

Journal Scan

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1. *Curr Health Sci J. 2014 Jul-Sep;40(3):195-9.*

Study of school fatigue on a group of teenagers studying at "dimitrie cantemir" highschool, iasi.

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Purpose: Fatigue is a physiological phenomenon which is permanently present at students because of the scholar demands. Excessive demands can cause pathological fatigue phenomenon, which should be avoided. Subjects and method. The study included a group of 203 students from Dimitrie Cantemir Highschool in Iasi. The teenagers were questioned about the presence of the fatigue phenomenon.

Results: Fatigue is rarely present at 62.6% of the questioned students. During the week, this phenomenon appears especially at the beginning (22.2%) or in the middle of the week (34.5%). In a few cases it appears at the end of the week, as it should. Night sleep is only of 6-7 hours (37.4%) or 7-8 hours (36.9%), which is not enough. The insufficient number of sleeping hours can be paid by day sleep, but most of the responses are "rarely" (50.7%). Active rest is represented by sport or other activities of choice. Sport is the only less attractive option - in most cases children allocate only 15-30 minutes a day for it (33.5%). They stay in front of the TV between 0.5 and 1 hour (42.9%) and of the computer between 2-3 hours (44.3%) daily. Conclusions. Children's daily schedule isn't balanced, so the risk of excessive fatigue really exists.

2. *Appl Cogn Psychol. 2014 September-October; 28(5):626-633.*

Mediators of the relationship between life events and memory functioning in a community sample of adults.

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The present study examines the association of frequency and severity of life events with memory functioning in a community sample of adults. We tested the hypothesis that stress-related cognitive interference mediated the effects of recent life events on cognition, in addition to examining the potential roles of fatigue, sleep disturbances, and depression. The sample consisted of 310 adults (age range 19-83) who received a battery of cognitive tests assessing their primary memory, episodic memory, and working memory. Individuals rated how stressful previous life events were when they occurred, as well as how stressful the events were for them currently. Ratings of current, but not past severity were negatively associated with working memory

performance. Both stress-related cognitive interference and depressive symptoms independently mediated this association. These findings highlight the importance of intrusive and avoidant thinking as a potential focus of psychosocial treatment for remediating stress-related memory dysfunction.

3. *Biol Sport*. 2014 Dec;31(4):303-8.

Changes in physiological tremor resulting from sleep deprivation under conditions of increasing fatigue during prolonged military training.

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The aim of the study was to define the changes of the characteristics of physiological postural tremor under conditions of increasing fatigue and lack of sleep during prolonged military training (survival). The subjects of the study were 15 students of the Polish Air Force Academy in Dęblin. The average age was 19.9 ± 1.3 years. During the 36-hour-long continuous military training (survival) the subjects were deprived of sleep. Four tremor measurements were carried out for each of the subjects: Day 1 - morning, after rest (measurement 0); Day 2 - morning, after overnight physical exercise (measurement 1); afternoon, after continuous sleep deprivation (measurement 2); Day 3 - morning, after a full night sleep (measurement 3). The accelerometric method using an acceleration measuring kit was applied to analyse tremor. A significant difference between mean values of the index evaluating tremor power in low frequencies L2-4 in measurement 0 and measurement 3 was observed ($p < 0.01$). No significant differences were found in mean values of index L10-20. Mean frequencies F2-4 differed significantly from each other ($F_{2,42} = 4.53$; $p < 0.01$). Their values were 2.94 ± 0.11 , 2.99 ± 0.9 , 2.93 ± 0.07 and 2.91 ± 0.07 for successive measurements. A gradual, significant decrease of F8-14 was observed ($F_{2,42} = 5.143$;

$p < 0.01$). Prolonged sleep deprivation combined with performing tasks demanding constant physical effort causes long-lasting (over 24 hours) changes of the amplitude of low-frequency tremor changes. This phenomenon may significantly influence psychomotor performance, deteriorating the ability to perform tasks requiring movement precision.

4. *Pulm Med*. 2014;2014:467576.

Sleep disordered breathing in children with mitochondrial disease.

