



Predicting Response towards Different Mental Health Therapies using Machine-Learning Approach

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Introduction

- Every year, over one million people died by suicide worldwide.
- 6.7% of them are due to depression.
- High depression, anxiety and stress are common prevalent health problems.
- They are less visible and gradually eroding people's life into their domains of life.
- Early recognition, and detection will allow better understanding and intervention to prevent further deterioration into mental disorders as well as disastrous complication.
- Early recognition and detection only are not enough to prevent the mental disorder.
- Therapeutic sessions are needed to overcome this mental disorder.



Problem Statement

However, selecting the most appropriate treatment for each patient can be nebulous and unreliable task, varying by the clinician's biases and theoretical training and with uncertain or unmeasured results.

Problem 1 - Detecting the level of mental health and early diagnosis are crucial in mental health problems. Diagnosis alone without treatment seems lacking in overcome this mental health issues. There are lots of available therapy worldwide. However, not all respondents benefit equally well from it, and some do not respond to treatment at all (Taubitz et al., 2022).



Objectives

This research aims to investigate the response of patients towards suitability of psychotherapy along the therapeutic process. This include:

To conduct Aroma therapeutic sessions with e-MAST, EEG and HRV collaborates with UniZA, NIOSH and HSNZ team.



Literature Review

SERVICES SECTOR



54%

of employees in the tech industry work more on weekends and in the evenings than before Covid



86%

of finance organisations experienced an increase in demand for mental health support in 2021



The education sector had a turnover rate of

70%

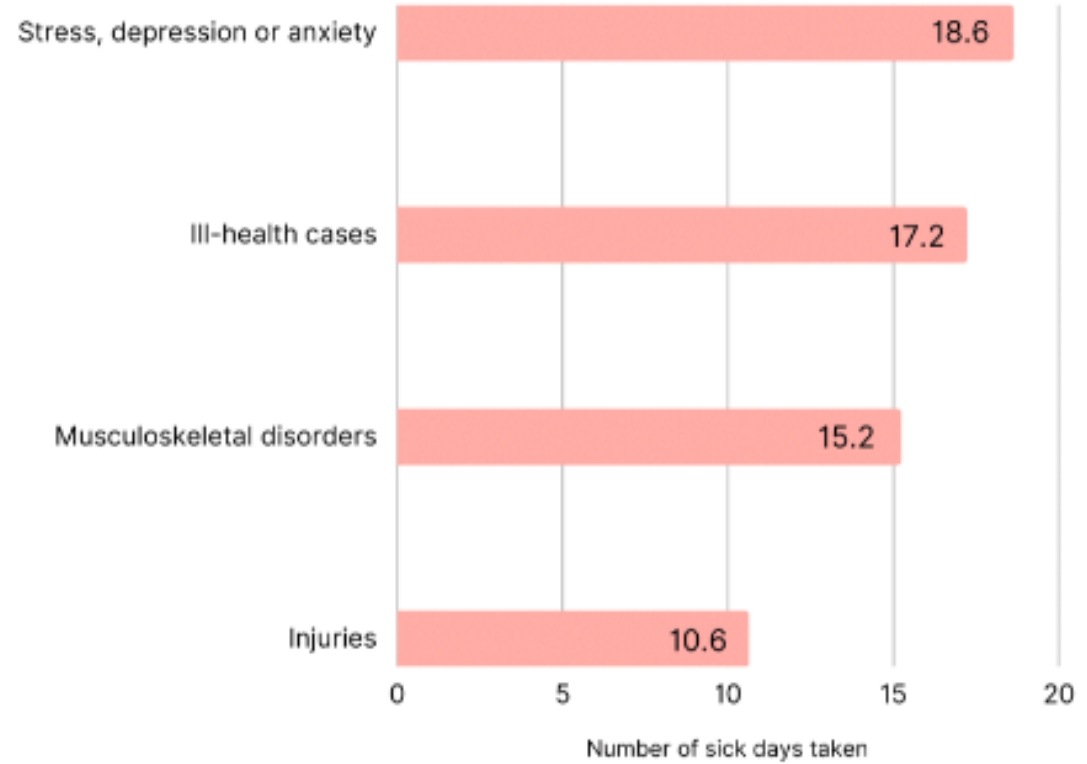
in 2020-2021, showing a steep decline in mental wellbeing

53 workplace mental health statistics you can't ignore in 2023. <https://www.spill.chat/mental-health-statistics/workplace-mental-health-statistics>



Average number of annual sick leave days taken per employee

Source: Deloitte, 2022





Employees take around 18 days off a year to deal with stress, depression, or anxiety, while taking around 10 days for injuries, 17 days for physical ill-health, and 15 days for musculoskeletal disorders.





