Dream recall frequency and dream content in women

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Summary. In several large-scale studies, sex is related to the frequency of dream recall, on average, women tend to recall their dreams more often than men. Studies on EEG analysis and its correlation with dreams in women are scarce. We aimed to evaluate REM dreams´ recall frequency and content and their emotional characteristics in healthy young women. 20 young women adults', nonclinical volunteers, without any history pf psychoactive medication and psychiatric disorders performed two consecutive nights of complete Video-Polysomnography recording. REM awakenings dreams were collected, after 10 consecutive minutes of uninterrupted REM. For every dream described, we applied the Hall and Van Castle method of quantitative and systematic dream content analysis and compared to published normative Hall and Van Castle data. The differences of this Portuguese women group and normative USA data obtained in female college students concern mostly dreaming about family, with dead and imaginary characters, while having increased rates of failure and striving. The cultural influences are a possible explanation.

Keywords: Dream recall, Women, REM sleep, Hall and Van Castle norms, cultural influences

1. Introduction

Dream is a state of consciousness that occurs in a physiological condition (sleep) different than that in which it becomes available for investigation via its recall (Tribl et al., 2018)(Cipolli et al., 2017).

Studies on dream content reveal similarities between persons in relation to dream characters, emotions, interactions between dream characters, and events that are beneficial or harmful to the dreamer relatively independent of the dreamer's cultural background (Hall et al., 1982; William Domhoff & Schneider, 2008). Several studies have examined the way dreams reflect dreamers' culture (Kracke, 2012). The occurrence of dreams and the association with REM sleep are already well known and seems to be independent of culture, but their content, themes and style are determined both individually and culturally (Giora et al., 1972; Hall & Van de Castle, 1966; Tribl et al., 2018).

In several large-scale studies (Giambra et al., 1996; Pagel et al., 1995; Schredl, 2002; Schredl et al., 2003), sex is related to the frequency of dream recall; on average, women tend to recall their dreams more often than men (T. A. Nielsen, 2000; Schredl & Reinhard, 2008). Women also tend to report longer dreams, with a larger number of characters and also a higher dream recording frequency (Hall, C. S., & Van de Castle, 1966). Furthermore, there is increasing evidence that hormonal fluctuations during the menstrual cycle have an impact on dreams (Chellappa et al., 2012; Ilias et al., 2019; Schredl & Reinhard, 2008; Stickgold et al., 2000), therefore, in our study all participants were in the same phase of the menstrual cycle, the follicular phase, and all women were taking contraceptives.

Hall and Van de Castle published a content analysis of a large dream sample (N = 1000) (Hall & Van de Castle, 1966). Five dreams from each of 100 male and 100 female college students were used. Their major findings showed the following pattern: women's dreams contain more explicitly mentioned emotions, more dream characters, especially known dream characters and show a higher incidence of indoor settings, household objects and references to clothing, and men dream more often about physical aggression, sexuality and work (Schredl et al., 1998; Schredl & Reinhard, 2008). The differences found have been reinforced in subsequent studies.(Tore A. Nielsen et al., 2003; Schredl, 2003), and can be related to different socializations or different ways of being in waking life (Schredl & Reinhard, 2008)

The purpose of this study was to evaluate recall frequency and REM dreams content in women, evaluate their emotional characteristics and compare them with Hall and Van Castle female norms.

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Submitted for publication: March 2021
Accepted for publication: October 2021
DOI: 10.11588/ijodr.2021.2.80238

2. Method

2.1. Participants and Procedure

20 young healthy women were admitted in our study with mean age of 27,8 ±4,92 St Dev (min 20; max 36) with an average of 16,75±2,593 St Dev years of education.

All participants without any history pf psychoactive medication and psychiatric disorders who volunteered after seeing advertisements for this study. All participants took the contraceptive pill, and completed the following questionnaires, obtaining results below the cutoff values: Pittsburgh Questionnaire <5; Chronotype questionnaire> 14 <21; Epworth Sleepiness Scale <10; Beck Anxiety Scale <7; Beck depression scale <10. The studies were performed during the first 7 days of menstrual cycle. Informed consent was obtained from all participants for being included in the study and the study was approved by the Ethical Committee of

the Medical Faculty, University of Lisbon.

