

**Saturday 10th September –
Monday 12th September 2022**

**Sports Science Institute of South Africa
Newlands, Cape Town**

First Congress of the South African Society for Sleep and Health



BOOK OF ABSTRACTS

**'Foregrounding good sleep as part of
holistic health in uncertain times'**

Restored Sleep

The *Dormonoct* Definition:

- An effective hypnotic¹
- 'Intermediate' half-life (6 - 8 hours)^{1,2}
- Unaltered REM sleep^{1,3}
- Rapid sleep onset and maintenance of sleep^{1,2}
- Refreshed morning awakening¹
- Helps reduce anxiety symptoms associated with insomnia^{1,4,5}

- Caution should be exercised in patients suffering from anxiety accompanied by an underlying depressive disorder



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Loprazolam 2 mg

References: 1. Clark BG, Jue SG, Dawson GW, *et al.* Loprazolam - A Preliminary Review of its Pharmacodynamic Properties and Therapeutic Efficacy in Insomnia. *Drugs*. 1986;31(6):500-516. 2. Dormonoct® 2 mg package insert. 3. Salkind MR, Silverstone T. The Clinical and Psychometric Evaluation of a new Hypnotic Drug, Loprazolam, in General Practice. *Curr Med Res Opin*. 1983;8(5):368-374. 4. McInnes GT, Bunting EA, Ings RMJ, *et al.* Pharmacokinetics and Pharmacodynamics Following Single and Repeated Nightly Administrations of Loprazolam, a new Benzodiazepine Hypnotic. *Br J Clin Pharmacol*. 1985; 19:649-656. 5. Botter PA. A comparative Double-blind Study of Loprazolam, 1 mg and 2 mg, Versus Placebo in Anxiety-induced Insomnia. *Curr Med Res Opin*. 1983;8(9):626-630.

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SCHEDULING STATUS: **S5** PROPRIETARY NAME (AND DOSAGE FORM): Dormonoct® 2 mg. COMPOSITION: Dormonoct® 2 mg: Each tablet contains 2.49 mg loprazolam mesylate, equivalent to 2 mg loprazolam. PHARMACOLOGICAL CLASSIFICATION: A 2.2. Sedatives, hypnotics. REGISTRATION NUMBER: Dormonoct® 2 mg: Q/2.2/355. NAME AND ADDRESS OF THE HOLDER OF THE CERTIFICATE OF REGISTRATION: sanofi-aventis south africa (pty) ltd., Reg. No. 1996/010381/07, 2 Bond Street, Midrand, 1685, South Africa. Tel +27 (0)11 256 3700, Fax +27 (0)11 256 3707. www.sanofi-aventis.com SAZA.LOME.16.11.0952

A word from the SASSH President

Dear all attendees of the first SASSH congress

Thank you so much for joining us for these 3 days as we start a new journey of presenting research work and invited talks on various topics in sleep. While this congress may be small, we hope that it will grow in strength year by year. We created the South African Society for Sleep and Health as a multidisciplinary body with three subcommittees – the medical and dental, the allied health group and the Science group who are primarily responsible for organising this congress. Thus we have tried to develop the content of this congress to appeal to a wide range of interested parties.

Each subcommittee has work to do: the medical subcommittee to work with medical aids and medical schools on training of doctors to widen the pool of experienced doctors. This can only improve the lot of patients seeking help. The Allied group is a vibrant mix of psychologists, occupational therapists, physiotherapists, neurophysiologists, dieticians and others working to find their place in sleep medicine. The psychology arm presents training in Cognitive Behavioural therapy for insomnia. The science committee is involved in research at a national level and want to develop prevalence data for South Africa for the various sleep disorders.

All this work, and others, will be presented at this congress. Please network, speak to new people about your journey in sleep medicine and become part of our family. Please also let us know how you enjoyed the congress and what type of other activities you would like to see presented by the society.

It simply remains for me to wish you a good, educational time at the congress.

Regards

Dr Alison Bentley

Chairperson: SASSH executive board

Conference hosts

The conference was organised by the South African Society for Sleep and Health in collaboration with Rhodes University, the University of Cape Town and the University of the Witwatersrand

Local organising committee

Jonathan Davy (Co-Chair), Dale Rae (Co-Chair), Karine Scheurmaier, Stella Iacovides, Gosia Lipinska, Philippa Forshaw, Alison Bentley, Michelle Baker, Roger Shannon (IT support)

Scientific committee

Jonathan Davy
Gosia Lipinska
Dale Rae

Sponsors and contributors

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Table of contents

The lack of prevalence data for insomnia in South Africa	12
Michelle Baker	
Questionnaire and narrative symptom assessment in South Africans seeking treatment for insomnia	13
Michelle Baker & Alison Bentley	
Home-based diagnostic studies and CPAP titrations for obstructive sleep apnea in Johannesburg	14
Micaela Rhoda & Alison Bentley	
Sleep disorders and cardiometabolic health in adolescents with obesity: Effects of a lifestyle intervention program based on diet and chronic exercise	15
Johanna Roche, Laurie Isacco, Karine Scheuermaier, Valérie Gillet, Fabienne Mougin, David Thivel	
Longitudinal association between self-reported sleep duration and cardiometabolic risk in corporate executives	16
Paula R. Pienaar, Laura C. Roden, Cécile R.L. Boot, Willem van Mechelen, MD, Jos W. R. Twisk, Estelle V. Lambert & Dale E. Rae	
Sleep, HIV and cardiometabolic disease risk in rural South Africa	17
Francesc X. Gomez-Olive	
Using Coach-assisted digital Technology to improve sleep quality and posttraumatic symptoms in female survivors of sexual assault: a pilot study	18
Gosia Lipinska; Matthieu Ortscheit; James Rink	
KEYNOTE - The intricate interaction between sleep and pain: What we know so far	19
Stella Iacovides	
WORKSHOP - How to train the body and encourage the mind to view sleep as a habit	20
Jacqui Koep & Romy Parker	
KEYNOTE - Sleep for Mental Health	21
Gosia Lipinska	
The relationship between affect in dreams and emotional memory consolidation	22
Liëtte du Plessis & Gosia Lipinska	
Pilot Study: The relationship of slow wave sleep and emotional memory in young adults with FASD	23
Thumira Pillay; Gosia Lipinska; Kevin Thomas; Sandra Jacobson; Joseph Jacobson & Neil Dodge	
The role of dreaming in affect regulation	24
Gosia Lipinska, Mark Solms & Braam Zeilinga	
Pilot Study: The relationship between slow-wave sleep quality, socio-economic status, alcohol consumption and declarative memory in young adults with prenatal alcohol exposure	25
Julia Tubaro, Gosia Lipinska, Kevin Thomas, Sandra Jacobson, Joseph Jacobson & Neil Dodge	
The relationship between sleep and mood-/anxiety-related disorders in women living in low-income areas	26
Arron T. L. Correia, Philippa E. Forshaw, Laura C. Roden, Gosia Lipinsk, H.G. Laurie Rauch & Dale E. Rae	
KEYNOTE - Sleep and Emotional Memory Research: Moving forward in uncertainty	27
Tony Cunningham	
KEYNOTE - Sleep, circadian rhythms and metabolic risks - relevance to the South African context	28
Karine Scheuermaier	

Comparison between self-reported and actigraphy-derived sleep characteristics in low-income South African adults	29
Philippa Eileen Forshaw, Arron Correia, Estelle Victoria Lambert, Laura Catherine Roden & Dale Elizabeth Rae	
Characterising the sleep wake behaviour of late adolescents living in rural and township areas surrounding Alice in the Eastern Cape of South Africa	30
Phelokazi Dlepu, Natasha Mandondo, Swantje Wells & Jonathan Davy	
Association between sleep and concussion in male rugby players	31
Dominique Rosslee, Dale Rae & Caroline D'Alton	
A pilot study of exercise as a strategy to mitigate the cognitive and mood effects of partial sleep deprivation among healthy adults.....	32
Celine H. le Roux, Gosia Lipinska & Dale E. Rae	
KEYNOTE - Unpacking the myths and fallacies that underpin fatigue management in practice	33
Sma Ngcamu-Tukulula	
Tracking sleep wake behaviour in aerial fire fighters as part of a Fatigue Risk Management system.....	34
Shaurissa Borchard; Markus Zahn; Nthathi Tlale; Luke Goodenough; Swantje Zschoernack & Jonathan Davy	
Fatigue prevalence and its contributing factors in the South African aviation industry: perspectives from blunt-end stakeholders	35
Darryl Clark & Jonathan Davy	
The impact of shift work on sleep and fatigue in South African train drivers and reported advantages and disadvantages of working shifts	36
Chumani Mona & Jonathan Davy	
KEYNOTE - Sleep health index - a novel metric for assessing habitual sleep	37
Dale Rae, Arron Correia & Philippa Forshaw	
The COVID-19 lockdown and changes in routine-oriented lifestyle behaviours and symptoms of depression, anxiety, and insomnia in South Africa.....	38
Presented by Jonathan Davy	
Vulnerability of South Africans with self-reported insomnia to changes in sleep, depression and anxiety symptoms during lockdown measures in response to the COVID-19 pandemic	39
Presented by Alison Bentley	
The impact of sleep, physical activity and sedentary behaviour on symptoms of depression and anxiety before and during the COVID-19 pandemic in a sample of South African participants	40
Presented by Raphaella Lewis	
Abruptly ceasing physical activity during the COVID-19 lockdown is associated with worse sleep and mental health status	41
Presented by Karine Scheuermaier	