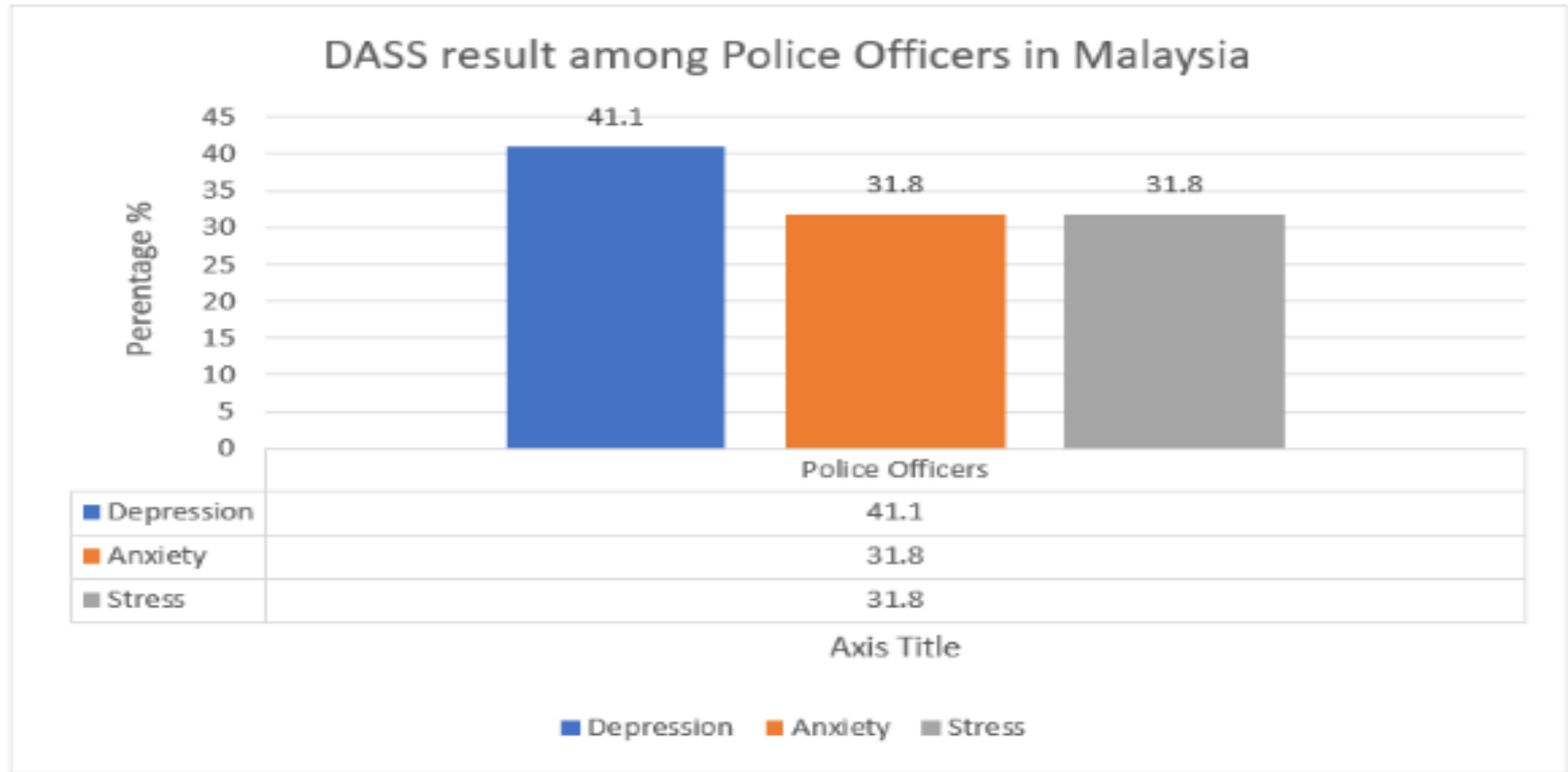
Research paper

Special educators' mental health and burnout: A comparison of general and teacher specific risk factors