2.2. Experimental protocol

The volunteers underwent two consecutive nights of complete Video-Polysomnography (PSGs) recording which included: 19 electrodes of EEG (International System 10-20): Fp1, Fp2, F3, F4, F7, F8, T3, T4, T5, T6, P3, P4, O1, O2, Fz, Cz and Pz with reference to the electrodes earlobes placed on the earlobe (M1 and M2); 1 bipolar EMG channel with two electrodes placed in the chin muscles; 1 bipolar EOG channel with 2 electrodes placed 1.5 cm from the outer corner of each eye and diverted 0.5 cm up to the right and 0.5 cm down to the left and 1 video camera.

The signals were acquired in the Nicolet vEEG (version 5.20.1038). Polysomnographic variables were recorded with sampling frequency of 1000 Hz.

All volunteers performed the PSGs at the Center for Electroencephalography and Clinical Neurophysiology, Lda. (CENC), in Lisbon.

Before each night, volunteers were instructed that throughout the night, whenever they were in REM sleep, they would be awake to report their dreams. REM awakenings dreams were performed after 10 continuous minutes of uninterrupted REM (figure 1). The participants were asked to describe the dream with much detail as possible, what they were seeing, thinking, feeling, expressing; the characters, the places, the activities, as if a film or photograph were treated, as well as all the associated feelings (Bértolo et al., 2003). If they did not remember a dream, they should go back to sleep.

2.3. Dream analysis

After each awakening woman report their dreams and for every dream described, we applied the Hall and Van Castle (1966) method of quantitative and systematic dream content analysis (Domhoff & Schneider, 1999).

The Hall and Van Castle coding system is composed by eight general categories: characters, social interaction, activity, striving, misfortune/good fortune, emotions, settings, and objects. This system relies on nominal categories, searches for significant regularities in a written text, provides a replicable body of descriptive empirical findings of dream content and allows for control comparisons (Bentes et al., 2011).

The present sample was compared to published normative data provided by (Hall & Van de Castle, 1966).

Hall and Van de Castle classification system, scores all explicitly mentioned emotions experienced by the dream ego in five categories: anger, apprehension, happiness, sadness, and confusion. Dreams were then subdivided in different emotional content express positive dreams (with happiness mentioned), negative dreams (with elements of anger, apprehension, sadness or/and confusion) (Bentes et al., 2011).

Figure 1. Experimental Protocol

2.4. Statistical analysis

Frequencies and distribution of awakenings and dreams reports were compared in the two nights and according to time-in REM stage; early REM were considered the first two REMs and Late REM the remaining after the third episode. Mann-Whitney test was used. Results were considered significant for $p<0.05$.

Oneiric data: For content analysis, coding categories were computed in dreamSAT (Schneider, 1995). In this system, raw frequencies of Hall and Van Castle categories were analyzed using percentages and ratios to correct for the varying lengths of dream reports. Statistical analysis was based on frequencies and comparisons of percentages through the "h" statistic (Cohen), which uses an arcsine transformation calculated for the two samples to correct for the fact that standard deviations cannot be computed for data expressed in percentages (Hall, C. S., & Van de Castle, 1966).

3. Results

All subjects performed the study during the first days of the menstrual cycle with an average of 3,9±1,87 St Dev.

3.1. Dream Content

130 awakenings were performed, 3 of them spontaneous awakenings in NREM (volunteers were interviewed if they woke up to report a dream), these awakenings were excluded from the analysis. Of the 127 REM awakenings performed, 82.7% of volunteers did recall their dreams Resulting in 105 awakenings with dream report and 108 dreams (more than 1 dream per awakening in 3 subjects). On average, 5.4 ± 2.29 dreams per subject in the two nights were reported. An average of 6.5 awakenings were made for each individual.

