed.

The emotions present in the dream reports included anger, apprehension, sadness, and confusion, considered negative emotions, and happiness as a positive emotion. In the female group, there were 149 dreams, of which 35 dreams (23.5%) had no emotions, 51 dreams (34.2%) con-

Table 2. Relationship between sleep quality and cognitive reappraisal using Moses Extreme Reaction Test.

Cognitive Reappraisal	Good sleep quality n (%)	Poor sleep quality n (%)	p-value
Low level	4 (9.1)	4 (9.1)	0.001
Intermediate level	19 (43.1)	15 (34.1)	
High level	1 (2.3)	1 (2.3)	

Legend: n – number of participants, % - percentage

Table 3. Relationship between sleep quality and expressive suppression using Kolmogorov-Smirnov Test.

Expressive Suppression	Good sleep quality n (%)	Poor sleep quality n (%)	p-value
Low level	6 (13.6)	2 (4.5)	0.001
Intermediate level	13 (29.5)	12 (27.3)	
High level	5 (11.3)	6 (13.6)	

Legend: n – number of participants, % - percentage

Table 4. Statistical comparison of dream contents between the male group of the present sample and the Hall and Van de Castle male norms, using Cohen's  $h$  \* $p < 0,05$ ; \*\* $p < 0,001$

	Study series	Male norms	$h$ vs male norms	$p$ vs male norms	N for study	N for male norms
<b>Characters</b>						
Male Percent	60%	67%	-.15	.563	15	873
Familiarity Percent	59%	45%	+.28	.090	39	1108
Friends Percent	38%	31%	+.15	.357	39	1108
Family Percent	15%	12%	+.11	.512	39	1108
Dead & Imaginary Percent	0%	0%	-.12	.474	39	1180
Animal Percent	0%	6%	-.50	.002**	39	1180
<b>Social Interaction Percents</b>						
Aggression/Friendliness Percent	50%	59%	-.18	.620	8	546
Befriender Percent	50%	50%	-.00	.992	4	203
Aggressor Percent	0%	40%	-1.36	.007**	4	253
Physical Aggression Percent	40%	50%	-.20	.655	5	402
<b>Social Interaction Ratios</b>						
A/C Index	.13	.34	-.50		39	1180
F/C Index	.10	.21	-.26		39	1180
S/C Index	.00	.06	-.15		39	1180
<b>Settings</b>						
Indoor Setting Percent	76%	48%	+.58	.009**	21	586
Familiar Setting Percent	90%	62%	+.69	.003**	20	320
<b>Self-Concept Percents</b>						
Self-Negativity Percent	58%	65%	-.14	.541	19	809
Bodily Misfortunes Percent	0%	29%	-1.14	.049*	3	205
Negative Emotions Percent	67%	80%	-.32	.086	33	282
Dreamer-Involved Success Percent	33%	51%	-.36	.386	6	141
Torso/Anatomy Percent	----	31%	----	----	0	246
<b>Topics per Dream</b>						
Aggression	19%	47%	-.62	.002**	27	500
Friendliness	15%	38%	-.54	.006**	27	500
Sexuality	0%	12%	-.70	<.001**	27	500
Misfortune	11%	36%	-.61	.002**	27	500
Good Fortune	19%	6%	+.39	.046*	27	500
Success	7%	15%	-.24	.217	27	500
Failure	15%	15%	-.02	.934	27	500
Striving	22%	27%	-.11	.574	27	500

Legend: N=27 dreams, % - percentage

tained one negative emotion, 10 dreams (6.7%) two negative emotions, 1 dream (0.7%) three negative emotions, 38 dreams (25.5%) one positive emotion, 12 dreams (8%) both one negative and one positive emotion, 1 dream (0.7%) one positive and two negative emotions, and 1 dream (0.7%) two positive emotions. Statistical analysis using the Kruskal-Wallis test indicated that this difference was statistically significant ( $p < 0.001$ ) (See Table 6).