[John McGrew](#)^a, [Lisa Ruble](#)^b  , [Christopher J. Cormier](#)^c, [David Dueber](#)^d

The cross-sectional study ascertained prevalence rates of stress-related outcomes of 490 special educators (i.e., major depressive disorder, generalized anxiety disorder) and examined the relative importance of variables hypothesized as predictive of stress outcomes (i.e., psychosocial model of stress, school/teacher variables). Over 60% scored at the dangerous level in emotional exhaustion (i.e., burnout). Nearly 40% met criteria for one or both mental illness diagnoses with rates 5 to 12 times higher than a normative adult sample.





Mohamed et al., (2022) studied on Malaysian police officers’ mental health. From their study, they found highest percentage reported of 41.1% moderate depression, 31.8% of moderate anxiety and 31.8% moderate stress among the police officers. They concluded that majority of the police officers suffer moderate to severe depression, anxiety and stress.





Contents lists available at [ScienceDirect](#)

Heliyon

journal homepage: www.cell.com/heliyon



Front-line hotel employees mental health and quality of life post COVID-19 pandemic: The role of coping strategies

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^b Hotel Studies Department, Suez Canal University, Ismailia, 41522, Egypt

- This study aims to assess the impacts of three coping strategies (problem focused, social support, and avoidance) on the mental health and quality of life of front-line hotel employees.
- The tourism business has been severely impacted by the COVID-19 pandemic, resulting in economic and job losses due to travel restrictions and lockdown measures.
- The study highlights the significance of developing and implementing effective coping strategies to support the mental health and well-being of tourism employees.



Methodology

In order to meet the set objectives, the project will be implemented into four steps:

Step 1 : Identify target group of respondents and distributing the questionnaires through the e-MAST web-based platform.

Step 2 : Selecting respondents with the highest e-MAST results.

Step 3 : Conducting therapy sessions with the HSNZ team for the selected respondents.

Step 4: Analysing the EEG and HRV data.

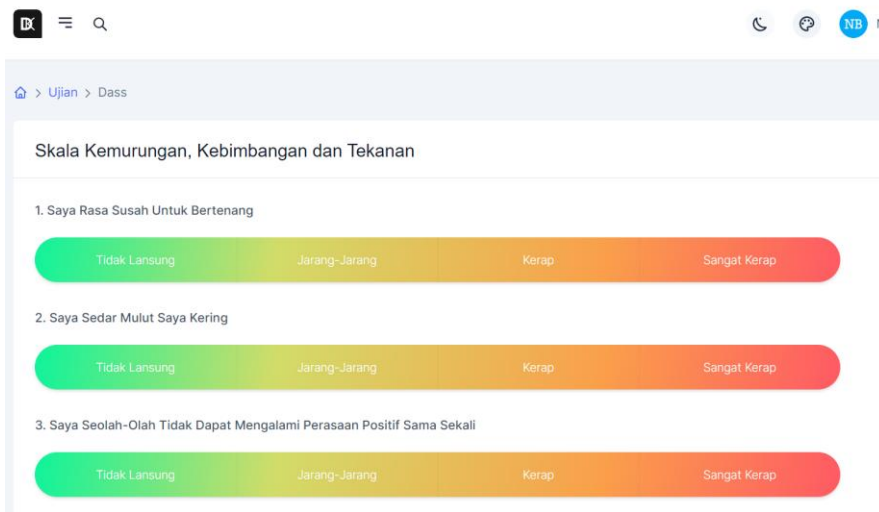
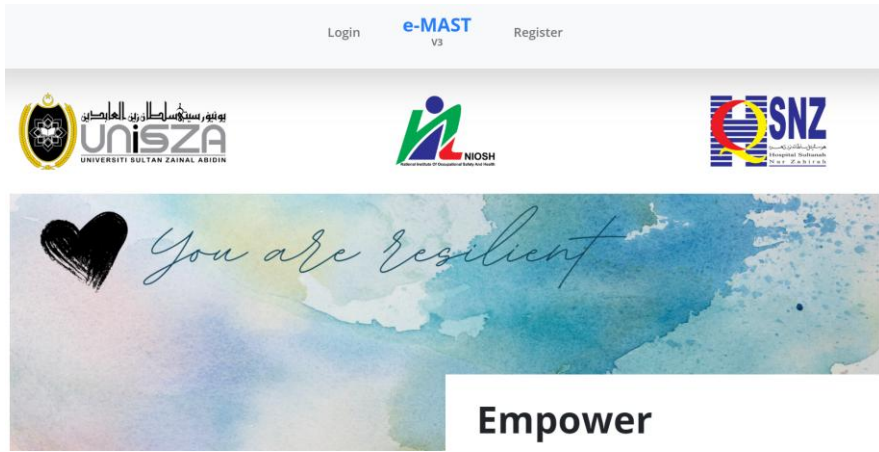