Program

SATURDAY 10th SEPTEMBER 2022	
07h00-08h00	Registrations
	WORKSHOP 1: OBSTRUCTIVE SLEEP APNOEA
08h00-09h00	Basics of OSA and consequences: Dr Alison Bentley
09h00-10h00	Diagnostic guidelines: Dr Alison Bentley
10h00-10h30	The ENT Surgeon's guide to Sleeping Right – Snoring 101: Dr Azgher Karjeker
10h30-11h00	Tea
11h00-11h30	Use of oral appliance for managing OSA: Dr Farahnaz Parker
11h30-12h30	Treating OSA with CPAP: Dr Alison Bentley
12h30-13h00	Mimic sleep disorders for OSA: Dr Louis Vlok
13h00-14h00	Lunch / Registrations
	WORKSHOP 2: INSOMNIA
14h00-15h00	Basics, natural history and consequences of insomnia: Dr Alison Bentley
15h00-16h00	RLS, Circadian rhythm disorders and other organic causes of insomnia: Dr Alison Bentley
16h00-16h30	Tea
16h30-17h00	Rational management of insomnia: Dr Alison Bentley
19h00	Congress welcome dinner (Jonkershuis: https://jonkershuisconstantia.co.za/index.php/demo-home/the-restaurant/)

SUNDAY 11th SEPTEMBER 2022	
07h00-08h00	Registrations
08h00-08h15	Welcome: Dr Alison Bentley
	SESSION 1: SLEEP DISORDERS (<i>Chair: Dr Gosia Lipinska</i>)
08h15-09h00	Keynote 1: Dr Pierre van der Merwe - Managing insomnia
09h05-09h20	The lack of prevalence data for insomnia in South Africa: Michelle Baker/Dr Alison Bentley
09h20-09h35	Questionnaire and narrative symptom assessment in South Africans seeking treatment for insomnia: Michelle Baker
09h35-09h50	Home-based diagnostic studies and CPAP titrations for obstructive sleep apnea in Johannesburg: Micaela Rhoda
09h50-10h20	Keynote 2: Michelle Baker - CBTi in a nutshell
10h20-10h45	Tea
	SESSION 2: SLEEP AND HEALTH INTERACTIONS (<i>Chair: Dr Jonathan Davy</i>)
10h45-11h15	Keynote 3: Dr Kim Laxton - Game addiction and insomnia
11h20-11h35	Sleep disorders and cardiometabolic health in adolescents with obesity: Effects of a lifestyle intervention program based on diet and chronic exercise: Dr Johanna Roche
11h35-11h50	Sleep, HIV and cardiometabolic disease risk in rural South Africa: Prof. Francesc X. Gomez-Olive
11h50-12h05	Longitudinal association between self-reported sleep duration and cardiometabolic risk in corporate executives: Paula Pienaar
12h05-12h20	Using coach-assisted digital technology to improve sleep quality and posttraumatic symptoms in female survivors of sexual assault: a pilot study: Dr Gosia Lipinska
12h20-13h05	Keynote 4: Dr Jocelyn Hellig - Sweet dreams: Sleep apnea and obesity: comfortable bedfellows? How to get your patient to manage their obesity and therefore their sleep apnoea.
13h05-14h00	Lunch
	SESSION 3: SLEEP AND PAIN (<i>Chair: Dr Dale Rae</i>)
14h00-14h30	Keynote 5: Dr Stella Iacovides - The intricate relationship between sleep and pain: what we know so far and where we are going
14h30-17h00	WORKSHOP 3: How to train the body and encourage the mind to view sleep as a habit: Dr Romy Parker and Jacqui Koep

MONDAY 12th SEPTEMBER 2022	
07h00-08h00	Registrations
	SESSION 4: SLEEP, COGNITION AND MENTAL HEALTH (<i>Chair: Michelle Baker</i>)
08h00-08h30	Keynote 6: Dr Gosia Lipinska - Sleep for mental health
08h30-08h45	The relationship between affect in dreams and emotional memory consolidation: Liette du Plessis
08h45-09h00	Pilot Study: The relationship of slow wave sleep and emotional memory in young adults with Fetal Alcohol Syndrome Disorder: Thumira Pillay
09h00-09h15	The role of dreaming in affect regulation: Braam Zeilinga
09h15-09h30	Pilot Study: The relationship between slow-wave sleep quality, socio-economic status, alcohol consumption and declarative memory in young adults with prenatal alcohol exposure: Julia Tubaro
09h30-09h45	The relationship of sleep and mood-/anxiety-related disorders in women living in low-income areas: Arron Correia
09h45- 10h45	Keynote 7: Prof. Tony Cunningham - Sleep and Emotional Memory Research: Moving forward in uncertainty
10h45 – 11h15	Tea
	SESSION 5: EXAMPLES OF SLEEP IN THE SOUTH AFRICAN CONTEXT (<i>Chair: Dr Karine Scheurmaier and Dr Jonathan Davy</i>)
11h15 - 11h45	Keynote 10: Dr Karine Scheurmaier - Sleep, circadian rhythms and metabolic risks - relevance to the South African context
11h45 - 12h00	Comparison between self-reported and actigraphy-derived sleep characteristics in low-income South African adults: Philippa Forshaw
12h00 – 12h15	Characterizing the sleep wake behaviour of late adolescents living in rural and township areas surrounding Alice in the Eastern Cape of South Africa: Dr Jonathan Davy
12h15 – 12h30	Association between sleep and concussion in male rugby players: Dominique Rosslee
12h30 - 12h45	A pilot study of exercise as a strategy to mitigate the cognitive and mood effects of partial sleep deprivation among healthy adults: Celine Le Roux
12h45 - 13h45	Lunch
	SESSION 6: FATIGUE AND SLEEP MANAGEMENT IN CONTEXT (<i>Chair: Alison Bentley</i>)
13h45-14h15	Keynote 9: Sma Ngcamu-Tukulula - Fatigue and accidents: insights from the South African context
14h15-14h30	Tracking sleep wake behavior in aerial fire fighters as part of a Fatigue Risk Management system: Dr Jonathan Davy
14h30-14h45	Fatigue prevalence and its' contributing factors in the South African aviation industry: perspectives from blunt-end stakeholders: Darryl Clark
14h45-15h00	The impact of shift work on sleep and fatigue in South African train drivers: preliminary findings: Chumani Mona
15h00-15h30	Keynote 10: Dr Dale Rae - Sleep health index - a novel metric for assessing habitual sleep

15h30-16h00	Tea
	SESSION 7: REFLECTIONS ON LESSONS LEARNED FROM COVID-19 LOCKDOWNS ON THE SLEEP, MENTAL HEALTH, LIFESTYLE AND PHYSICAL ACTIVITY OF SOUTH AFRICANS
16h00-17h00	Background to the study and an overview of findings: Dr Jonathan Davy
16h15-16h30	Sleep disorders and insomnia: Dr Alison Bentley
16h30-16h45	Effects on mental health: Raphaella Lewis
16h45-17h00	Effects on physical activity: Dr Karine Scheuermaier
17h00	Closing: Dr Alison Bentley/ Dr Jonathan Davy/ Dr Dale Rae

SESSION 1

SLEEP DISORDERS

The lack of prevalence data for insomnia in South Africa

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Objective: Examining the burden of insomnia on the public health system in South Africa is essential. Globally, insomnia is one of the most ubiquitous sleep disorders in the general population causing personal distress and occupational problems. Insomnia research appears to be very scant in South Africa. This study aims to investigate the prevalence of insomnia globally with the final lens on South Africa by exploring international and local research papers.

Method: We searched three databases; The Cochrane collaboration for recent meta-analytic data, Pubmed and Google Scholar. For the Cochrane review we searched using only the term insomnia, without any other filters. For Pubmed we used the term: (primary insomnia) and (prevalence) and (population); and used the following filters: Clinical Trial, Meta-Analysis, Randomized Controlled Trial, Review, and Systematic Review, in the last 10 years. The google scholar search using search term: (primary insomnia) and (prevalence) and (gender or women) filtered for the last 10 years.

Results: The Cochrane collaboration rendered 83 results of which none were relevant to this study i.e. they did not cover prevalence but conditions and therapeutics. For the Pubmed there were 253 results of which 45 were relevant to the study, with the following insomnia themes: conditions co-morbid to insomnia (19) women (9) population specific (9) occupational (4) comorbid sleep disorders (4). A Google Scholar search revealed 16800 results. This indicates that there has been a large body of research globally, but not necessarily in the clinical setting, as would be found in the Pubmed search. Two South African studies were separately identified in the first page of the scholar search.

Conclusion: Current exploration suggests that the global prevalence of short-term insomnia is 11% but is highly variable by site, ranging between 2.3% - 25.5%. In a South African study, the prevalence was 7% in a localized provincial adult population and increased with age to resemble global figures. Psychological distress and PTSD symptoms were positively associated with insomnia in the South African study. Insomnia is a primary clinical disorder. The condition carries risk factors and substantial implications for public health and mental health in South Africa. Research on insomnia prevalence is scant in South Africa. Future research should focus on this omission

Questionnaire and narrative symptom assessment in South Africans seeking treatment for insomnia

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Background: When assessing a new patient with insomnia, symptoms can be obtained from questionnaires or a narrative interview. Both approaches have strengths and weaknesses but very few studies have compared the information gathered from both in the same patients and whether there are any gender differences. The aim was to investigate the expression of insomnia symptoms by sleep questionnaires and intake narratives in a group of South African adults with insomnia.