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A retrospective chart review study was performed to determine the presence of sleep disordered breathing (SDB) in children with primary mitochondrial disease (MD). The symptoms, sleep-related breathing, and movement abnormalities are described for 18 subjects (ages 1.5 to 18 years, 61% male) with MD who underwent polysomnography in our pediatric sleep center from 2007 to 2012. Of the 18 subjects with MD, the common indications for polysomnography were excessive somnolence or fatigue (61%, $N = 11$), snoring (44%, $N = 8$), and sleep movement complaints (17%, $N = 3$). Polysomnographic measurements showed SDB in 56% ($N = 10$) (obstructive sleep apnea in 60% ($N = 6$), hypoxemia in 40% ($N = 4$), and sleep hypoventilation in 20% ($N = 2$)). There was a significant association between decreased muscle tone and SDB ($P = 0.043$) as well as obese and overweight status with SDB ($P = 0.036$). SDB is common in subjects with MD. Early detection of SDB, utilizing polysomnography, should be considered to assist in identification of MD patients who may benefit from sleep-related interventions.

5. *BMC Med Educ.* 2014;14 Suppl 1:S2.

Delinking resident duty hours from patient safety.

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Patient safety is a powerful motivating force for change in modern medicine, and is often cited as a rationale for reducing resident duty hours. However, current data suggest that resident duty hours are not significantly linked to important patient outcomes. We performed a narrative review and identified four potential explanations for these findings. First, we question the relevance of resident fatigue in the creation of harmful errors. Second, we discuss factors, including workload, experience, and individual characteristics, that may be more important determinants of resident fatigue than are duty hours. Third, we describe potential adverse effects that may arise from-and, therefore, counterbalance any potential benefits of-duty hour reductions. Fourth, we explore factors that may mitigate any risks to patient safety associated with using the services of resident trainees. In summary, it may be inappropriate to justify a reduction in working hours on the grounds of a presumed linkage between patient safety and resident duty hours. Better understanding of resident-related factors associated with patient safety will be essential if improvements in important patient safety outcomes are to be realized through resident-focused strategies.

6. *BMC Med Educ.* 2014;14 Suppl 1:S9.

Resident duty hours in Canada: a survey and national statement.

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Physicians in general, and residents in particular, are adapting to duty schedules in which they have fewer continuous work hours; however, there are no Canadian guidelines on duty hours restrictions. To better inform resident duty hour policy in Canada, we set out to prepare a set of recommendations that would draw upon evidence reported in the literature and reflect the experiences of resident members of the Canadian Association of

Internes and Residents (CAIR). A survey was prepared and distributed electronically to all resident members of CAIR. A total of 1796 eligible residents participated in the survey. Of those who responded, 38% (601) reported that they felt they could safely provide care for up to 16 continuous hours, and 20% (315) said that 12 continuous hours was the maximum period during which they could safely provide care (n=1592). Eighty-two percent (1316) reported their perception that the quality of care they had provided suffered because of the number of consecutive hours worked (n=1598). Only 52% (830) had received training in handover (n=1594); those who had received such training reported that it was commonly provided through informal modelling. On the basis of these data and the existing literature, CAIR recommends that resident duty hours be managed in a way that does not endanger the health of residents or patients; does not impair education; is flexible; and does not violate ethical or legal standards. Further, residents should be formally trained in handover skills and alternative duty hour models.

7. *BMC Med Educ.* 2014;14 Suppl 1:S3.

Managing and mitigating fatigue in the era of changing resident duty hours.

Puddester D.

The medical establishment is grappling with the complex issue of duty hour regulations - an issue that is a natural consequence of the numerous changes in medical culture and practice that have occurred over the course of decades. Sleep deprivation resulting from long duty hours has a recognized impact on resident health and wellness. This paper will briefly outline the evolution of the concept of well-being in residency, review the specific theme of fatigue management within that context, and describe strategies that may be used to mitigate and manage fatigue, as well as approaches that may be taken to adapt to new scheduling models such as night float. Finally, the paper will call for a change in the culture in our workplaces and among our residents and faculty to one that promotes good health and ensures that we maintain a fit and sustainable medical workforce.

8. *World J Clin Cases*. 2014 Dec 16;2(12):828-34.

Sleep disordered breathing in interstitial lung disease: A review.

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Patients with interstitial lung disease commonly exhibit abnormal sleep architecture and increased sleep fragmentation on polysomnography. Fatigue is a frequent complaint, and it is likely that poor sleep quality is a significant contributor. A number of studies have shown that sleep disordered breathing is prevalent in this population, particularly in the idiopathic pulmonary fibrosis subgroup. The factors that predispose these patients to obstructive sleep apnoea are not well understood, however it is believed that reduced caudal traction on the upper airway can enhance collapsibility. Ventilatory control system instability may also be an important factor, particularly in those with increased chemo-responsiveness, and in hypoxic conditions. Transient, repetitive nocturnal oxygen desaturation is frequently observed in interstitial lung disease, both with and without associated obstructive apnoeas. There is increasing evidence that sleep-desaturation is associated with increased mortality, and may be important in the pathogenesis of pulmonary hypertension in this population.