- **Study Location - Hospital Sultanah Nur Zahirah (HSNZ)**
- **Reference Population - Respondents with stress or anxiety or depression illness.**
- **Source Population – All services sectors in Kuala Terengganu and Kuala Nerus.**
- **Study Participants – Workers in the services sector who volunteer to participate in this research.**
- **Inclusion and Exclusion Criteria**
 - 1) Respondents with mental health problems; 2) Services worker ; 3) Receive high results from DASS21

Exclusion Criteria: 1) Receive low results from DASS21; 2) Patient with diabetes; 3) Patient with epilepsy
- **The sample size are determined based on the identified population and groups by using Analysis of Variance (ANOVA). The ANOVA uses F-tests to statistically assess the equality of means when you have three or more groups. It allows to calculate an ideal sample size given a desired level of precision, desired confidence level, and the estimated proportion of the attribute present in the population.**
- **Sampling Frame - Mental health candidates from services sector who met the mental health criteria as per the e-MAST questionnaires.**
- **Sampling Method(s) - Sampling involves non-random selection based on convenience or other criteria, allowing it to be easily collected the data.**



Instrument



Rekod DASS

NO	NAMA	SKOR KEMURUNGAN	SKOR TEKANAN	SKOR KEBIMBANGAN	TARIKH DIAMBIL	TINDAKAN
1	<input type="text"/>	Sederhana	Teruk	Sangat Teruk	2023-07-10 06:13:34	⋮
2	<input type="text"/>	Sederhana	Ringan	Sangat Teruk	2023-07-10 06:30:22	⋮
3	<input type="text"/>	Teruk	Sederhana	Sangat Teruk	2023-07-12 03:01:24	⋮
4	<input type="text"/>	Teruk	Sederhana	Sangat Teruk	2023-07-12 03:01:25	⋮

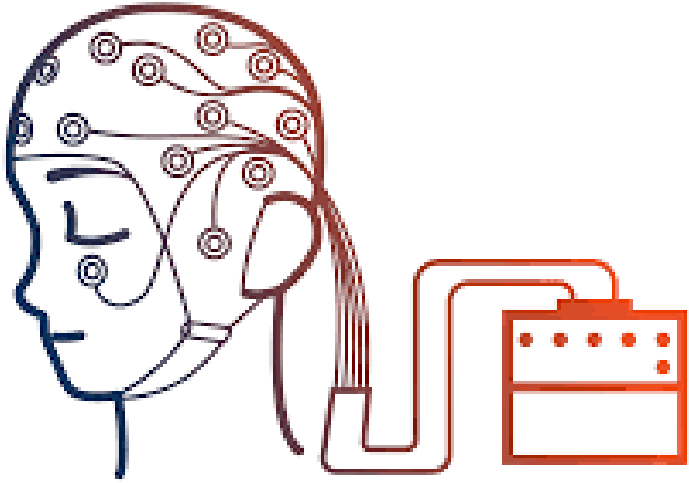
- We have distributed information to 157 agencies around Kuala Terengganu and Kuala Nerus. From this outreach, 30 agencies have agreed to join this program. Please refer to the list of all agencies at the following link:

https://docs.google.com/spreadsheets/d/1RV8_20U82UMgucjkgLgvlQgYa-9qCcGRAWBP-O3Mou4/edit#gid=0

- Out of the 30 participating agencies, approximately 273 respondents have filled out the DASS questionnaire on the e-MAST website."