Methodology: A mixed-methods retrospective design was applied. The records of patients who had attended the private practice of a Clinical Psychologist in Kwa Zulu-Natal, South Africa were used. Patients completed two selected, validated questionnaires (the Sleep Symptoms Checklist (SSC) and the Insomnia Severity Index (ISI)) before an intake interview for treatment for insomnia. Symptoms expressed by $\geq 50\%$ of the patients on the questionnaires and the number of patients expressing the same symptoms on the intake narratives were compared with a Chi squared analysis.

Results: A total of 12 males and 13 females responded. Patients selected significantly more sleep symptoms on the questionnaires compared to those expressed in the narrative notes. Core symptoms of insomnia including difficulty in falling asleep, often due to worry, daytime dysfunction and physical symptoms were common to both techniques. There were no significant gender differences in demographics, sleep symptoms nor the number of symptoms expressed either on the questionnaires or narratives.

Conclusion: While the use of questionnaires for insomnia may provide a more comprehensive picture it is likely that the narratives reveal the most concerning symptoms to the patient. With no gender differences a combination of both approaches would be recommended in all patients presenting with insomnia.

Home-based diagnostic studies and CPAP titrations for obstructive sleep apnea in Johannesburg

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Introduction: Obstructive sleep apnea (OSA) is a pharyngeal airway collapse that occurs upon inspiration during sleep, causing breathing difficulty and arousal from sleep. OSA home-based diagnostic studies as well as automatic CPAP titrations have been recommended to reduce time and costs but questions remain on the efficacy of CPAP when done at home.

Aim: To describe the demographics, diagnostic tests results, efficacy of CPAP titrations and gender differences in a home-based private sleep clinic in Johannesburg.

Methods: A retrospective study was conducted by reviewing the records of patients referred to A Bentley Inc for sleep apnea testing and treatment. Sleep assessment was done using the WatchPat and 3-4 nights of home-based CPAP titrations using a Phillips Dreamstation auto CPAP machine. A good response to CPAP was defined as an AHI <10 per hour or greater than 4 hours of sleep on the CPAP titration nights.

Results: Data from 453 sleep studies were analysed plus data from 163 CPAP titrations. The mean (SD) age was 53.6 (13.9) years, and the BMI was 33.6(7.9) kg.m⁻². The only gender difference was that females were significantly more likely to complain of headaches. A total of 270 (60%) patients had moderate to severe apnea and of these 60% had a CPAP titration. An AHI<10 per hour was obtained in 72% of patients and 83% were able to sleep longer than 4 hours per night on at least one night. Poor responders were more likely to be older, males with higher AHI.

Discussion: The uptake and efficacy of CPAP and home-based CPAP titration were successful in the majority of patients. The reduction in uptake may be due to poor communication from referring doctors and both AHI and hours slept on CPAP can improve with continued use.

SESSION 2

SLEEP AND HEALTH INTERACTIONS

Sleep disorders and cardiometabolic health in adolescents with obesity: Effects of a lifestyle intervention program based on diet and chronic exercise

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Context: Obstructive sleep apnea (OSA) represents a chronic condition characterized by complete or partial upper airway obstruction during sleep. Prevalence rates of both OSA and obesity are still growing worldwide; the prevalence of OSA reaches 33-61% in youth with obesity, while it represents 1-3% of the general pediatric population. However, there is to date no consensus for OSA threshold in adolescent obesity. OSA has been found to alter sleep quality while obesity is associated with shorter sleep duration and impaired sleep architecture. Through different pathways, OSA and obesity have both been found to be involved in the development of systemic inflammation and metabolic disorders leading to an increased risk of cardiovascular disease. While the evidence regarding the efficacy of multidisciplinary interventions to improve pediatric obesity is compelling, less is known about their effect on overall sleep and cardiometabolic health in the case of OSA. The purpose of the present project conducted in adolescents with obesity was therefore i) to determine a clinical cut-off for the diagnosis of OSA based on cardiometabolic alterations; ii) to assess the effects of a lifestyle intervention on OSA severity, on sleep duration, sleep architecture and cardiometabolic risk.

Methods: Comparable data from three different centers (Besançon and Clermont-Ferrand, France and São Paulo, Brazil) were compiled and data from 82 participants were analyzed. Sleep, investigated by polysomnography, body composition and anthropometric measures, glucose and lipid profiles, and cardiorespiratory fitness were assessed at admission and at the end a 3 to 9 months lifestyle intervention including chronic exercise and a balanced diet.

Results: Multivariable analyses enabled us to identify a threshold of apnea-hypopnea index (AHI) = 2 above which a strong and significant relation between cardiometabolic risk and AHI was observed.

Out of the 50 participants who completed the lifestyle intervention, 20 (40%) had OSA at baseline, as defined by an AHI ≥ 2 events/hour. Overall, the participants exhibited a short sleep duration and reduced proportions of rapid-eye movement (REM) sleep. REM sleep % was increased, and sleep duration unchanged post-intervention, both overall and in participants initially diagnosed with OSA. OSA was normalized (AHI < 2) in 11 participants and persisted in 9. OSA was associated at baseline with lower insulin sensitivity and higher blood pressure, but it did not affect the lipid profile. Post-intervention, the cardiometabolic profile was improved, whether OSA was normalized or not.

Conclusions: OSA starts affecting cardiometabolic health from and AHI of 2 in adolescents with obesity. A lifestyle intervention including chronic exercise and a balanced diet is useful to decrease OSA severity, improve sleep architecture, and improve the metabolic parameters whether or not OSA is normalised post-intervention. Mechanisms mediating OSA persistence remain unelucidated.

Longitudinal association between self-reported sleep duration and cardiometabolic risk in corporate executives

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Introduction: Corporate executives may be at increased risk for poor sleep and cardiometabolic disease owing to performance-related work pressures in highly competitive environments. While cross-sectional relationships between sleep duration and cardiometabolic risk have been well-established, these findings predominate in the general population and shift workers, with little to no data on corporate executives. Recent findings have reported a significant association in corporate executives, but over a 1-year period, thus whether this relationship remains robust over time is yet to be established.

Aim: To determine the longitudinal association between self-reported sleep duration and cardiometabolic risk in corporate executives participating in a workplace wellness programme.

Methods: Self-reported sleep duration and lifestyle, occupational, psychological, and measured anthropometrical, blood pressure and blood marker variables were obtained between 2016 and 2019. Longitudinal associations between self-reported sleep duration and cardiometabolic risk factors were analysed using sex-stratified linear mixed models, adjusting for age, lifestyle, occupational and psychological covariates.

Results: Among women, shorter sleep duration was associated with higher body mass index (BMI) covarying for age (β with 95% confidence intervals: -0.19 [-0.36, -0.03]), age and occupational factors (-0.20 [-0.36, -0.03]) and age and psychological factors (-0.20 [-0.37, -0.03]). Among men, shorter sleep was associated with both BMI and waist circumference (WC) covarying for age (BMI: -0.15 [-0.22; -0.08]; WC: -0.62 [-0.88; -0.37]); age and lifestyle factors (BMI: -0.12 [-0.21; -0.04]); WC: -0.016 [-0.92; -0.29], age and occupational factors (BMI: -0.20 [-0.22; 0.08]; WC: -0.62 [-0.88; -0.36]), and age and psychological factors (BMI: -0.15 [-0.22; -0.07]; WC: -0.59 [-0.86; -0.33]). Shorter sleep and higher CMR scores were associated among men for models adjusted for age and lifestyle factors (CMR: -0.12 [-0.20; -0.04]) and age and psychological factors (CMR: -0.08 [-0.15; -0.01]).

Conclusion: Corporate executives who report shorter sleep durations are more likely to present with poorer cardiometabolic risk profiles, independent of age, lifestyle, occupational and psychological factors. Addressing sleep health in workplace health programmes may help mitigate the development of cardiometabolic disease in such employees.