In the male group, there were 27 dreams, of which 4 dreams (14.8%) had no emotions, 6 dreams (22.2%) contained one negative emotion, 4 dreams (14.8%) two negative emotions, 2 dreams (7.4%) three negative emotions, 9 dreams (33.3%) one positive emotion, and 2 dreams (7.4%) both one negative and one positive emotion. Statistical analysis using the Kolmogorov-Smirnov test indicated that

Table 5. Statistical comparison of dream contents between the female group of the present sample and the Hall and Van de Castle female norms, using Cohen's  $h$  \* $p < 0.05$ ; \*\* $p < 0.001$

	Study series	Male norms	h vs male norms	p vs male norms	N for study	N for male norms
<b>Characters</b>						
Male Percent	46%	48%	-.05	.670	96	1054
Familiarity Percent	66%	58%	+.15	.038*	208	1363
Friends Percent	35%	37%	-.05	.535	208	1363
Family Percent	30%	19%	+.25	.001**	208	1363
Dead & Imaginary Percent	1%	1%	+.04	.552	219	1423
Animal Percent	5%	4%	+.04	.596	219	1423
<b>Social Interaction Percents</b>						
Aggression/Friendliness Percent	61%	51%	+.19	.193	51	530
Befriender Percent	55%	47%	+.16	.498	20	225
Aggressor Percent	33%	33%	+.01	.964	27	231
Physical Aggression Percent	47%	34%	+.27	.118	36	337
<b>Social Interaction Ratios</b>						
A/C Index	.16	.24	-.17		219	1423
F/C Index	.10	.22	-.28		219	1423
S/C Index	.01	.01	+.00		219	1423
<b>Settings</b>						
Indoor Setting Percent	66%	61%	+.10	.297	141	591
Familiar Setting Percent	77%	79%	-.04	.730	105	306
<b>Self-Concept Percents</b>						
Self-Negativity Percent	65%	66%	-.01	.914	75	865
Bodily Misfortunes Percent	23%	35%	-.27	.227	22	206
Negative Emotions Percent	62%	80%	-.40	<.001**	141	420
Dreamer-Involved Success Percent	46%	42%	+.08	.732	26	78
Torso/Anatomy Percent	7%	20%	-.40	.132	15	314
<b>Topics per Dream</b>						
Aggression	21%	44%	-.51	<.001**	149	500
Friendliness	13%	42%	-.66	<.001**	149	500
Sexuality	1%	4%	-.15	.109	149	500
Misfortune	14%	33%	-.46	<.001**	149	500
Good Fortune	4%	6%	-.07	.430	149	500
Success	9%	8%	+.06	.490	149	500
Failure	11%	10%	+.05	.575	149	500
Striving	20%	15%	+.14	.121	149	500

Legend: N=149 dreams, % - percentage

this difference was statistically significant ( $p=0.030$ ) (See Table 7).

A total of 110 negative emotions were identified: 68 in the dreams of individuals with poor sleep quality and 42 in the dreams of those with good sleep quality. Among the negative emotions reported, apprehension and sadness were the most frequent. Among individuals with poor sleep quality, 35 dreams (51.5%) contained one negative emotion,

12 dreams (17.6%) two negative emotions, and 3 dreams (4.4%) three negative emotions. Among participants with good sleep quality, 36 dreams (85.7%) contained one negative emotion and 3 dreams (7.1%) two negative emotions. Statistical analysis using the Moses Extreme Reactions Test indicated that this difference was statistically significant ( $p < 0.001$ ) (See Table 8).

Table 6. Frequency and type of emotions identified in the dream reports of the female group, using the Krustal-Wallis Test.