THERAPY SESSIONS



01

Group 2 (aroma therapy based
sensational oil from Gelam
Tree)



BECK - PRE 1

From the e-MAST system, respondents will be asked to fill out a questionnaire

BAI - Beck Anxiety Inventory

BDI - Beck Depression Inventory

PREPARATION INSTRUMENT 2

- Respondents will be equipped with EEG and HRV monitoring.

PRE-THERAPY 3

- They will then rest for 5 minutes, during which their brain activity and heart rate will be recorded.

THERAPY SESSION 4

- Respondents will undergo only one therapy session (either deep breathing therapy, aroma therapy based sensational oil from Gelam Tree or Ruqyah technique based Quranic recitation and control group).
- Each respondent is required to attend 3 sessions, which each session lasting 15 minutes.

POST-THERAPY 5

- After the 15 minutes therapy session, the respondent will rest for an additional 5 minutes, during which brain activity and heart rate will be recorded again.

BECK-POST 6

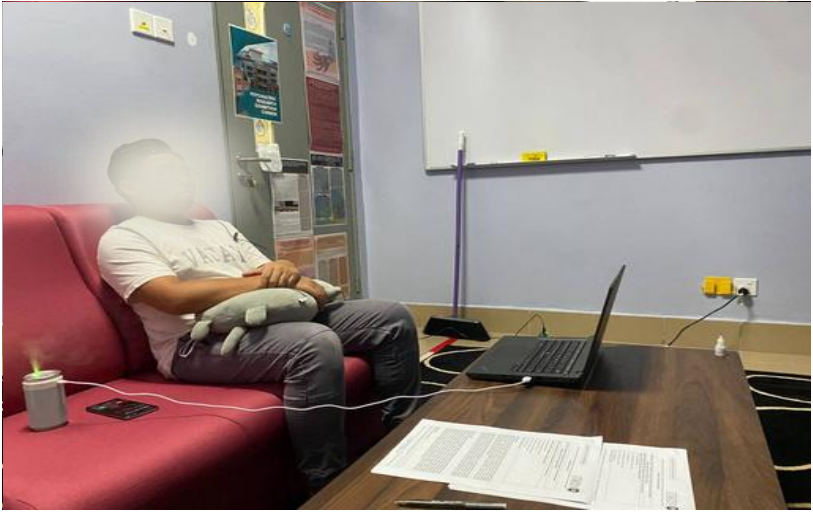
From the e-MAST system, respondents will be asked to fill out a questionnaire

- BAI - Beck Anxiety Inventory
- BDI - Beck Depression Inventory



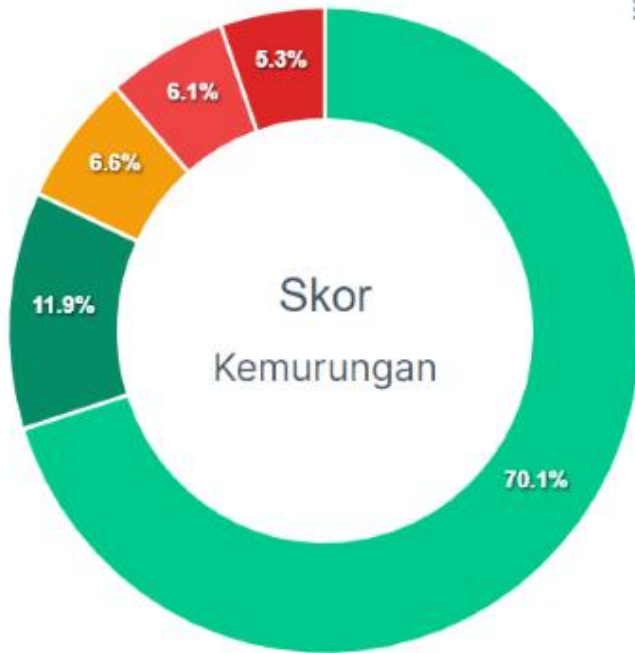
THERAPY SESSIONS

Respondents will undergo only one therapy session (aroma therapy based sensational oil from Gelam Tree).