Sleep, HIV and cardiometabolic disease risk in rural South Africa

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Sleep is affected by and affects both infectious diseases and NCD. However, sleep is a neglected aspect of health. We investigated sleep habits and their interactions with HIV or NCDs in 5059 individuals 40 plus years from HAALSI in South Africa. We collected socio-demographic data, anthropometric measurements and blood tests. We performed descriptive analysis, measured associations using logistic regression and estimated models for continuous variables using ordered logistic regression. Self-reported sleep duration was 8.2 ± 1.6 h. Insufficient sleep was associated with age, education, unemployment, obesity. Restless sleep was associated with age, being female, education status, unemployment, and being single. Hypertension was associated with shorter sleep duration, poor sleep quality, restless sleep, sleep apnea. HIV positive individuals not on ART reported more nocturnal awakenings than those on ART ($p=0.029$) and HIV negative individuals ($p=0.024$). These data provide a basis for further objective studies of the relationship between sleep and other risk factors in South African populations

Using Coach-assisted digital Technology to improve sleep quality and posttraumatic symptoms in female survivors of sexual assault: a pilot study

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Individuals diagnosed with posttraumatic stress disorder (PTSD) have significant sleep disruption, including persistent and often severe insomnia. Cognitive behavioural therapy for insomnia (CBT-i) has proved to be effective at treating this sleep difficulty in PTSD-diagnosed individuals and concurrently improving other symptoms of the disorder. However, this therapy is unavailable and inaccessible to South Africans living in low-income communities. Digital versions of CBT-i have gained recognition as feasible, acceptable and efficacious ways of delivering CBT-i that overcomes availability and accessibility. However, adherence to these applications remain low globally. In a proof of concept study, we examined the usability, acceptability, and efficacy of a digital health (dHealth) application that was supported by trained sleep coach, and compared it to the same application without coach-assistance and a passive sleep health advice newsletter. We recruited 15 sexual assault survivors to each group (coach assisted dHealth; dHealth only; newsletter only). All participants had significant trauma symptoms and sleep disruption at baseline. After orientation, participants in both the coach-assisted and application only groups completed two weeks using CBT-i Coach, a dHealth CBT-i application, while also receiving a daily sleep health newsletter. Control participants received only the newsletter. Participants completed assessment of insomnia, PTSD symptoms and depressive symptoms at baseline, and after 3, 7, 14-days of treatment. Usability, acceptability and the incidence of adverse events were recorded at day 14 after the conclusion of the intervention. The results showed that the coach-assisted group found the application more usable and acceptable than the application only and control groups. Furthermore, those in the coach-assisted and control groups showed a significant decline in insomnia, posttraumatic and depressive symptoms, which was not evident in those in the application only group. Additionally, those in the coach-assisted group had lower scores of depression than those in the control group. The results show that a dHealth intervention for insomnia is acceptable, feasible and efficacious for South Africa women with PTSD symptoms, but only with coach-assistance. More broadly, dHealth interventions in low-income contexts should consider coach assistance as mandatory, when considering this form of intervention to overcome issues of availability and accessibility.

SESSION 3 SLEEP AND PAIN

KEYNOTE

The intricate interaction between sleep and pain: What we know so far

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Chronic pain and insomnia are highly comorbid, and a substantial body of work has accumulated over the past two decades to support an intricate, bidirectional relationship between sleep and pain. Indeed, sleep and pain share a mutually reinforcing, disruptive relationship, in which pain disrupts sleep, and more critically, sleep disruption interferes with mechanisms of pain control and increases pain perception. In this talk, Dr Iacovides will summarize the current understanding of this intricate pain-sleep relationship, focusing largely on the multiple underlying mechanisms that drive their interaction. More specifically, Dr Iacovides will present the evidence that sleep disruption interferes with mechanisms of endogenous pain modulation, including opioid analgesia, placebo analgesia, and positive affect analgesia. Given the high comorbidity between chronic pain and insomnia, a better understanding of these mechanisms can help identify modifiable clinical correlates that may unlock novel targets for intervention to improve the health-related outcomes of these two extremely disabling conditions, particularly when they co-occur. Dr Iacovides highlights that sleep may be one such important modifiable clinical and physiological correlate, but more research is required to fully unravel the complexity of the sleep-pain interaction.

WORKSHOP

How to train the body and encourage the mind to view sleep as a habit

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This workshop will provide important insights into the fundamental mechanisms behind pain, before going into the expanding on the interactions between sleep and pain mechanisms. Thereafter, through various workshopping strategies, treatment and intervention options will be discussed, including those around exercise and how to sooth the nervous system through mindfulness, relaxation and qi qong. The workshop will conclude by providing participants with insights into how to conduct motivational interviewing to ensure that patients are well informed about the value of sleep, how to communicate clearly with patients to facilitate buy in to strengthen the likelihood of positive clinical outcomes.

SESSION 4

SLEEP, COGNITION AND MENTAL HEALTH

KEYNOTE

Sleep for Mental Health

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Sleep is critical physiological state that has emerged as an important regulator of multiple biological systems. For decades, researchers have understood that sleep difficulties are pervasively reported in individuals with psychiatric disturbances, but more recently findings have described how sleep disturbance may help drive psychopathology or interact with other biological and psychological states to exacerbate symptoms. For example, findings from our own laboratory show that sleep difficulties are related to the presence of cognitive disturbances in individuals diagnosed with posttraumatic stress disorder. Another study we conducted showed that emotional dysregulation characteristic of depressive and posttraumatic symptoms had an influence on symptom severity, but primarily via sleep disturbance. Via structural equation modelling we showed that individuals who tended to struggle with emotion regulation strategies had poor sleep quality and these sleep disturbances were strongly predictive of increased depressive and posttraumatic symptom severity, with little direct influence of emotion regulation strategies on symptoms. In a recent study conducted during the COVID pandemic we broadened our understanding of how sleep interacts with lifestyle factors such as exercise and sedentary behaviour including time spent on screens. We showed that spending more time on screens and sitting, and less time being active, increased insomnia symptoms and in turn depressive and anxiety-related symptoms. These findings highlight the importance of sleep, not as an isolated physiological function, but nested in a greater biological and psychological milieu.

The relationship between affect in dreams and emotional memory consolidation

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Introduction: Research in the field of cognitive neuroscience has greatly focused on the role of sleep in various neurocognitive processes such as memory consolidation, however, an area that has not been fully researched is the role of dreaming in these memory processes. Dreaming is a universal human experience, yet the purpose of dreaming is still poorly understood. This study aims to determine the relationship between affect experienced in dreams and emotional memory consolidation to investigate whether dreams assist in consolidating emotional memories. Considering that dreams emerging from rapid-eye-movement (REM) sleep are laden with emotion and that emotion enhances memory, one possibility is that dreaming could play a role in the consolidation process. The hypothesis is that the greater the intensity of affect in a dream (regardless of the valence), the greater the recall accuracy will be for emotional information, but not neutral information. **Methods:** 65 healthy participants, aged 18 – 50, were recruited for the study. Healthy participants include those who do not suffer from a sleep or psychiatric disorder, regularly sleep between 7-9 hours a night, and do not take medication for sleeping or psychiatric disorders. On the night of the study, the participant viewed a series of pictures from the South African Affective Picture System (SA-APS) in an online environment. Afterwards, they verbally recalled as many pictures as possible. The following morning the researcher asked participants to recall any dreams and rate the emotional intensity of their dreams. Participants then again verbally recalled all the pictures that they could remember from the previous night. **Results:** The seven possible affects in dreams (anticipation, anger, anxiety, sexual desire, nurturance, grief, and joy) were measured using a visual analogue scale. For each participant, an average for all positive and negative affects was calculated. Using multiple regression analysis, the results determine whether affect in dreams predicts participants' recall accuracy for each category (positive, negative, and neutral information). There is a significant effect of gender on the recall of positive and negative information but not neutral information. This effect is accounted for by females remembering more positive and negative information on average than males. The analyses also explore the possibility that positive and negative affect in dreams may differentially modulate emotional memory consolidation. **Conclusion:** There is, currently, not enough evidence showing that the affect in dreams modulates emotional memory consolidation. This study contributes to the growing literature on the role that dreaming plays in sleep, specifically its role in emotional memory consolidation.

Pilot Study: The relationship of slow wave sleep (SWS) and emotional memory in young adults with FASD

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Introduction: In the last few decades, researchers have demonstrated a robust relationship between sleep and memory consolidation, with evidence that sleep consolidates emotional memory. However, other factors also influence memory processing and consolidation. In the South African context socio-economic status (SES) is an important variable that influences memory performance, with individuals coming from lower SES backgrounds having less opportunity to develop their memory abilities. Furthermore, alcohol use, which is prevalent in South African communities, also has an important influence on memory functioning, especially with high levels of consumption. **Aim:** This study aims to assess the relationship between polysomnographically measured sleep quality and emotional memory in young adults coming from a low SES environment. Furthermore, this study aims to determine whether SES and or current alcohol consumption contribute to the effect that objective sleep quality has on emotional memory performance. Hypothesis 1: Objectively measured sleep quality predicts emotional memory performance. Hypothesis 2: Lower SES and heavier drinkers will be associated with poorer sleep quality and memory performance. **Methods:** This study is part of a larger investigation of sleep-dependent cognitive and emotional processing in individuals with and without pre-natal alcohol exposure. The study's cohort consisted of healthy, partial and heavily alcohol exposed participants between 18-23 years old that were recruited from the Cape Town longitudinal cohort. Participants completed an alcohol use interview, measures of SES and the standardised South African Affective Picture system (SA-APS) memory tasks pre-sleep and post-sleep. Sleep was recorded using standardised polysomnograph. **Results:** Data analysis has shown that SWS is significantly correlated to the performance of emotional memory and the consolidation of emotional memory. Furthermore, the data indicated that SES status and alcohol consumption were not significantly correlated to SWS and emotional memory within our cohort. **Conclusion:** Results indicate that SWS plays an important role in emotional memory consolidation, and that there is little influence of SES and alcohol use in these processes for young adults from low SES backgrounds. Hence, sleep-based interventions can be considered to address impairments of emotional memory, if individuals experience such difficulties.

The role of dreaming in affect regulation

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Introduction: A key theory of dreaming proposes that dreams function to regulate affect. Research investigating change in emotions across sleep often does not consider the contribution of dreaming mentation to affect regulation, but rather focuses on association between sleep physiology and affect regulation. We hypothesise that if dreams are responsible for affect regulation, there will be a change in self-reported emotion (both positive and negative) within a dream, leading to less emotionality towards the end of a dream. We also hypothesise that affect will be regulated across the night, with less emotionality in dreams towards the end of the night.