9. *Saf Health Work*. 2014 Dec;5(4):203-9.

Psychological distress and pain reporting in Australian coal miners.

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BACKGROUND: Coal mining is of significant economic importance to the Australian economy. Despite this fact, the related workforce is subjected to a number of psychosocial risks and musculoskeletal injury,

and various psychological disorders are common among this population group. Because only limited research has been conducted in this population group, we sought to examine the relationship between physical (pain) and psychological (distress) factors, as well as the effects of various demographic, lifestyle, and fatigue indicators on this relationship.

METHODS: Coal miners (N = 231) participated in a survey of musculoskeletal pain and distress on-site during their work shifts. Participants also provided demographic information (job type, age, experience in the industry, and body mass index) and responded to questions about exercise and sleep quality (on-and off-shift) as well as physical and mental tiredness after work.

RESULTS: A total of 177 workers (80.5%) reported experiencing pain in at least one region of their body. The majority of the sample population (61.9%) was classified as having low-level distress, 28.4% had scores indicating mild to moderate distress, and 9.6% had scores indicating high levels of distress. Both number of pain regions and job type (being an operator) significantly predicted distress. Higher distress score was also associated with greater absenteeism in workers who reported lower back pain. In addition, perceived sleep quality during work periods partially mediated the relationship between pain and distress.

CONCLUSION: The study findings support the existence of widespread musculoskeletal pain among the coal-mining workforce, and this pain is associated with increased psychological distress. Operators (truck drivers) and workers reporting poor sleep quality during work periods are most likely to report increased distress, which highlights the importance of supporting the mining workforce for sustained productivity.

10. *Aviat Space Environ Med*. 2014 Dec;85(12):1177-84.

Comparison of in-flight measures with predictions of a bio-mathematical fatigue model.

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INTRODUCTION: Bio-mathematical models are increasingly used for predicting fatigue in airline

operations, and have been proposed as a possible component of fatigue risk management systems (FRMS). There is a need to continue to evaluate fatigue models against data collected from crews conducting commercial flight operations.

METHODS: A comparison was made between several in-flight studies of pilot fatigue, conducted over a 10-yr period on a variety of operations, and the predictions of a widely used bio-mathematical model, the System for Aircrew Fatigue Evaluation (SAFE). The in-flight studies collected a variety of subjective ratings as well as reaction time on a performance task.

RESULTS: Overall correlation between observed and predicted fatigue was stronger for subjective fatigue than reaction time. More detailed analysis on selected studies shows discrepancies between predicted and observed fatigue, which may be explained by a variety of confounders. Closer analysis of the duty time, time of day, and schedule length show discrepancies of up to 15% between observed and predicted fatigue.

DISCUSSION: This study provides comparison between the predictions of one bio-mathematical model, SAFE, and observed fatigue measures across a number of operations. Possible causes of discrepancies are discussed. There is potential for more comparison studies of this type with the various available models.

11. *Aviat Space Environ Med.* 2014 Dec;85(12):1199-208.

Mitigating and monitoring flight crew fatigue on a westward ultra-long-range flight.

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BACKGROUND: This study examined the uptake and effectiveness of fatigue mitigation guidance material including sleep recommendations for a trip with a westward ultra-long-range flight and return long-range flight.

METHODS: There were 52 flight crew (4-pilot crews, mean age 55 yr) who completed a sleep/ duty diary and wore an actigraph prior to, during, and after the trip.

Primary crew flew the takeoff and landing, while relief crew flew the aircraft during the Primary crew's breaks. At key times in flight, crew members rated their fatigue (Samn-Perelli fatigue scale) and sleepiness (Karolinska Sleepiness Scale) and completed a 5-min Psychomotor Vigilance Task.

RESULTS: Napping was common prior to the outbound flight (54%) and did not affect the quantity or quality of in-flight sleep (mean 4.3 h). Primary crew obtained a similar amount on the inbound flight (mean 4.0 h), but Secondary crew had less sleep (mean 2.9 h). Subjective fatigue and sleepiness increased and performance slowed across flights. Performance was faster on the outbound than inbound flight. On both flights, Primary crew were less fatigued and sleepy than Secondary crew, particularly at top of descent and after landing. Crewmembers slept more frequently and had more sleep in the first 24 h of the layover than the last, and had shifted their main sleep to the local night by the second night.