We compared the percentages of awakenings with dreams of the two nights. In general, there was a slight in-

Table 1. Awakenings and successful dream recall frequency distribution in the 2 nights: Early REM and Late REM

	First Night			Second Night			
	Early REM	Late REM	Total	Early REM	Late REM	Total	p value
REM Awakenings (127)	36 (60,0%)	24 (40,0%)	60 (47,2%)	38 (56,7%)	29 (43,3%)	67 (52,8%)	N.S.
DreamsRecall (108)	31 (59,6%)	21 (40,4%)	52 (48,1%)	30 (53,6%)	26 (46,4%)	56 (51,9%)	N.S.

Wilcoxon Mann-Whitney test p>0,05 – N.S. not significant

crease in the number of awakenings on the second night, but with less dream recall, which was offset by the fact that 3 awakenings together had 6 dreams (2 dreams each).

Awakenings and successful dreams were organized according to Early REM (first and second awakening) and Late REM (from third awakening). There were not statistically differences in the number of awakenings (Wilcoxon test, p= 0,180) or the number of dreams recall (Wilcoxon test, p= 0,655) in the two nights. (see table 1)

108 dreams (Word count – Mean±St.Desv. 69,75±31,501; range sample 19-121) were analysed with Hall and Van Castle method (h Cohen statistic), and it was verified that the group of women of our study in comparison with the female norms (N=500 dreams- USA), had a smaller percentage of friendly characters (p = 0.004), a greater percentage of family characters (p < 0.001) and a higher percentage of dead and / or imaginary characters (p = 0.009); in relation to the aggressive interactions there was a higher percentage of dreams in which the dreamer is the aggressor (p = 0.032), with regard to the concepts about the self there is a lower percentage of bodily misfortunes (p = 0.017); a lower percentage of dreams with at least one element of aggression (p = 0.012), friendship (p < 0.001) and misfortune (p < 0.001), and a higher percentage with elements of failure (p = 0.001) and striving (p = 0.002). (see table 2)

Table 2. Differences in dream content between study group and female norms

	Study series	Female Norms	h vs. females	p vs. females	N for Study	N for Female Norms
Characters						
Male/Female Percent	43%	48%	-,11	,148	202	1054
Familiarity Percent	60%	58%	+,03	,666	308	1363
Friends Percent	28%	37%	-,18	** ,004	308	1363
Family Percent	31%	19%	+,26	** ,000	308	1363
Dead & Imaginary Percent	03%	01%	+,16	** ,009	326	1423
Animal Percent	06%	04%	+,06	,322	326	1423
Social Interaction Percents						
Aggression/Friendliness Percent	61%	51%	+,20	,154	59	530
Befriender Percent	47%	47%	-,01	,973	15	225
Aggressor Percent	53%	33%	+,42	* ,032	30	231
Physical Aggression Percent	23%	34%	-,24	,102	56	337
Social Interaction Ratios						
A/C Index	,17	,24	-,15		326	1423
F/C Index	,09	,22	-,31		326	1423
S/C Index	,02	,01	+,02		326	1423
Settings						
Indoor Setting Percent	63%	61%	+,03	,754	142	591
Familiar Setting Percent	82%	79%	+,08	,571	66	306
Self-Concept Percents						
Self-Negativity Percent	70%	66%	+,08	,523	63	865
Bodily Misfortunes Percent	11%	35%	-,59	* ,017	18	206
Dreamer-Involved Success Percent	30%	42%	-,26	,231	30	78
Torso/Anatomy Percent	24%	20%	+,11	,584	29	314
Dreams with at Least One:						
Aggression	31%	44%	-,27	* ,012	108	500
Friendliness	19%	42%	-,50	** ,000	108	500
Sexuality	03%	04%	-,05	,659	108	500
Misfortune	12%	33%	-,52	** ,000	108	500
Good Fortune	02%	06%	-,20	,054	108	500
Success	08%	08%	+,03	,798	108	500
Failure	22%	10%	+,34	** ,001	108	500
Striving	28%	15%	+,32	** ,002	108	500
Emotions						
Dreams emotion Percent	67%	80%	-,32	* ,025	57	420
Emotions dinv Percent	93%	80%	+,38	** ,007	57	420
Negative Emotions Percent	74%	80%	-,16	,251	57	420
Emotions dinv negative Percent	67%	80%	-,32	* ,025	57	420

Cohen's h statistic for differences in dream content between study group and female norms *p<0,05; **p<0,001

3.2. Emotions in Dreams

In what concerns emotions, with the Hall and Van Castle method we notice a lower percentage of dreams with described emotions (p= 0,025), a higher percentage of dreams with emotions related to the dreamer (p=0,007) and a lower percentage of negative emotions associated with the dreamer (p=0,025) (see table 3).