Methods: 24 healthy UCT students (age range 19 – 34 years) were selected to spend three non-consecutive nights at a sleep laboratory for PSG monitoring, collection of dream-reports and self-reported emotions experienced during these dreams. During the first experimental night after adaptation, participants were awoken in REM sleep during the early night (dream-point: Early REM) and on the second experimental night they were awoken in REM sleep towards the end of the night (dream-point: Late REM) to record their dreams, using voice recordings, and collect self-reported emotions experienced during these dreams using Visual Analogue Mood Scales (VAMS). Participants completed mood scales for emotions experienced in both the first part (1st dream-half) and last part (2nd dream-half) of their dream. Each recorded dream was transcribed and assessed for affective content using a software package (LIWC). Furthermore, the change in mood of participants across each experimental night was measured using the Positive and Negative Affect Schedule (PANAS).

Results: Analysis of the VAMS did not reveal significant difference in self-reported emotion between the first and second half of dreams, or between early and late REM dreams. There was, however, a significant interaction between dream-half and dream-point, indicating a decline in emotionality from the first half to the second half of early REM dreams, followed by an increase in emotionality from the first to the second half of late REM dream, although still below that of early REM levels. Analysis of the LIWC showed significant decrease in objectively scored emotional content of dreams from early to late REM.

Conclusions: These results suggest that there is an initial decrease in dream affect during the night, followed by an increase in the early morning. We hypothesize that dream affect decreases towards a homeostatic settling point during the night, before rising again to meet this homeostatic point in the early morning hours, which may be required for next-day readiness. This change towards a homeostatic point and the overall attenuation of dream affect across the night, demonstrates preliminary support for the notion that dreaming plays a role in affect regulation.

Pilot Study: The relationship between slow-wave sleep quality, socio-economic status, alcohol consumption and declarative memory in young adults with prenatal alcohol exposure

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Introduction: Sleep is a vital biological function for maintaining optimal physical and cognitive functioning. Thus, poor sleep quality has implications for physical wellbeing and cognitive performance. One aspect of cognition sensitive to disturbances in sleep, specifically slow-wave sleep (SWS), is declarative memory. This is due to the intrinsic link between SWS and sleep-dependent declarative memory consolidation through hippocampal-neocortical dialogue. This pilot study forms part of a parent study investigating sleep-dependent cognitive and emotional processing in individuals with and without prenatal alcohol exposure (PAE). Research findings show that these individuals experience fragmented sleep, memory deficits, lower socio-economic status (SES) and higher likelihood of alcohol use. This pilot study aims to assess the relationship between (1) SWS quality and declarative memory retention, and (2) SES and (3) alcohol consumption in relation to SWS quality and memory retention in a sample of individuals with and without PAE. Methods: 13 participants, aged 20-22 years were recruited from the Cape Town Longitudinal Cohort (est. Jacobson et al., 2008). Participants first completed a demographic questionnaire and timeline follow-back alcohol use interview. Standardised neutral declarative memory tasks were then administered before and after an eight-hour polysomnographically recorded sleep opportunity. Results: From a battery of three neutral declarative memory tasks, the list learning task had the most sensitivity in describing associations between sleep, SES, alcohol use and neutral declarative memory retention. The findings related to this task showed strongly that a higher percentage of time spent in SWS was associated with higher memory retention. Surprisingly a higher percentage of time, but also fragmentation of REM sleep was strongly associated with lower memory retention. Furthermore, higher alcohol consumption, irrespective of the time period in which that alcohol was consumed, was associated with lower memory retention. SES did not influence memory retention. Discussion: These findings replicate and highlight the importance of SWS for memory consolidation but also show that disrupted REM sleep is detrimental for consolidation of neutral information. Furthermore, high alcohol consumption is likely to disrupt consolidation, which is important for individuals that are already cognitively vulnerable. Conclusion: These associations highlight the importance of healthy sleep for memory processing in vulnerable individuals with PAE.

The relationship between sleep and mood-/anxiety-related disorders in women living in low-income areas

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Introduction: Previous research has established that there is a bidirectional relationship between sleep and mood- and anxiety-related disorders, however, these studies are largely based on populations in the global north. Mental illness is one of the leading health concerns globally, with anxiety and depressive disorders having estimated a global prevalence of 3.6% and 4.4%, respectively pre-2020 with estimated increases due to the subsequent Covid-19 pandemic. This is likely higher in low-income areas, which have previously been associated with increased risk of psychiatric disorders such as depression. South Africans living in low socioeconomic areas have reported unusually long sleep durations (± 10.3 h). The reason(s) for this have not been explored, but perhaps long sleep is in compensation for poor sleep quality associated with underlying mood- and anxiety-related disorder symptoms.

Aim: To characterize mood- and anxiety-related disorder symptoms in this population and investigate whether these symptoms were associated with markers of sleep quality or sleep duration.

Methods: South African women (n=75, 27-55y) of African origin living in an urban informal settlement, characterised by high crime and poverty rates, participated in this study. Self-reported demographic, sleep and fear of sleep and mood- and anxiety-related symptom data were collected via questionnaires. Participants wore a wrist-worn accelerometer for a week.

Results: Nearly 60%, 40% and 24% of women achieved scores suggestive of post-traumatic stress disorder, moderate-to-severe depression and moderate-to-severe anxiety respectively. Adjusted logistic models indicated that excessive daytime sleepiness (Epworth Sleepiness Scale >10, β coefficient with 95% confidence interval: 0.13(0.04–0.21), $p=0.002$), poor sleep quality (Pittsburgh Sleep Quality Index >5: 0.22(0.03–0.41), $p=0.021$) and clinically significant insomnia symptoms (Insomnia Severity Index >14: 0.13(0.03–0.23), $p=0.015$) were all associated with more severe symptoms of depression.

Conclusion: South African women living in low socioeconomic areas appear to have higher prevalence of mood- and anxiety-related disorders than both the global and national estimations. Additionally, self-reported sleep data appears to be more closely linked to symptom severity of mood- and anxiety-related disorders than objectively-derived measures.

KEYNOTE

Sleep and Emotional Memory Research: Moving forward in uncertainty

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For over two decades, sleep has been touted as one of the primary drivers necessary for the processing and retention of episodic emotional memory (Wagner et al., 2001; Hu et al., 2006). Recently, however, the role of sleep in human emotional memory processing has received renewed scrutiny following a series of comprehensive meta-analyses and reviews that have indicated that sleep may only contribute a small effect that may hinge on certain elements of the event, such as the content or context of the learning and retrieval episodes (Lipinska et al., 2019; Schäfer et al., 2020; Davidson et al., 2021). On the one hand, the strong perception of sleep's importance in prioritizing memory for emotional events may have been exacerbated by certain publication bias phenomena, such as the "winner's curse" and "file drawer problem." On the other hand, it is plausible that there are particular sets of circumstances that lead to consistent and reliable effects of sleep on emotional memory. Importantly, in an effort to prevent losing the baby with the bathwater, the authors of these critical reviews did not immediately argue against the role of sleep entirely. Rather, they highlighted a number of factors that need future research to investigate in a step-wise fashion to better understand their influence on this effect, including: (1) the placement and quality of sleep in relation to the encoding, consolidation and retrieval of an emotional memory (see Cunningham et al., In press); (2) the involvement of circadian, time-of-day, and sleep homeostatic influences; (3) the amount of time that has passed between encoding and retrieval; (4) the content, context, and intensity of an emotional experience or stimuli; (5) the types of probes and strategies used to assess memory at retrieval; (6) whether there is pre- as well as post-sleep testing; (7) the type of sleep manipulation employed; and (8) the macro- and microarchitecture of the studied sleep period. To make matters more challenging, it is possible that these factors have distinct, competing, overlapping, and/or interacting effects on emotional processing vs. memory processing, which may then combine to alter the long-term retention and retrieval of emotional memories. In this talk, I will begin by presenting some preliminary work that suggests that sleep and circadian influences on emotion perception and emotional memory processing can be distinguished using a sleep deprivation and recovery nap study design. Early evidence from this study suggests that while sleep may be critical for memory processing, the perception of emotional intensity may have stronger ties to circadian influences, at least in the short term. I will then highlight some of our recent research delving into the microarchitecture of sleep in an attempt to determine the components of sleep that may be involved in memory processing beyond what can be distinguished through traditional visual inspection. I will end with a discussion of our recent review paper that suggests one path forward for sleep and emotional memory research, with a focus on determining the role of *sleep placement* on the different stages of emotional memory processing.

SESSION 5

EXAMPLES OF SLEEP IN THE SOUTH AFRICAN CONTEXT

KEYNOTE

Sleep, circadian rhythms and metabolic risks - relevance to the South African context

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In this talk, we will show evidence from South African studies of the association between sleep, circadian rhythms disruption and enhanced cardiometabolic risk. We will also examine how this relationship may be enhanced in people with HIV and hint at possible biological mechanisms.

The first study examines the prevalence of OSA in a rural aging population and its association with cardiometabolic risk.

The second study will show results how sleep and circadian disruption associate with cardiometabolic risk in a population of South African shift workers, and how HIV mediates this relationship.

The last two studies will cover sleep disruption in people with HIV, how it associates with markers of immune function, and how this may explain enhanced cardiometabolic consequences of sleep in this population. We will also show findings from a recent study suggesting that sleep issues in people with HIV may be caused by changes in circadian timing.