DISCUSSION: The suggested sleep mitigations were employed by the majority of crewmembers. Fatigue levels were no worse on the outbound ultra-long-range flight than on the return long-range flight.

12. *Int Marit Health.* 2014;65(3):166-72.

A review of fatigue in fishermen: a complicated and underprioritised area of research.

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BACKGROUND: Fatigue in fishing has been a highly underprioritised area of research, even though fatigue has been found to be the largest single contributing factor in accidents.

AIM: The aim of this article/paper is to provide an overview of the research conducted on fatigue in fishermen up to date, in order to establish a starting point for further research in this area.

MATERIALS AND METHODS: The review is mainly

based on journal articles from PubMed, Google Scholar, International Maritime Health, Science Direct and some relevant articles links were also followed.

RESULTS: The research revealed that only 5 articles have been published concerning fatigue in fishermen. The articles all confirmed that fatigue is a serious health and safety issue among fishermen, and that further research therefore is warranted.

CONCLUSIONS: Only 2 of the 5 studies of fishermen's fatigue used objective measures and in one of these, the sample size was small ($n = 19$), effectively limiting the statistical analysis and its application. Further research using larger samples is needed, preferably with a mix of objective and subjective measures, where of some of the questions should be scenario based and some should be from standardised questionnaires. Greater understanding is also needed to assess how much of the variance in fatigue is attributable to e.g. length of trip, hours of work without rest, and type of job and specific tasks. A greater understanding of the similarities and differences between acute and long-term fatigue is also needed.

13. *J Clin Neurophysiol.* 2014 Dec;31(6):517-22.

Sleep profile in opioid dependence: a polysomnographic case-control study.

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PURPOSE: Many opioid receptors are located in the same nuclei that are active in sleep regulation. It has been suggested that opioid peptides are involved in the induction of the sleep state. Prolonged opioid use has been hypothesized to cause disturbed sleep. It also causes excessive daytime sleepiness and fatigue. This study was conducted to compare the polysomnographic sleep profile of patients with opioid dependence with normal matched controls and to see the correlation between various clinical profiles of patients with opioid dependence with their polysomnographic sleep profile.

METHODS: Fifteen opioid-dependent male patients were selected, and after the detoxification procedure, the patients were assessed using Objective Opioid Withdrawal Scale, Obsessive Compulsive Drug Use Scale, Hamilton Rating Scale for Depression, Hamilton Anxiety Rating Scale, and Global Assessment of Functioning.

Fifteen healthy volunteers matched for age, education, and handedness were taken as controls and were assessed using Epworth sleepiness scale and General Health Questionnaire-12. All night polysomnography recording was done on patient and control group, and staging of sleep was done.

RESULTS: Patients had significantly decreased total sleep time, sleep efficiency and stage N1 sleep, prolonged sleep latency, and increased limb movement index. No significant correlation was found between sleep profile and various clinical variables.

CONCLUSIONS: Use of opioids cause sleep disturbance, and these changes occurring in sleep can persist even after substance use has been stopped. Opioids seem to affect non-rapid eye movement stages of sleep.

14. *PLoS One.* 2014 Nov 18;9(11):e113376.

Evaluation of the visual analog score (VAS) to assess acute mountain sickness (AMS) in a hypobaric chamber.

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Education), Third Military Medical University, Chongqing, PR China.

OBJECTIVE: The visual analog score (VAS) is widely used in clinical medicine to evaluate the severity of subjective symptoms. There is substantial literature on the application of the VAS in medicine, especially in measuring pain, nausea, fatigue, and sleep quality. Hypobaric chambers are utilized to test and exercise the anaerobic endurance of athletes. To this end, we evaluated the degree of AMS using the visual analog scale (VAS) in a hypobaric chamber in which the equivalent altitude was increased from 300 to 3500 m.

METHODS: We observed 32 healthy young men in the hypobaric chamber (Guizhou, China) and increased the altitude from 300 to 3500 m. During the five hours of testing, we measured the resting blood oxygen saturation (SaO₂) and heart rate (HR). Using the VAS, we recorded the subjects' ratings of their AMS symptom intensity that occurred throughout the phase of increasing altitude at 300 m, 1500 m, 2000 m, 2500 m, 3000 m, and 3500 m.