Analyzing only the negative and positive emotions described in the dream reports, we observed a significant increase in the identification of negative emotions. (see figure 2)

4. Discussion

The differences of this Portuguese women group and normative USA data concerns mostly with more dreams about family, more dead and imaginary characters, while having increased rates of failure and striving.

In our study, all the dreams were considered, and a minimum cut off number of words per report was not established. Most of the categories expressed in a dream report depend on the number of words (Hall, C. S., & Van de Castle, 1966); the characters, for example, tend to be more often known in small reports of 16 to 71 words (Kahn et al., 2000), therefore reports with fifty or more words provide more reliable results (Hobson et al., 2000).

Frequency and distribution of dreams were not different in the two nights or according with time-in REM stage; these findings disagree with other studies where variations in recall frequencies and complexity of reports were influenced by cycle (first night and second half of the night) (Cipolli et al., 2015; Foulkes & Schmidt, 1983), Our dreams did not differ in characteristics and emotions according to the time of night when they were collected.

As already described by Schredl (2003) waking life activities such as watching tv, writing, walking, can be reflected in dreams. The dreams of our sample were collected during a period of economic and financial crisis. The impact of this situation with high unemployment rates, increased taxes, and an indefinite future, with many participants students of higher education or with temporary jobs with little prospect of improvement or development, might explain dreams with more failure, striving and even the increase of family characters. In effect, one of the Portuguese characteristics is the family connectedness, familism or familismo, identified as an important feature of family life among Latino populations (Zeiders et al., 2016). Then, dreams during illness, family crisis, when loved ones die, or at times of cultural crisis, lead to a close tie between dreams and belief in a world of spirits. (Domhoff, 1996) This fact can justify the greater number of dead or imaginary characters. The women involved in the study, by definition, are not depressed (exclusion criterion) and since the study was carried out during an economic crisis, these data will have to be corroborated in another study on dreams social stress situations.

Another important aspect is related to the fact that our study focusses on a group of women, already in a study carried out by Cartwright (1992) women are slightly more likely to fail when they strive in dreams, and to be victims in aggressive interactions, compared to men (Cartwright, 1992); this seems to reflect way women face obstacles and difficulties, tending to place themselves more commonly in victim position than in the role of the “hero” who solves the problem or overcomes obstacles. (Cartwright, 1992)

Emotional experiences in dreams are common and often intense and negatively toned (Desseilles et al., 2011; Hefez et al., 1987; Merrit et al., 1994; Schredl & Doll, 1998). With Hall and Van Castle coding system, only emotions that are expressed are encoded and not the implicit ones. In our sample, emotions are predominantly represented by negative emotions. This also happens with negative events (being a victim of aggression, being a victim of harmful fortuitous events, not being successful in trying to overcome obstacles).

This contrasts even more when in the Hall and Van Castle dream content analysis, only 20% of the emotions described were positive. (Hall & Van de Castle, 1966). This fact also meets findings of previous studies (Desseilles et al., 2011; Hefez et al., 1987) but can be associated with the economic and financial situation, or represent a trait of subject´s personalities/neuroticism and their cultural context (Dijk, 2012; Kemp et al., 2017; Malinowski, 2015; Stickgold et al., 2000). Portuguese´s have a close relation with melancholic feelings, typically described as saudade or saudosism, (Tribl et al., 2018) and with pessimism that are perpetuated from generation to generation. Portugal is always in positions of high rates of pessimism, on Eurostats barometers, and low positive mental health scores. (Eurostats Baromethrs reports 2016, 2018). With this we want to evidence the close connection with more melancholic feelings that can stress the importance given to the description of negative emotions.

