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CHRONOREXIA AND ORTHOSOMNIA: TOWARDS THE DEVELOPMENT OF SCALES TO MEASURE UNHEALTHY OBSESSIONS WITH SLEEP

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Introduction: In 2015 Van den Bulck warned that commercially available wearable sleep monitors might lead to an unhealthy obsession with healthy sleep and referred to it as "Chronorexia". In 2017 Glazer Baron et al. documented cases of patients who presented with such an obsession, which they referred to as "Orthosomnia". Both terms were inspired by earlier work on anorexia and orthorexia. This paper argues that there are two concepts that can be linked to those two terms and will use **Orthosomnia** to refer to an *obsession with healthy sleep* and **Chronorexia** for the belief that *one does (and should) not need a lot of sleep*. Two measurement scales are presented for examining these concepts in questionnaire form.
Materials and Methods: 500 adults 18 and older took part in an online survey. Chronorexia and Orthosomnia were assessed with a battery of 22 questions for each concept. The questionnaire included the FAS, CIRENS, PSQI, pre-sleep arousal, Shuteye Latency, social jetlag, and the Big 5 personality traits.
Results: Chronbach's Alpha was high for the Chronorexia (alpha=93.8) and the Orthosomnia (alpha=92.9) scale, and both showed normal distributions. Both scales, while orthogonal, correlate with lower levels of self-control, higher levels of fatigue, and higher levels of negative arousal. Neither was strongly related to chronotype. There were notable differences in subscales. Orthosomnia correlated with a much higher reporting of not being able to sleep in under 30 minutes, of waking up during the night, and of using sleep medication, while Chronorexia correlated with lower self-rated sleep quality.
Conclusions: Both concepts showed good internal and external validity. They were orthogonal, so they clearly refer to different phenomena. Surprisingly, perhaps, both concepts had similar relationships with several negative sleep outcomes, supporting the idea that both, indeed, are unhealthy beliefs about sleep. While further research is needed, the extent to which either belief predicts outcomes in a clinical setting, or seeking medical attention is an interesting avenue for examining the predictive use of these scales.

DETECTING CLINICALLY SIGNIFICANT DEPRESSIVE BURDEN IN SLEEP CLINICS THROUGH PHYSIOLOGICAL PARAMETERS: PRELIMINARY DATA AS TO SLEEP STAGES AND HEART RATE

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Introduction: Due to the powerful link between sleep and mood regulation, sleep architecture imbalance may lead to an emergence of depressive symptoms. Moreover, the presence of a depressive condition frequently involves subjective and objective sleep disturbance.
In addition to sleep disorders, mood states have been associated with cardiovascular functioning and regulation modifications, revealing an increased heart rate (HR) and a diminished heart rate variability during low mood states, stronger under conditions of sleep.
In this brief report, we present preliminary data from our ongoing clinical study, designed to develop medically graded software device based on a machine learning algorithm used to aid in identifying a clinically significant burden of depressive symptoms (CDB) in individuals referred to sleep clinics (SCs) for polysomnography (PSG) assessment.
These preliminary analyses aimed to compare sleep stages and HR between subjects with and without CDB (+CDB, -CDB respectively) to identify those physiological parameters able to discriminate between the two groups.
Materials and Methods: Cross-sectional, observational, single-arm, multicenter study conducted in 2 SCs in the United States.