RESULTS: During the phase of increasing altitude in the hypobaric chamber, the patients' SaO₂ was $96.8 \pm 0.8\%$ at 300 m and $87.5 \pm 4.1\%$ at 3500 m ($P < 0.05$) and their HR was 79.0 ± 8.0 beats/minute at 300 m and 79.3 ± 11.3 beats/minute at 3500 m. The incidence of symptoms significantly increased from 21.9% at an altitude of 1000 m to 65.6% at an altitude of 3500 m ($P < 0.05$). The composite VAS score, which rated the occurrence of four symptoms (headache, dizziness, fatigue, and gastrointestinal discomfort), was significantly correlated with elevation ($P < 0.01$).

CONCLUSION: Based on the experimental data, the VAS can be used as an auxiliary diagnostic method of Lake Louise score to evaluate AMS and can show the changing severity of symptoms during the process of increased elevation in a hypobaric chamber; it also reflects a significant correlation with altitude.

15. *J Med Food*. 2014 Dec;17(12):1261-72.

The gut microbiome and the brain.

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The human gut microbiome impacts human brain

health in numerous ways: (1) Structural bacterial components such as lipopolysaccharides provide low-grade tonic stimulation of the innate immune system. Excessive stimulation due to bacterial dysbiosis, small intestinal bacterial overgrowth, or increased intestinal permeability may produce systemic and/or central nervous system inflammation. (2) Bacterial proteins may cross-react with human antigens to stimulate dysfunctional responses of the adaptive immune system. (3) Bacterial enzymes may produce neurotoxic metabolites such as D-lactic acid and ammonia. Even beneficial metabolites such as short-chain fatty acids may exert neurotoxicity. (4) Gut microbes can produce hormones and neurotransmitters that are identical to those produced by humans. Bacterial receptors for these hormones influence microbial growth and virulence. (5) Gut bacteria directly stimulate afferent neurons of the enteric nervous system to send signals to the brain via the vagus nerve. Through these varied mechanisms, gut microbes shape the architecture of sleep and stress reactivity of the hypothalamic-pituitary-adrenal axis. They influence memory, mood, and cognition and are clinically and therapeutically relevant to a range of disorders, including alcoholism, chronic fatigue syndrome, fibromyalgia, and restless legs syndrome. Their role in multiple sclerosis and the neurologic manifestations of celiac disease is being studied. Nutritional tools for altering the gut microbiome therapeutically include changes in diet, probiotics, and prebiotics.

16. *Eur Cytokine Netw*. 2014 Jul-Sep;25(3):52-7.

Effect of acute sleep deprivation and recovery on Insulin-like Growth Factor-I responses and inflammatory gene expression in healthy men.

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Acute sleep deprivation in humans has been found to increase inflammatory markers and signaling pathways in the periphery through a possible Toll-like receptor 4 (TLR-4). In addition, short duration sleep has been associated with low circulating total Insulin-like Growth Factor-I (IGF-I) concentrations. We aimed to determine whether a total sleep deprivation (TSD) protocol with recovery altered whole-blood gene expression of the proinflammatory cytokines TNF- α and IL-6, as well as TLR-4 expression, and to examine the relationship with circulating concentrations of the IGF-I system. Twelve healthy men participated in a five-day TSD (two control nights followed by one night of sleep deprivation and one night of recovery). Blood was sampled at 0800, before

and after sleep deprivation (D2 and D4), and after recovery (D5). It is shown that 25 h of sleep deprivation (D4) induced significant increases in mRNA levels of TNF- α and its soluble receptor R1 ($P < 0.01$ respectively), as well as TLR-4 ($P < 0.05$), while IL-6 mRNA levels remained unchanged. Circulating concentrations of free IGF-I were decreased at D4 ($P < 0.001$). One night of recovery was sufficient to restore basal expression levels for TNF- α , sTNF-R1, TLR-4 and circulating IGF-I. Changes in TLR-4 mRNA levels during the protocol correlated positively with those of TNF- α and sTNF-R1 ($r = 0.393$ and $r = 0.490$ respectively), and negatively with circulating free IGF-I ($r = -0.494$). In conclusion, 25 h of sleep deprivation in healthy subjects is sufficient to induce transient and reversible genomic expression of the pro-inflammatory cytokine TNF- α and its R1 receptor, and its mediator TLR-4, with a possible link to IGF-I axis inhibition.