Differences in dream content may also be related to the type of memory involved in dream recall. Dreams collected from female norms resulted from dream diaries (Hall & Van de Castle, 1966). Sleep interruption is the most direct method and appears to primarily depend upon short-term memory and episodic information and diaries require long-term memory of the previous night (Giambra et al., 1996). Furthermore, episodic information can be activated and processed not only over the following night but also up to 5-7nights later(Malinowski & Horton, 2014; Tore A. Nielsen et al., 2004) Another aspect is related with sleep stage,

Table 3. Emotions analysed with Hall and Van Castle method

Category	**Emotions Hall and Van Castle analysis**			
	Women Sample	Female Norms	Statistic h cohen	p value
Dreams emotion %	67%	80%	-,32	* ,025
Emotions dreamer involved %	93%	80%	+,38	** ,007
Negative Emotions %	74%	80%	-,16	,251
Emotion’s dreamer involved negative %	67%	80%	-,32	* ,025

Cohen’s h statistic for differences in dream content between study group and female norms *p<0,05; **p<0,001

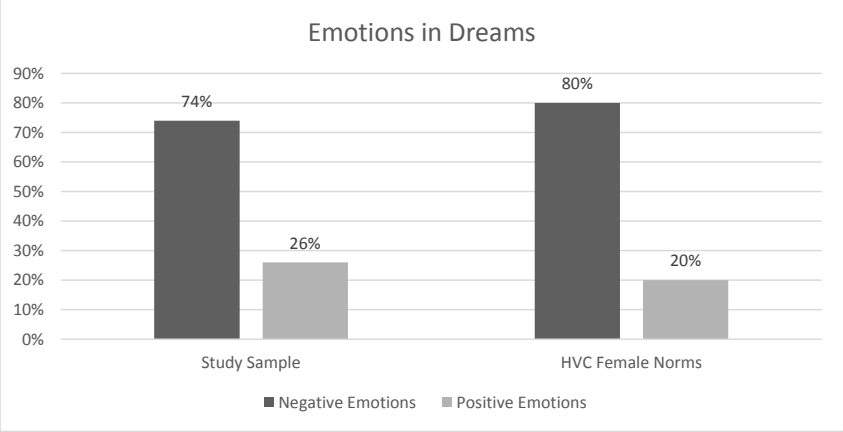

Figure 1. Descriptive analysis of positive and negative emotions in both groups: study sample and Hall and Van Castle female norms.

dreams collected from dream diaries may originate from REM or NREM sleep. Cognitive processes underlying functions of memory consolidations and emotional adaptation occurs during both NREM and REM sleep but with some differences. (Blagrove et al., 2011). In NREM, dreams are shorter, less visual, and vivid, more controlled and, often, a reflection of everyday life or biographical analyzes(Blagrove et al., 2011; Cipolli et al., 2015; Llewellyn, 2013; T. Nielsen et al., 2005). While in REM, are long, bizarre, intense, hallucinatory, very emotional (Corsi-Cabrera et al., 2003) Dreams occur in all stages and cycles but their contents result from the processing of several memory sources and also depend on memory consolidation during sleep(Llewellyn, 2013; Malinowski, 2015)

Describing culture implies a certain complexity; seems to be a possible association between dream content and cultural characteristics, (Tribl et al., 2018) however this association is difficult to prove due to the intrinsic difficulty of conducting experimental studies.

5. Limitations and Future Direction

This study has some limitations especially regarding to our small sample size. In relation to dream analysis, we do not limit dream reports with a minimum number of words. Moreover, it should be noted that the sample were not representative of Portuguese population and subjects were selected trough personal contacts and from a specific group of people.

6. Conclusion

Frequency and distribution of dreams were not different in the two nights or according with time-in REM stage, and emotions are predominantly represented by negative tones.

Complementary investigation should be interesting to perform to extend our findings. In future studies, larger samples with different dream types (diary dreams, last dream remembered and laboratory dreams) and considering the possible relation between dream contents and their cultural and social contexts, may allow a more precise analysis.

Acknowledgement

Funding: R/A-Cr 107/2010 de 28-07-2010. Doctoral Program Biomedical Science (CAML) by Prof Dr. Teresa Paiva

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