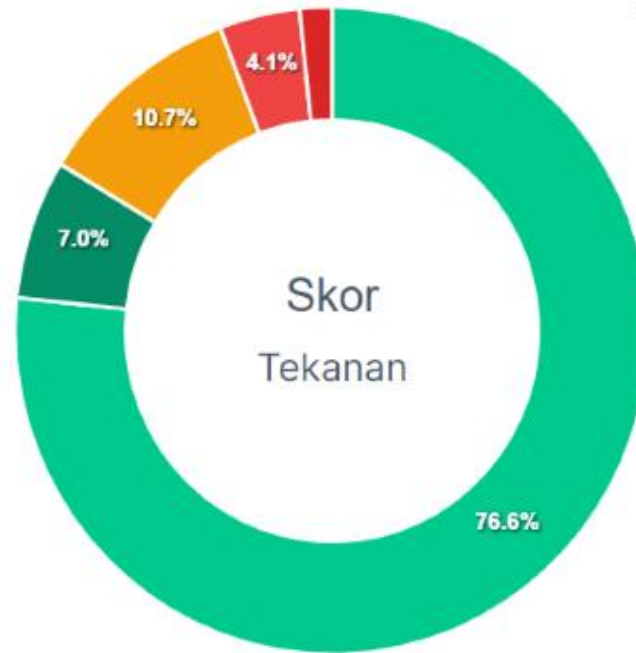


Results

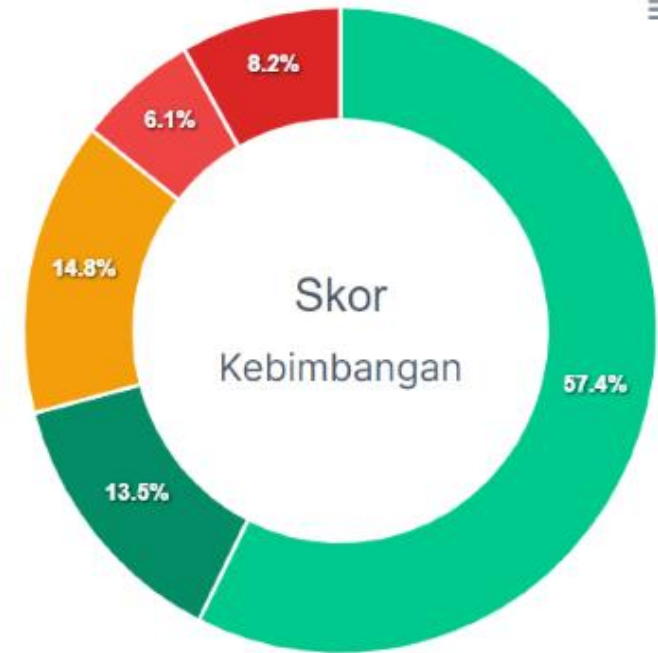
DASS Result on e-MAST



● Normal ● Ringan ● Sederhana ● Teruk
● Sangat Teruk



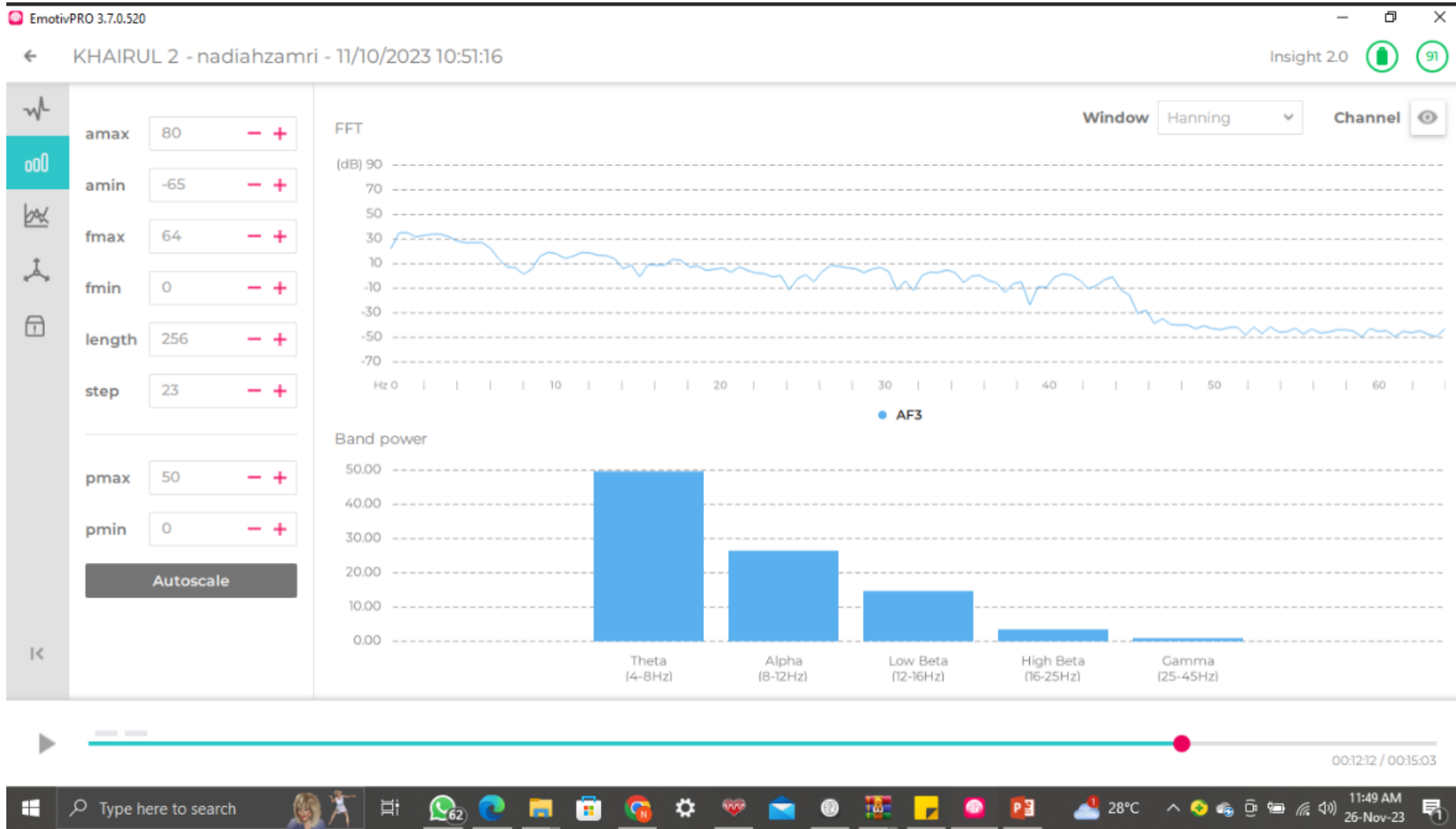
● Normal ● Ringan ● Sederhana ● Teruk
● Sangat Teruk



● Normal ● Ringan ● Sederhana ● Teruk
● Sangat Teruk



Raw EEG data retrieved from the therapy session.



Raw HRV data retrieved from the therapy session.