Inclusion criteria: 1) age $\geq$18 and $\leq$75 years, 2) informed consent, 3) ability to read and understand the instructions for the study, 4) willingness to undergo a *full night PSG study*. *Exclusion criteria*: subject 1) has a pacemaker, 2) suspected or known current alcohol/drug abuse.
CBD was defined through the Patient Health Questionnaire 9 (PHQ9, 9 items) at the cut-point score of $\geq$ 10.
For descriptives, continuous and categorical variables were compared between the two groups by T-Test and Chi-square tests, respectively. Multivariate analysis of variance was applied to HR and sleep stages, with age, number of psychotropic medications, and current cardiac diseases as covariates. The significance level was 0.05.
Results: 128 subjects (83 -CDB and 45 +CDB) referred to two SCs in the United States were consecutively recruited and analyzed.
The two groups did not differ in the distribution of gender, BMI, diagnosed sleep-wake disorders, and physical activity on regular basis. They significantly differ in age (-CDB >+CDB), current psychotropic medications and number of clinician-diagnosed current anxiety, major depressive and bipolar disorders (+CDB>-CDB), current cardiac diseases (-CDB >+CDB).
Compared to subjects -CDB, subjects +CDB showed statistically significant: higher HR in deep (N3) and REM sleep stages, higher number of cortical arousals in N3, and increased time spent in N3 and REM, associated with an early onset of REM.
Conclusions: Despite the small sample size, we found preliminary indications suggesting an unbalanced autonomic control on cardiac function during sleep in +CBD subjects, reflecting increased sympathetic activity in +CDB subjects. Moreover, +CDB patients present an alteration of sleep architecture, as reported consistently in the literature.
On these bases, optimizing the use of PSG data routinely collected in sleep clinics may be of great importance to identify a CDB in this setting, minimizing the chances of misdiagnosis, and foster appropriate and individualized therapeutic strategy.
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DISTRESSING NIGHTMARES AND BAD DREAMS DURING THE COVID-19 PANDEMIC ARE ASSOCIATED WITH DEPRESSIVE SYMPTOMS, SOMATIC SYMPTOMS, AND DELUSIONAL IDEATION

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Introduction. Distress associated with bad dreams and nightmares is a commonly used measure to assess psychological impact of dysphoric or intensified dreaming. It has previously been associated with negative mental health outcomes, including depression, anxiety, and suicidality. Recent theories of nightmare-formation propose an interaction between environmental stressors and individual psychological/physical reactivity as factors in the etiology of nightmares and bad dreams. Numerous studies have documented a marked increase in frequency of bad dreams and nightmares during the pandemic, but little is known about factors associated with this trend. Sub-clinical delusional ideation is increasingly of interest, since it represents forms of distorted or intensified cognition in non-clinical populations and is likely reactive to a variety of stressors. Somatic symptoms (SS) are another marker of stress, which is expressed through unusual or increased non-specific bodily symptomatology. The objectives of the present study were to investigate the relationship between nightmare/bad dream distress and different markers of psychological distress during the COVID-19 pandemic: depressive symptoms, delusional ideation, and somatic symptoms.
Materials and Methods 1516 participants (Canada=634, Mexico=378, USA=315, UK=54, other countries=135; female=976, male=477, other/no answer=63; average age=34.8, s.d.=12.9, range=16-83) completed an online questionnaire between June 17, 2020 and March 24, 2021.

Nightmare/bad dream distress was assessed using a 5-point Likert-type scale. Depressive and delusional symptoms were assessed using the Community Assessment of Psychic Experiences (CAPE) questionnaire. This instrument quantifies three aspects associated with the psychotic continuum: depressive, positive (delusional) and negative (anhedonia and others) symptoms. Somatic symptoms were assessed using the Somatic Symptom Scale-8 (SSS-8).

Results. A forward stepwise linear regression analysis revealed that nightmare/bad dream distress was associated with depressive symptoms CAPE score, somatic symptoms and positive/delusional symptoms CAPE score (F (3,1509)=67.87, p<.001, R^2_{adj}=.117).

Conclusions. Nightmare and bad dreams distress during the COVID-19 pandemic was most strongly associated with the depressive dimension of CAPE, followed by somatic symptoms and by delusional ideation. The relationship between nightmares and depressive symptoms was expected and is well-documented. However, this is the first study to date showing a relationship between delusional ideation and nightmare/bad dream distress outside of a clinical context, suggesting a potentially generalizable mechanism by which cognitive and perceptual distortions associated with mild levels of delusional thinking may contribute to a more global levels of psychological distress, which, in turn, may express itself in bad dreams and nightmares. This association can become even more prevalent in the context of a high stress situation such as a global pandemic. Lastly, a strong association between somatic symptoms and nightmare/bad dream distress lends further support to embodied theories of dream formation, highlighting the contribution of bodily experiences to dreamt emotions. This work provides further evidence for an interaction between psychological, environmental, and physiological stress reactivity in the development of dysphoric dreams.

