Interrelationship between negative mental states and cognitive and electroencephalographic measures in Australian nurses

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Introduction

Consistent presence of negative mental states like depression, anxiety and stress can lead to:

- Cognitive impairment[1,2,4]
- Reduced workplace performance[4,5]
- Reduced quality of care[4,6]

Despite this, research examining negative mental states and cognitive performance in health professionals remains limited.

Hypotheses

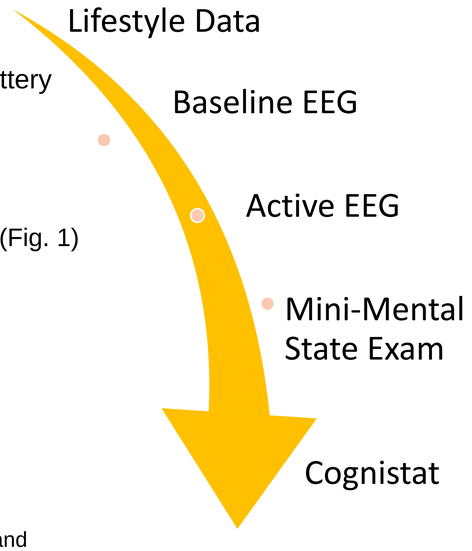
Negative mental states will:

1. Influence the cognitive performance of Nurses
2. Result in a nurse specific cognitive profile

Methodology

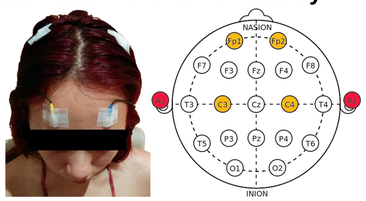
22 nurses participants in the present study

- Pre-study Questionnaire Battery
- Two Lead Bipolar electroencephalogram
  - Positions Fp_1, Fp_2, C_3, C_4 (Fig. 1)
  - Baseline (Resting)
  - Stroop Test[7] (Active)
- Psychometric assessment
  - Mini-mental State exam[8]
  - Cognistat[9]



Note: Participants were age, weight and gender matched to 22 non-nurse individuals

Figure 1 – Diagrammatical and pictorial representation of Electrode placement in the current study



Note: Active electrodes are marked in yellow, with reference electrodes in red

Results

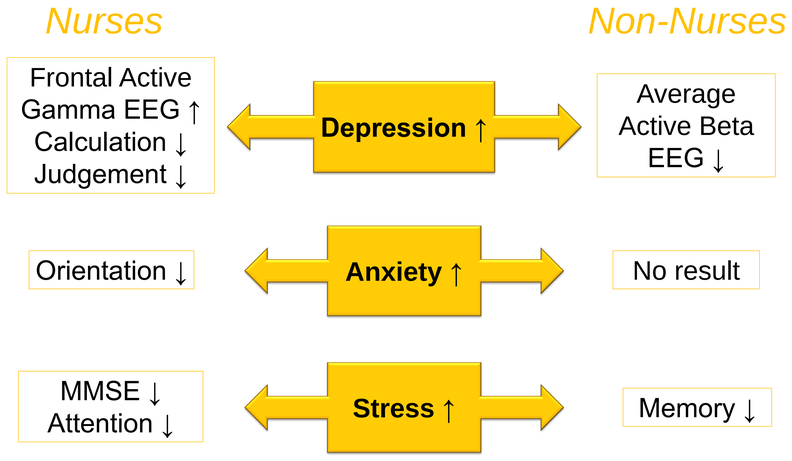
Table 1 – Average participant demographics and differences n = 22, 22

Variable	Nurses	Non-nurses	p - value
Age[1]	26.77 ± 5.85	25.45 ± 6.40	0.48
Weight[2]	76.95 ± 22.4	71.74 ± 12.66	0.35
BMI	26.64 ±	25.82 ± 4.49	0.65
Gender[3]	14:8	14:8	-

Note: [1] Age in years [2] Weight in kilograms [3] Females:Males

Table 2 – Participant scores for the subscales of the Depression, Anxiety, and Stress Scale

Variable	Nurses	Non-nurses	p - value
Depression	4.77 ± 4.09	1.9 ± 2.94	0.01
Anxiety	5.95 ± 4.95	2.32 ± 2.15	< 0.01
Stress	10.77 ± 8.75	5.14 ± 3.77	< 0. 01
Total	21.50 ± 14.49	9.36 ± 6.93	< 0.01



Discussion

Psychometric

Depressive symptoms in nurses was linked to:

- Reduced Calculation and Judgement ability
  - Frontal region alterations[10,11]
  - Emotional dysfunctionality[12,13]

Anxious symptomology was associated with Orientation

- Localisation of Time and Place
- Modulation of information acquisition[14]

High Stress was associated with

- Reduced MMSE, Attention, and Calculation Scores
  - Localised within frontal regions[15]
  - Cortisol exposure[16]

Electroencephalographic

Depression was linked to:

- Increased active phase frontal gamma activity
  - Neural plastic changes and recruitment[17]
  - Require greater resource allocation[17,18]
  - Potentially reflective of increased attention and/or anxiety[19]

Conclusions

Negative mental states may alter

- Cognitive performance and Brain activity

- There is an affected cognitive profile specific to Nurses
  - May be attributable to occupational demands
  - May influence work output

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