Comparison between self-reported and actigraphy-derived sleep characteristics in low- income South African adults

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Background: Research has shown that low-income South Africans report long sleep durations (avg. 8-10h per night). Given the potential; lack of agreement between subjective and objective measures of sleep, there is a need to compare self-reported sleep characteristics with objectively measured sleep characteristics in the population to determine their agreement and ascertain if this self-reported sleep is indeed long.

Methods: In 201 participants (98 men, 107 women 21-67y) self-reported sleep characteristics were assessed using the Pittsburgh Sleep Quality Index (PSQI), the Epworth Sleepiness Scale (ESS) and the Insomnia Severity Index (ISI). Wrist actigraphy data were collected continuously for seven consecutive days with a sleep diary.

Results: Compared to actigraphy-derived sleep, Bland-Altman plots show that self-reported TIB is underestimated by 0.51h, TST is overestimated by 1.26h, bedtime is underestimated by 0.69h, wake-up time is underestimated by 1.19h, sleep-onset latency is underestimated by 1.96min and sleep efficiency is underestimated by 18.36%. Spearman correlations found negligible correlations between self-reported and actigraphy derived TST ($r_s=0.07$, $p=0.069$), between self-reported and actigraphy derived SOL ($r_s=-0.04$, $p=0.538$) and between self-reported SE and actigraphy derived SE ($r_s=0.15$, $p=0.036$); weak correlation between self-reported and actigraphy derived TIB ($r_s=0.24$, $p<0.001$) and between self-reported and actigraphy derived bedtime ($r_s=0.26$, $p=0.003$); moderate correlation between self-reported and actigraphy derived wake-up time ($r_s=0.43$, $p<0.001$).

Conclusion: Agreement between self-reported and actigraphy-derived sleep characteristics was low, which is consistent with prior studies. Low-income South Africans are spending more time in bed than they report but are getting less sleep than they report, which seems to be largely driven by very disrupted sleep which is of poor efficiency.

Characterising the sleep wake behaviour of late adolescents living in rural and township areas surrounding Alice in the Eastern Cape of South Africa

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Introduction: School-going adolescents are at risk of obtaining insufficient sleep, due to various biological and psychosocial changes they experience during this phase of their development, while also meeting the demands of navigating high school. While there has been extensive research on adolescents' sleep in the global north, there is less research in Africa and specifically in South Africa. Of the research performed in SA, it has mostly focused on characterising sleep-wake behaviour in adolescents from city or urban contexts, with less research focused on exploring the sleep wake behaviour of learners in rural and township areas.

Aim: The aim, therefore, of this study was to characterise the sleep-wake behaviour of late adolescents from selected rural and township areas in Alice in the Eastern Cape of South Africa.

Methods: An adapted hard copy version School Sleep Habits Survey (SSHS) was distributed to four co-educational rural and township schools in Alice. The SSHS explores the reported sleep wake behaviour of school going learners during the school week and weekend, while also asking about napping habits, caffeine use, and transport to get to and from school. Embedded within the survey are scales that can determine daytime sleepiness, sleep-wake behaviour problems, depressive moods and chronotype.

Results: One hundred and twenty three final year of high school learners completed the survey. Analyses revealed that self-reported sleep was less than the average recommended sleep hours for this group (< 7 hours), with participants reporting reasonable, advanced median weekly bed times (week - 21:30 (21:00-22:30) but early wake times during weekdays (05:30 (5:00- 6:00)). Students reported that sleep was shortened by the early rise times due to having to commute to make the early school start times. Reported bed times during the weekend were later than the week (22:15 (21:00- 23:30)), but wake times did not differ significantly (05:30 (5:00-6:30)), which resulted in learners not being able to 'catch up' sleep during the weekends. There were no significant differences between the reported sleep wake behaviors of rural and township learners.

Discussion: The findings of this study add to the mounting evidence that adolescents do not obtain enough sleep. However, contrary to previous research, this study found that late adolescents from rural and township settings who reported experiencing inadequate sleep during the week were unable to compensate for this during the weekend, likely because of the certain contextual factors that need further elucidation. Given the need for an early rising to commute to school, interventions such as delaying school start times may help improve the sleep of learners from this context. However, this would require extensive consultations to ensure that systemic changes that aim to improve sleep of adolescents are applicable for the context of rural and townships areas in South Africa.

Association between sleep and concussion in male rugby players

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Introduction: A lesser explored aspect of concussion is the relationship with sleep. Sleep disturbances post-concussion are common, with insomnia reported in 30-60% of patients. Sleep is highly beneficial for athletes in terms of skills related to performance, as well as for recovery and adaptation to training. Individuals tend to inaccurately assess their own level of sleep impairment, implying that athletes may not be able to adequately gauge the effect of insufficient sleep on their performance.

Aim: To investigate associations between sleep and sports-related concussion in male rugby players.

Methods: Professional adult male rugby players are being recruited. Participants are asked to complete an online questionnaire including demographic information, rugby history and five validated sleep questionnaires to assess sleep quality (PSQI and ASSQ), risk for insomnia (ISI), daytime sleepiness (ESS) and fatigue severity (FSS). Participants wore a wrist worn device (Phillips ActiWatch) to monitor habitual sleep over seven days. Concussion history is obtained from SCAT-5.

Results To date, 20 players have completed the protocol and valid actigraphy has been collected on 17 players. Of those 20, 14 players report poor sleep quality (PSQI) and one player had a high self-reported risk for insomnia. Of the 17 valid actigraphy, 10 players have a sleep efficiency of less than 85%, 5 have a sleep onset latency of more than 30 minutes, 12 have an irregular bedtime (variation of more than 1.5h between earliest and latest bedtime) and 14 have an irregular wake-up time (variation of more than 1.5h between earliest and latest wake-up time). More participants are being recruited and SCAT data is still being analysed.

A pilot study of exercise as a strategy to mitigate the cognitive and mood effects of partial sleep deprivation among healthy adults

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Introduction: Healthy sleep is essential for optimal functioning and well-being although, in today's society, sleep is no longer a priority. A substantial portion of the population is likely to experience partial sleep deprivation (PSD) as society places greater importance on academic and work demands than on healthy sleeping habits. However, sleep deprivation (SD) profoundly impairs cognitive functioning and adversely affects mood, which has implications for health, safety and productivity. Thus, it is essential to investigate the strategies which people can use to minimise the effects associated with SD especially when it is unavoidable. An inexpensive and safe strategy may be exercise.

Aim: The aim of the study is to determine whether a bout of moderate intensity aerobic exercise counteracts the negative cognitive and mood effects of PSD among healthy adults.

Method: We recruited five healthy adults to undergo the following study phases: screening, consent and familiarisation, lead-in week, sleep deprivation phase 1, washout week, sleep deprivation phase 2. The study had a counterbalanced cross-over experimental design where participants were assigned to an exercise and control condition for the sleep deprivation phases. In the exercise condition participants performed a 40min submaximal bout of running (90% of maximum HR [HR_{max}] with five 1-min intermittent accelerations at 95% of HR_{max}) on the treadmill while in the control condition participants did not undergo any exercise. Both sleep deprivation phases 1 and 2 were comprised of three consecutive nights of partial sleep deprivation (70%, 60% and 50% of time-in-bed). Testing occurred prior to sleep deprivation (i.e. after a night of habitual sleep [T_1 : baseline]) and then again the day after the third night of sleep deprivation at three time points: at habitual wake-up time (T_2 : after PSD), 5hr (T_3 : after condition) and 10hr (T_4 : after condition follow-up) after that. Testing sessions included the administration of a sleepiness and mood questionnaire, along with cognitive tests which assessed the following domains: attention, working memory, inhibition and neutral declarative memory.

Results: Multi-linear mixed models were run to explore the interactions between time (T_1 : baseline, T_2 : after PSD, T_3 : after condition and T_4 : after condition follow-up) and condition (exercise or control).

Discussion: Preliminary data on the following will be discussed:

- a) the effects of three nights of PSD on our measures of cognitive performance and mood relative to baseline (i.e. performance following habitual sleep duration)
- b) the effects of a 40min submaximal effort run on our measures of cognitive performance and mood following three nights of PSD throughout the day relative to control (i.e. performance in the absence of a 40min submaximal effort run). While most studies have considered the effects of sleep deprivation for performance during exercise, none have explored whether this technique can be used to mitigate the cognitive and emotional effects of sleep deprivation. This is an important area to explore as the prevalence and side-effects of SD is concerning and exercise may be a beneficial tool that people can easily incorporate in their daily lives to continue to function at optimal levels under suboptimal conditions.