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DO LARKS AND OWLS FEEL BETTER AT THEIR OPTIMAL TIMES OF DAY? AN EXPLORATORY STUDY IN PRIMARY SCHOOL CHILDREN

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Introduction: In circadian rhythms research, synchrony effects regarding mood diurnal fluctuations (i.e., better mood at optimal, worse mood at suboptimal times of day) have been previously studied in adolescents and adults, with only a handful of studies finding evidence of chronotype X time-of-day effects. At the same time, evidence regarding synchrony effects in children emotional states is lacking. This study investigated the interactive/synchrony effect of chronotype and time-of-day on school-aged children's emotional states daily fluctuations, in a naturalistic setting.

Materials and Methods: From an initial pool of 298 participants from the 3rd and 4th grades, aged from 7 to 11 years old, 134 Morning-type (M-type) and Evening-type (E-type) children were selected for subsequent statistical analysis (n=52 M-types; n=82 E-types; 53% girls, 47% boys, M =8.84 years-old, SD =.60). Parents/guardians filled the Children's Chronotype Questionnaire (CCTQ) to assess children's chronotype. In order to control sleep patterns, and psychopathological symptoms, parents/guardians also filled the Child Sleep-Waking Questionnaire (CSWQ) and the Strengths and Difficulties Questionnaire (SDQ). Students completed momentary emotional state measures [i.e., Faces Scale (FS), the State scale of the State-Trait Anxiety Inventory for Children (STAIC), and the Positive and Negative Affect Scale for Children (EAPNC)] on the first (9 a.m.) and last lesson (4 p.m.) of the school day, either on the same or in consecutive weekdays, counterbalanced to avoid carry over effects. These interrelated measures were used to determine a composite measure of overall momentary emotional state.

Results: The results showed a statistically significant small to moderate interactive effect between chronotype and time-of-day on overall emotional state [F (1,127) = 4.83, p = .03, $\eta\rho 2$ = .05]. If tested at their optimal time-of-day, M- and E-type children reported a better overall momentary emotional state (i.e., morning for M-types, afternoon for E-types) when compared to a suboptimal time-of-day (i.e., morning for E-types, afternoon for M-types). Main effects of chronotype and time-of-day were both non-significant. No significant associations were found between the composite measure of overall momentary emotional state, sleep patterns and psychopathological symptoms.

Conclusions: The present study have explored the influence of chronotype and time-of-day in primary school children's diurnal emotional experience in a real-life setting, and have identified the presence of a synchrony effect in M- and E-type school-aged children's overall emotional experience. Given the potential relevance of emotional states in subjective well-being, these emotional state fluctuations might differently impact M- and E-type children's daily functioning while engaging in school activities. Future research employing more assessment points and larger samples is needed.

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DREAM EMOTION RECOGNITION THROUGH EEG NONLINEAR ANALYSIS

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Introduction: Dreams are exciting unknown experiences which happen every night and are full of emotional content. Emotion recognition during dreaming plays a crucial role in the diagnosis and treatment of psychological disorders such as post-trauma-stress-disorder (PTSD), depression, anxiety, etc. Dream content analysis is challenging since one should deal with long biological signal recordings and also subjective dream reports. This could be one of the most important reasons why researchers have not focused on this topic to a large extent which has consequently resulted in our knowledge about dreaming being limited.

Materials and Methods: In this study, a novel method is proposed to process high-density EEG signals in dreaming. Since the brain is assumed as a nonlinear non-stationary complex biological system, nonlinear methods should be utilized to extract reliable information. In the present study, we suggested a new approach to dream emotion recognition using complex networks. Our proposed complex network is reconstructed with regard to EEG phase space which reflects EEG dynamics appropriately and has been used in several previous studies. We used the graph theory and statistical features to quantitatively describe our proposed EEG complex network. Extracted features are selected using statistical analysis and the most significant ones are fed to our classification models where well-known classifiers have been employed. EEG signals during dreaming are classified into four emotional states according to the continuous model of emotions or in other words the arousal-valence plane of emotions.

Results: The classification performance (on average) was 82.69% (with a standard deviation of 3.57%). The most significant channels and brain regions in each emotional state are determined as frontal, occipital, and central lobes. Not only did our proposed complex network classify EEG signals into four emotional classes efficiently, but also it was able to describe different dynamics in other complex signals.

Conclusions: We managed to associate EEG dynamics with emotions in dreams. To the best of our knowledge, no study has employed computational neuroscientific methods to classify dream emotions. Our results suggest that the proposed method is quite effective and can be used in