		Positive emotions			p (value)
		No emotions	1 emotion	2 emotions	
Negative emotions	No emotions	35 (23.5%)	38 (25.5%)	1 (0.7%)	0.001
	1 emotion	51 (34.2%)	12 (8%)	0 (0%)	
	2 emotions	10 (6.7%)	1 (0.7%)	0 (0%)	
	3 emotions	1 (0.7%)	0 (0%)	0 (0%)	

Legend: n – number of dreams. % - percentage

#### 4. Discussion

This study included 44 participants from ESALD, the majority of whom were female, reflecting the demographic distribution of health-related degree programmes. According to the 2023 Statistical Bulletin of the Commission for Citizenship and Gender Equality (CIG), 76.8% of students enrolled in Health and Social Protection courses were women (Comissão para a Cidadania e a Igualdade de Género, 2023). This pattern is consistent with previous years, such as the 2022 CIG Bulletin, which reported a feminisation rate of 77.0% in these fields (Comissão para a Cidadania e a Igualdade de Género, 2022). Thus, the composition of the sample reflects the national reality. However, the predominance of female participants, combined with the small number of male participants, limited the possibility of conducting comparisons between sexes.

The results indicated that nearly half of the participants had poor sleep quality. Although this percentage was lower than that of students with good sleep quality, it still represents nearly half of the sample. This prevalence may be associated with several factors, including irregular schedules, excessive use of electronic devices, high stress levels, reduced physical activity, and the consumption of substances such as alcohol, tobacco, caffeine, or energy drinks (Wang & Bíró, 2021). The lack of control for these variables is a limitation of the study. Future research would benefit from including measures to assess and control for these factors in order to achieve a more accurate understanding of sleep habits. When compared to the literature, the results fall within the variability observed in other countries. For instance, a similar prevalence was found in Germany, where 49% of students had poor sleep quality (Schmickler et al., 2023). However, studies conducted in Jordan reported much higher percentages, with 74% (Albqoor & Shaheen, 2021) and 70% (Alghwiri et al., 2021) of students experi-

encing poor sleep quality, while in Rwanda the percentage reached 80% among medical students (Nsengimana et al., 2023). In contrast, lower rates were observed in China, with 30.1% reporting poor sleep quality (Li et al., 2020). These discrepancies may be related to cultural, academic, and sociodemographic differences. However, it is worth noting that sleep quality was assessed through self-report measures, which are subjective in nature and may introduce bias in participants' perceptions of their own sleep.

Data regarding dream recall indicated that the highest dream recall rate was observed predominantly in participants with good sleep quality, suggesting a positive association between sleep quality and the ability to recall dreams. This finding aligns with previous studies (Bloxxham, 2018; Tselebis et al., 2021; Vitali et al., 2022). However, despite this trend, some participants with poor sleep quality also showed high recall levels, indicating that this ability is not exclusively dependent on sleep quality. Dream recall can be influenced by various factors such as the moment of awakening (particularly after REM sleep), age, and sleep quality. Nevertheless, the restricted age range (18 to 25 years) in this study did not allow for analysis of the effects of ageing, although the literature suggests a decline in dream recall with age (Bloxxham, 2018). Furthermore, since all dreams were collected using dream diaries, it was not possible to determine the sleep phase (REM or NREM) in which the dreams occurred, even though it is known that dreams tend to occur more frequently during REM sleep (Bloxxham, 2018; Tselebis et al., 2021; Vitali et al., 2022).

Additionally, a study by Schredl & Reinhard (2008) showed that females tend to recall dreams more frequently than males, which may be partly attributed to the higher number of nocturnal awakenings in women due to poorer sleep quality, thereby facilitating dream recall. In this context, it is relevant to analyse the length of dream reports. Our findings

Table 7. Frequency and type of emotions identified in the dream reports of the male group, using the Kolmogorov-Smirnov Test.

		Positive emotions		p (value)
		No emotions	1 emotion	
Negative emotions	No emotions	4 (14.8%)	9 (33.3%)	0.001
	1 emotion	6 (22.2%)	2 (7.4%)	
	2 emotions	4 (14.8%)	0 (0%)	
	3 emotions	2 (7.4%)	0 (0%)	

Legend: n – number of dreams. % - percentage

Table 8. Distribution of negative emotions in dream reports, stratified by sleep quality, using the Moses Extreme Reactions Test.