SESSION 6

FATIGUE AND SLEEP MANAGEMENT IN CONTEXT

KEYNOTE

Unpacking the myths and fallacies that underpin fatigue management in practice

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Worker fatigue is pervasive across various industries and has been associated with negative health, safety, and organisational performance consequences. The effective management of fatigue in many organisations is thwarted by incorrect assumptions about fatigue contributory factors and its impact on workers and organisational outputs. Correcting this misinformation is a necessary first step towards more proactive, risk-based fatigue management strategies. Through exploring selected commonly occurring practices in industry, this presentation will point out some of the myths and fallacies that are harming fatigue management initiatives. Some of the myths and fallacies that will be discussed include the following:

- Compliance to legislation on working times is an effective fatigue management strategy
- Falling asleep at work is gross worker misconduct and treating it as a dismissible offence will deter others from this behaviour
- Non-work-related factors that affect worker fatigue are the workers' sole responsibility and do not concern the organisation
- Where fatigue is concerned, workplaces are "fit for duty", and workers contribute the most to fatigue risks at work

Tracking sleep wake behaviour in aerial fire fighters as part of a Fatigue Risk Management system

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Aerial fire fighters play a crucial role in assisting ground fire fighters to extinguish fires that can and do have devastating effects on people and property, threatening areas of development adjacent to fire-prone ecosystems. Often, the areas that require the presence of and careful monitoring by both aerial and ground fire-fighting crews are remote and require crew to live and remain on call at bases in these remote areas. Given the logistics of travelling to and from these remote areas, crew can be on duty for between four and six weeks, before getting extended time off. Given that these duty periods exceed the stipulated Flight and Duty periods, as prescribed by the Civil Aviation Regulations, fatigue can present a risk to operational safety. In light of this, aerial firefighting operations often have to operate under Fatigue Risk Management Systems (FRMS), where fatigue risks are monitored and responded to ensure that crew can operate at adequate levels of alertness. Part of assessing fatigue risks involves tracking the sleep-wake behaviour of crew while on duty, in conjunction with assessing both subjective and objective levels of alertness. In collaboration with an aerial firefighting industry partner, we tracked the sleep wake behaviour of a small group of aerial firefighters over the course of one season.

In two distinct phases, the first running from June to August 2021 and the second from September to November 2021, we monitored the sleep wake behaviour of fourteen and then eleven aerial fire fighters, respectively. Six crew participated in both phases. Participants wore an actiwatch and recorded their sleep in a sleep diary for the duration of their duty period (which ranged from four to six weeks). At the end of their work period, participants completed the Pittsburgh Sleep Quality index (PSQI).

The results across both phases of data collection indicate that crew maintained consistent actigraph-determined sleep wake patterns while on duty, characterized by adequate length (P1: 06h42 $\pm$ 58 minutes; P2: 07:02 $\pm$ 1.49hrs), appropriate timing (at night), with short sleep latencies (P1: 06:49 $\pm$ 04:09min; P2: 08:28 $\pm$ 707:17min)), adequate efficiency (P1:82 $\pm$ 9%; P2: 85.74 $\pm$ 9.72%), but a slightly higher than normal wake after sleep onset (P1: 69:38 $\pm$ 31.6 min; P2: 59:04 $\pm$ 01:05 hrs)). Sleep diary responses showed similar consistency over the two phases, but showed an overestimation of reported sleep duration ($\approx$ 07:40 hours). Self-reported sleep quality was higher in phase one when compared to phase two, possibly indicating the effects of a long season. The PSQI revealed a global score of 4 ($\pm$ 2.05) for phase one and 3.14 ($\pm$ 1.46) for phase two, indicating that participating crew, on average, obtained good quality sleep.

The results highlight that, on average, the sleep-wake behaviour of various crew working in remote bases is adequate in duration, timing, efficiency and self-reported quality, but there is evidence of fragmentation given the extended WASO. This supports research outside of aerial firefighting that indicates that workers operating in remote locations tend to develop regular sleep-wake routines when in the absence of domestic responsibilities and atypical working time arrangements (such as night shift work). However, these results need to be integrated with other data collected by the company in order to determine the efficacy of the current FRMS program.

Fatigue prevalence and its' contributing factors in the South African aviation industry: perspectives from blunt-end stakeholders

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Background: Cockpit and cabin crew fatigue is a commonly reported risk factor that results from the complex interaction between various task and organizational factors, often linked to the characteristics of the Flight and Duty periods (FDPs) that crew must work. Previous research on fatigue in aviation has focused on understanding the effects of FDPs on crew (sharp-end stakeholders), but very little research explores the perceptions of those who manage, regulate, or represent crew (the blunt-end stakeholders). The aim of this study, therefore, was to explore the self-reported contributory factors to fatigue from the perspective of management and decision-makers (blunt-end stakeholders) in airline operators, as well as union, regulator, and industry association groups in the South African aviation industry.

Method: This study adopted a cross-sectional, qualitative exploratory design. Semi-structured interviews sought to explore the participant's insights regarding the prevalence of fatigue and its contributing factors in the South African aviation industry. Using purposive and snowball sampling, participants from various airline operators, the regulator, pilot unions, industry associations and other non-scheduled operations were invited to participate in one interview session online. The interview data gathered from the semi-structured interviews were analyzed using a thematic analysis.

Results: Thirteen participants – nine males and four females – were interviewed. Participants were represented as their subsequent broad overview parts of the industry: union (1 participant); industry associations (3 participants); airline and scheduled operations (5 participants); Non-scheduled operations (2 participants); and regulator (2 participants). Stakeholders perceived that there were multiple systemic factors that contribute to fatigue in aviation. The key themes included person-related factors, environment-related factors, regulation-related factors, and roster/schedule-related factors. Person-related contributing factors included economic induced stress, lack of knowledge and awareness, irresponsible reporting, and crew mentality and attitude towards fatigue. Regarding regulations, concerns revolved around a lack of standardized sign-on times, definition of local night, neglect of current science, and that the regulations were outdated. For the environment-related theme, the impact of weather conditions, unfamiliar and dangerous environments, poor interactions with air traffic control and passengers, and commuting to work emerged. Lastly, for schedule/roster-related factors, delays, insufficient rest periods, operation-specific factors and inadequate crew were cited as contributory to fatigue.

Discussion: Overall, the study revealed contributory factors to fatigue from blunt-end stakeholders that are consistent with some of previous research, but also reflect the unique operating context of the South African aviation industry and certain operations within it. This study serves as a foundation for further investigation into more specific areas of the crew's working time that increase workload and are disruptive to sleep. This may assist operators in limiting the incidence of fatigue by making roster duties more predictable, while also providing an opportunity for the regulator and other stakeholders to focus their efforts on how to better design the current FDPs to limit the prevalence and risks associated with crew fatigue.

The impact of shift work on sleep and fatigue in South African train drivers and reported advantages and disadvantages of working shifts

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The inclusion of shift work is common and often necessary way of arranging working time in the transportation settings, such as railway industry, given the demand for round-the-clock demand of transport services. Shift work, which can include combinations of early morning, day, afternoon and night shifts, often leads to suboptimal timed sleep, sleep disturbances and fatigue, which in turn may negatively affect train drivers alertness, driving performance and incident risk. While there has been ample research on the effects of different shift arrangements on train driver sleep and fatigue, less research has explored this in the context of the South African railway industry. Therefore, the aim of this study was to characterize train drivers' shift system and to explore the effects of shift work on train drivers' self-reported sleep wake behaviour and sleep disturbance.

Method: Selected parts of the Standard Shift work Index (consists of a battery of questionnaires which explored demographic and the shift-related characteristics, reported sleep wake behaviour and fatigue experienced during different shifts), was administered to 30 train drivers across three different depots of one of South Africa's rail operators.

Results: Train drivers were required to work highly irregular rotating shifts. Morning shifts ran from 05:00 (IQR 01:57-06:00) to 16:00 (IQR 14:00-18:00), while afternoon shifts occurred between 14:28 (IQR 12:00-15:57) and 02:00 (IQR 24:00-02:57). The night shift ran from 18:00 (IQR 18:00-20:00) to 06:00 (IQR 06:00-09:39). The duration of the shifts varied between 6 and 18 hours. Train drivers reported working between four and seven day days before getting two (IQR 2-4) days off. The reported sleep duration when crew worked morning shifts was 6.35 hours (IQR 5hrs-8hrs) of sleep, which was shorter than sleep duration on afternoon shifts (7.73 (± 1.48) hours. While working night shifts, crew reported getting 6.08 (± 1.81) of sleep, which was the shortest sleep compared to all the shifts. Higher sleep disturbance of 3 (± 0.89) were associated with the night shift compared the morning (2 ± 0.78) and afternoon shifts (2 ± 0.66), and days off (2 ± 0.64).

Discussion: train drivers in this study were required to work in highly irregular work schedules that include characterised by variable shift start and end times that were driven largely by operational needs. The night shift was associated with the shortest sleep duration and greatest sleep disturbance than the other shifts and days off, attributable to the challenges associated with sleep during the day after a night shift. There was greater sleep disturbance reported on days off compared to afternoon shifts. While unexpected, this may reflect the effects of having to readjust to a more regular sleep wake cycle during the first day off following the highly irregular shift patterns. The findings from this research provide some insights into the effects of the current shift patterns on sleep in train drivers. However, more objective empirical research that characterises the sleep of train drivers over the course of a roster, is warranted, as the SSI could not fully characterise the complex effects of the shift work in this context.

KEYNOTE

Sleep health index - a novel metric for assessing habitual sleep

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Sleep is multi-dimensional in nature, and as research around sleep and health grows, it has become increasingly apparent that relying on just one dimension of sleep (e.g. duration, or efficiency, or time in deep sleep) to either describe sleep health or understand associations between healthy sleep and physical and mental health is limited. There is also a growing appreciation of the need to understand habitual sleep in the home environment, as opposed to snapshots of laboratory sleep. Furthermore, there has been an explosion of commercially-available devices that measure an array of sleep metrics for users. On the upside, awareness around sleep is at an all-time high, but helping people make sense of sleep data and avoiding undue worry about sleep is critical.