Number of negative emotions in dream reports	Good sleep quality n (%)	Poor sleep quality n (%)	p-value
1	35 (31.8)	36 (32.7)	0.001
2	12 (21.8)	3 (5.5)	
3	3 (8.2)	0 (0)	

Legend: n – number of participants, % - percentage

indicate an average of  $36.25 \pm 22.889$  words in the reports of female participants, while the average for males was  $34.50 \pm 18.546$  words, suggesting that females tend to produce longer and more detailed dream narratives, in accordance with the literature (Schredl et al., 2019). This may be related to the higher dream recall in females, which allows for more elaborate descriptions (Schredl & Reinhard, 2008). Moreover, a study on autobiographical memory found that women tend to produce more detailed narratives in general, supporting the idea that they may describe dreams in more depth than men (Karlsson et al., 2019).

The analysis of dream content was conducted separately by sex, as dreams tend to contain distinct themes across sexes. One method for analysing dream content is the Hall and Van de Castle Coding System, which provides normative values differentiated by sex. The normative data for this scale were obtained in the United States through the analysis of 1,000 dreams (500 male and 500 female), collected via dream diaries from university students, a feature shared with the current study (Domhoff, 1996).

The differences observed between Portuguese female students dreams and the normative data were mainly reflected in a higher presence of dreams involving family members, as well as higher frequencies of friendship, misfortune, and aggression themes. The strong cultural emphasis on family ties in Portugal may explain the frequent appearance of family members in dreams (Zeiders et al., 2016). Additionally, the Portuguese educational environment, marked by strong interpersonal relationships as highlighted in the 2022 PISA report (Duarte et al., 2022), may influence the prevalence of friendship-related themes in dreams. Regarding themes of misfortune and aggression, it was noted that women tend to appear more frequently in the role of victims in aggressive interactions. This trend seems to reflect how women face everyday challenges, in which they may consciously or unconsciously perceive themselves as targets of adversity (Kilius et al., 2021).

The differences between Portuguese male students dreams and the normative data from the United States mainly concerned the higher presence of animal-related dreams, as well as increased frequencies of the dreamer assuming the role of aggressor, friendship, sexuality, misfortune, luck, and dreams with familiar settings. The fact that male students more often take on the role of the aggressor in dreams may be linked to cultural norms associated with masculinity (Reis et al., 2025) and the increasing prevalence of violence among youth (Malonda-Vidal et al., 2021). The rise in friendship and sexuality themes may be explained by the social and academic context typical of this age group, in which young people are particularly focused on building in-

terpersonal relationships and exploring their emotional and sexual identities (Wang et al., 2022).

The emotions found in dream reports included anger, apprehension, sadness, and confusion, classified as negative emotions and happiness as the sole positive emotion. Only explicitly expressed emotions were considered, since the Hall and Van de Castle scale focuses exclusively on the coding of explicit emotions. Implicit emotions were not included in the analysis, which may introduce slight interpretive differences. However, dreams with negative emotional valence tend to be more easily remembered and described (Schredl, 2010). Most participants, regardless of sex, reported dreams containing a single emotion. Nonetheless, a sex-related difference was noted: negative emotions were more frequent in female reports, while positive emotions predominated among males. This may be due to women recalling dreams in greater detail, particularly those with negative emotional content (Schredl & Reinhard, 2008). Additionally, studies have shown that women exhibit greater emotional sensitivity to negative stimuli, reacting more intensely and becoming more emotionally involved than men, which may be reflected in their dreams. Conversely, men tend to show less emotional engagement with negative content, potentially contributing to a higher occurrence of positive emotions in their dreams (Gardener et al., 2020).

It is important to note that whenever dreams included two or three emotions, they were exclusively negative in both sexes. This predominance of negative emotions may reflect the emotional weight of events or concerns experienced during wakefulness (Barbeau et al., 2022; Samson et al., 2023; Scarpelli et al., 2019b). Since the Hall and Van de Castle system codes four negative emotions (anger, apprehension, confusion, and sadness) but only one positive emotion (happiness), this unequal distribution suggests a tendency for dreams to more frequently express negative affective states.