In this context, a composite sleep health score may well have a place. The concept of a sleep health score or index is relatively new, and as such there are no standardised guidelines for how best to assess this. Recently, however, there have been a few publications that have proposed definitions and components of composite scores to assess sleep health. The proposal is that dimensions of sleep which should be included in this measure are duration, efficiency, regularity, timing, satisfaction and alertness. These scores have typically relied on self-report and actigraphy-derived data and the dimensions are binary as opposed to continuous, which limit them considerably. In addition, only the most recent versions are starting to make use of sleep staging information.

We propose a framework for a sleep health index designed to assess habitual sleep health, and which can be implemented in research and free-living environments. We also use one month of sleep data to show how responsive such an index might be over time.

SESSION 7: SPECIAL SESSION - REFLECTIONS ON LESSONS LEARNED FROM COVID 19 LOCKDOWNS ON THE SLEEP, MENTAL HEALTH, LIFESTYLE AND PHYSICAL ACTIVITY OF SOUTH AFRICANS

This final session of the conference will provide insights from the SASSH Research committee's activities undertaken during the hard lock down that was imposed in South Africa from March 2020 in response to the COVID-19 pandemic. Through four presentations, this session will highlight the impact that the restrictions placed on the liberties of South Africans, had on sleep, mental health and physical activity. Further, insights into the reported prevalence and impact of various sleep disorders will be discussed.

The COVID-19 lockdown and changes in routine-oriented lifestyle behaviours and symptoms of depression, anxiety, and insomnia in South Africa

Presented by Jonathan Davy

Introduction: The authors assessed the impact of lockdown in response to the COVID-19 pandemic on routine-oriented lifestyle behaviors and symptoms of depression, anxiety, and insomnia in South Africans.

Methods: In this observational study, 1048 adults (median age = 27 y; n = 767 females; n = 473 students) responded to an online survey on work, exercise, screen, alcohol, caffeine and sleep behaviours, depression, anxiety, and insomnia before and during lockdown. Comparisons were made between males and females, and students and nonstudents.

Results: During lockdown, males reported larger reductions in higher intensity exercise and alcohol use than females, while depressive symptoms increased more among females, more of whom also reported poorer sleep quality. Students demonstrated larger delays in work and sleep timing, greater increases in sitting, screen, sleep duration, napping, depression and insomnia and larger decreases in work hours, exercise time, and sleep regularity compared with nonstudents.

Conclusions: Students experienced more changes in their routine-oriented behaviours than nonstudents, coupled with larger increases in depression and insomnia. The dramatic change in their work and sleep timing suggests habitual routines that are at odds with their chronotype, with their sleep changes during lockdown likely reflecting "catch-up" sleep in response to accumulated sleep debt under usual routines.

(Citation: Davy, J.P., Scheuermaier, K., Roden, L.C., Christie, C.J., Bentley, A., Gomez-Olive, F.X., Iacovides, S., Lewis, R., Lipinska, G., Roche, J. and Todd, A., 2021. The COVID-19 lockdown and changes in routine-oriented lifestyle behaviors and symptoms of depression, anxiety, and insomnia in South Africa. *Journal of Physical Activity and Health*, 18(9), pp.1046-1057).

Vulnerability of South Africans with self-reported insomnia to changes in sleep, depression and anxiety symptoms during lockdown measures in response to the COVID-19 pandemic

Presented by Alison Bentley

Introduction: Changes in sleep and mental health outcomes have been observed because of COVID-19 pandemic-induced lockdowns. We hypothesized that lockdown-induced disruption to daily life would have a greater effect on sleep, anxiety and depression symptoms in people with insomnia than those without insomnia.

Aim: To describe the impact of lockdown on individuals with self-reported insomnia.

Method: An online survey assessed behaviours before and during a stringent 5-week-long lockdown in 1048 South Africans in 2020. Participants self-identified as either currently or previously suffering or diagnosed with insomnia, depression and anxiety. Insomnia was assessed using the Insomnia Severity Index, anxiety using the Generalized Anxiety Disorder 7-item and depression severity using the Patient Health Questionnaire-2.

Results: Of the total sample, 33% reported at least one sleep disorder with 18% (n=135) reporting a previous or current diagnosis of insomnia (Insomnia group) and 700 participants reporting no sleep disorder (No-Insomnia group). Participants in the Insomnia group were more likely to be women, have a chronic medical condition, and have higher depression and/or anxiety scores. Both groups reported a significant increase in symptoms of insomnia, depression and anxiety during lockdown compared to before lockdown. However, the increase in symptoms in the Insomnia group was significantly more than the No-Insomnia group (all $p < 0.001$).

Discussion: Participants with self-reported insomnia, even if currently asymptomatic, were more vulnerable to worsening symptoms of insomnia, anxiety and depression during lockdown compared to those with no insomnia as predicted by the concepts of insomnia identity and stress reactivity.

The impact of sleep, physical activity and sedentary behaviour on symptoms of depression and anxiety before and during the COVID-19 pandemic in a sample of South African participants

Presented by Raphaella Lewis

During lockdowns associated with the COVID-19 pandemic, individuals have experienced poor sleep quality and sleep regularity, changes in lifestyle behaviours, and heightened depression and anxiety. However, the inter-relationship and relative strength of those behaviours on mental health outcomes is still unknown. We collected data between 12 May and 15 June 2020 from 1048 South African adults (age: 32.76 ± 14.43 years; $n = 767$ female; $n = 473$ students) using an online questionnaire. Using structural equation modelling, we investigated how insomnia symptoms, sleep regularity, exercise intensity/frequency and sitting/screen-use (sedentary screen-use) interacted to predict depressive and anxiety-related symptoms before and during lockdown. We also controlled for the effects of sex and student status. Irrespective of lockdown, (a) more severe symptoms of insomnia and greater sedentary screen-use predicted greater symptoms of depression and anxiety and (b) the effects of sedentary screen-use on mental health outcomes were mediated by insomnia. The effects of physical activity on mental health outcomes, however, were only significant during lockdown. Low physical activity predicted greater insomnia symptom severity, which in turn predicted increased depressive and anxiety-related symptoms. Overall, relationships between the study variables and mental health outcomes were amplified during lockdown. The findings highlight the importance of maintaining physical activity and reducing sedentary screen-use to promote better sleep and mental health.

Citation: Lewis, R., Roden, L.C., Scheuermaier, K., Gomez-Olive, F.X., Rae, D.E., Iacovides, S., Bentley, A., Davy, J.P., Christie, C.J., Zschernack, S. and Roche, J., 2021. *The impact of sleep, physical activity and sedentary behaviour on symptoms of depression and anxiety before and during the COVID-19 pandemic in a sample of South African participants. Scientific reports, 11(1), pp.1-11.*

Abruptly ceasing physical activity during the COVID-19 lockdown is associated with worse sleep and mental health status

Presented by Karine Scheuermaier

Introduction. In response to the COVID-19 outbreak, severe movement restrictions were placed on the South African population during hard lockdowns, limiting the population's ability to participate in many forms of physical activity. We investigated the impact of abrupt changes in physical activity in South Africans on sleep and mental health over this period.

Methods. South African adults were invited to respond to an online survey reporting on patterns of physical activity (PA), sleep quality, symptoms of insomnia, depression and anxiety before and during a 5-week hard lockdown. Based on responses to the International Physical Activity Questionnaire Short Form (IPAQ-S) and using the World Health Organization's definition of "active" (at least 75min of vigorous PA or 150min of moderate PA per week), we created four PA groups: i) inactive prior to lockdown and remained inactive during lockdown (n=122); ii) active prior to lockdown and stayed active (n=457); iii) inactive prior to lockdown and became active (n=67); iv) active prior to lockdown and became inactive (n=388). We investigated the associations between PA group and changes in sleep (timing, duration, insomnia symptoms), mental health outcomes (symptoms of anxiety and depression), and sedentary behaviour (time spent sitting and using screens) using multivariable regression models adjusted for age, gender and student status.

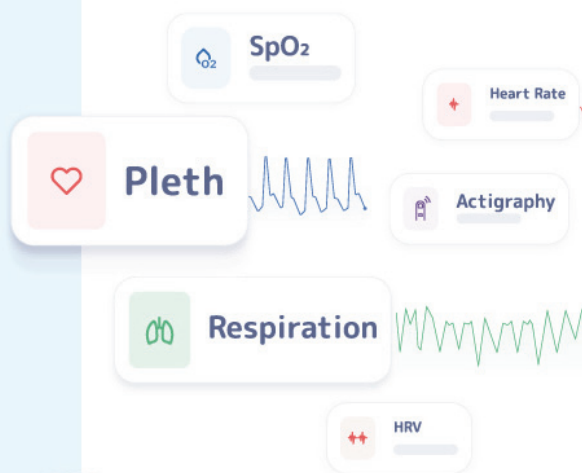
Results. We present data on 1034 individuals (median age: 27y; 757 women; 464 students). The group that was active prior to lockdown and became inactive was younger and more likely to contain students than the other groups. This group, when compared to those who stayed active, and after adjusting for age, gender and student status, reported significantly larger delays in bedtime (+1.5h) and wake-up time (+2.2h), greater increases in sleep irregularity and insomnia symptoms, larger increases in depressive although not anxiety-related symptoms, and spent more time sitting and using screens.

Conclusions. Becoming physically inactive was independently associated with larger degradation in sleep quality, worse depression and increased sedentary behaviour compared to becoming more active or retaining pre-lockdown activity/ inactivity levels. These data suggest that maintaining sleep and mental health is highly dependent on maintaining physical activity habits, even for short periods of time.



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