A total of 110 negative emotions were identified in the participants' dream reports, of which 68 occurred in individuals with poor sleep quality, and 42 in those with good sleep quality. This pattern suggests that poor sleep quality may be associated with a greater presence of negative emotions in dreams. One possible explanation is the emotional desensitisation hypothesis, which posits that dreams reflect the reprocessing of negative waking experiences (Barbeau et al., 2022; Samson et al., 2023). However, when such negative emotions are too frequent or intense, they may contribute to a more negative perception of one's sleep. In other words, disturbing dream content may lead the individual to feel that their sleep was worse. Similarly, the Threat Simulation Theory proposes that dreams simulate threatening situations as a way of training the individual's response to such threats (Conte et al., 2020; Samson et al., 2023; Scarpelli et al., 2019b). While this function may be theoretically useful, excessively negative or distressing dreams may have the opposite effect: disrupting rest and reinforcing the feeling of poor sleep.

One limitation of this study was the timing of dream diary completion. As this did not occur at a uniform point in the academic year, some participants may have completed their diaries during periods of higher academic pressure (e.g. exam or assignment deadlines), while others did so during less demanding periods. This temporal discrepancy may have influenced the emotional state of the participants and, consequently, the content of their dreams. However,

this variable was not considered during data collection, and it would therefore be relevant for future research to explore the influence of academic and emotional context on dream content, by controlling the timing of data collection.

The results of this study indicated a statistically significant relationship between sleep quality and cognitive reappraisal, suggesting that better sleep quality is associated with a greater tendency to reinterpret situations cognitively. Reinterpreting situations involves mentally reframing an event to make it less negative, allowing the individual to assign new meaning to the experience. This process can reduce emotional distress, facilitate relaxation, and promote better sleep quality (Liu et al., 2023; McRae & Gross, 2020). Conversely, no significant association was found between sleep quality and expressive suppression. These findings are in line with those of Zamani et al. (2021), who also found no significant link between expressive suppression and sleep quality, suggesting that this strategy is not necessarily detrimental when used occasionally (Zamani et al., 2021).

However, since data collection was based on the Emotion Regulation Questionnaire, the analysis was limited to the two strategies assessed by this instrument: cognitive reappraisal and expressive suppression. Results showed that most students in the sample used both strategies at a moderate frequency, corresponding to intermediate levels of use. Future research could consider using a different instrument that includes a wider range of emotion regulation strategies, to gain a more comprehensive understanding of how university students regulate their emotions. This intermediate usage pattern is consistent with previous literature indicating that individuals, particularly in academic settings, do not rely on a single strategy but rather use a combination of them, adapting to the emotional demands of the moment (Battaglini et al., 2022). The moderate use of both cognitive reappraisal and expressive suppression suggests a degree of flexibility in how students manage their emotions, which may reflect a balanced response to academic and emotional pressures.

## 5. Conclusion

Almost half of the sample showed poor sleep quality, which is a concerning finding considering the impact that sleep can have on cognitive, emotional, and academic functioning. However, a positive association was found between sleep quality and cognitive reappraisal, suggesting that this strategy may be related to a more favourable perception of sleep. It was also observed that individuals with poor sleep quality were associated with a higher presence of negative emotions in their dreams, further reinforcing the link between an individual's emotional state and dream content. In the dreams of female participants, family figures, friendly interactions, and themes of misfortune and aggression were more frequently reported, aspects that may reflect the importance attributed to emotional bonds and a greater emotional sensitivity. In male participants, the presence of dreams in which the dreamer takes on the role of aggressor and themes related to sexuality stood out, which may be related to social norms as well as to the typical dynamics of this stage of life.

## Ethical Considerations

The study was approved by the Ethics Committee of the Polytechnic Institute of Castelo Branco and registered under the code 145/CE-IPCB/2024.

## Conflict of Interest

The research team declares no conflict of interest and confirms compliance with the principles of the Declaration of Helsinki.

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