RESPONDENT 1

DASS	BDI	HRV	BAI																
<p>Depression-Very Severe</p> <p>Stress-Severe</p> <p>Anxiety-Severe</p>	<p>Before-Moderate</p> <p>After-Normal</p>	<table border="1"> <caption>Coherence Level Ratios Data</caption> <thead> <tr> <th>Date</th> <th>Low (%)</th> <th>Medium (%)</th> <th>High (%)</th> </tr> </thead> <tbody> <tr> <td>09-Oct-23</td> <td>~10</td> <td>~15</td> <td>~75</td> </tr> <tr> <td>09-Oct-23</td> <td>~20</td> <td>~15</td> <td>~65</td> </tr> <tr> <td>09-Oct-23</td> <td>~5</td> <td>~30</td> <td>~65</td> </tr> </tbody> </table>	Date	Low (%)	Medium (%)	High (%)	09-Oct-23	~10	~15	~75	09-Oct-23	~20	~15	~65	09-Oct-23	~5	~30	~65	<p>Before-Mild</p> <p>After-Normal</p>
Date	Low (%)	Medium (%)	High (%)																
09-Oct-23	~10	~15	~75																
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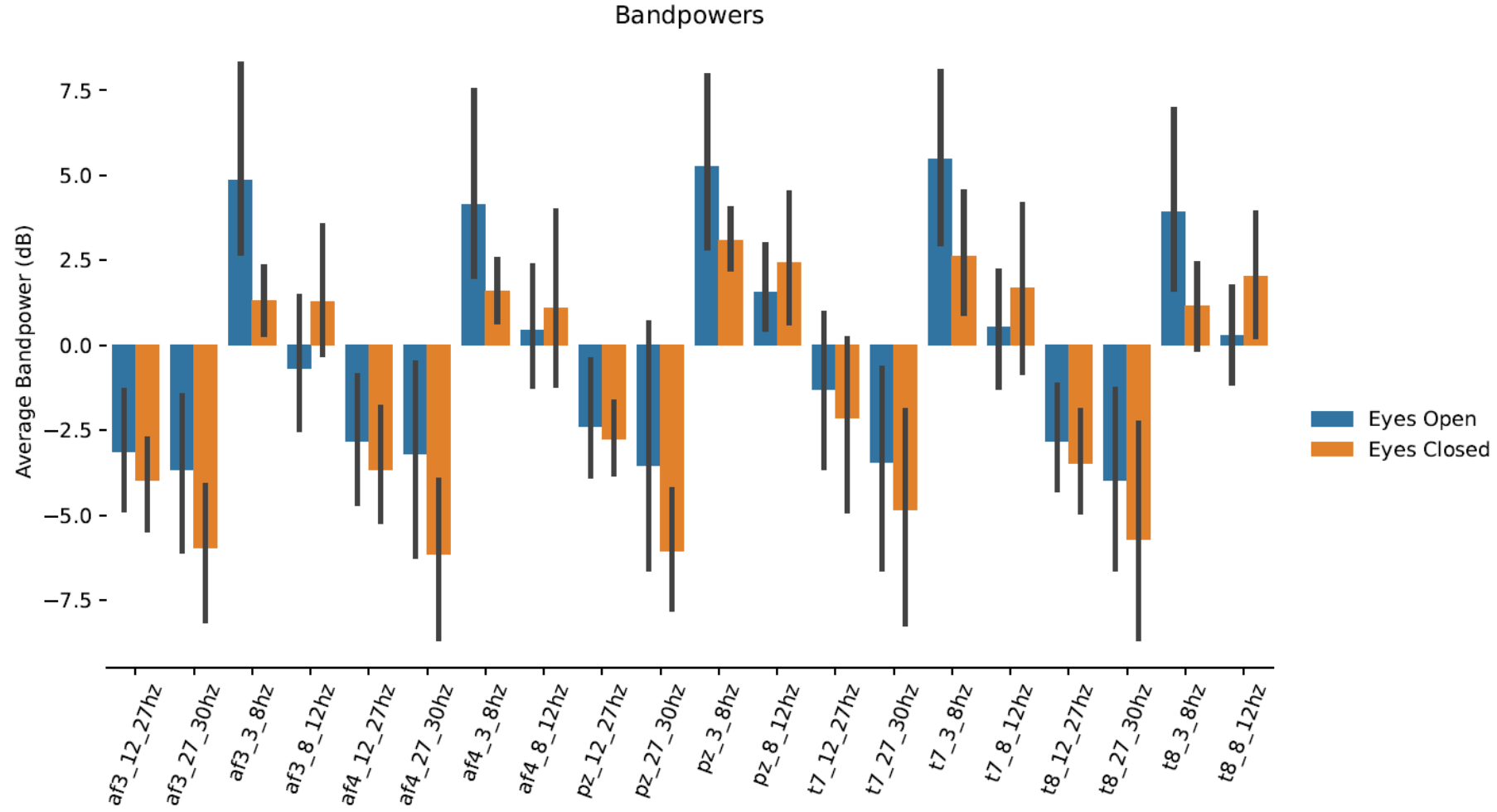
RESPONDENT 2

DASS	BDI	HRV	BAI																
Depression-Severe	Before-Normal	<table border="1"> <caption>Coherence Level Ratios Data</caption> <thead> <tr> <th>Date</th> <th>Low (%)</th> <th>Medium (%)</th> <th>High (%)</th> </tr> </thead> <tbody> <tr> <td>04/12/23</td> <td>0</td> <td>~10</td> <td>~90</td> </tr> <tr> <td>04/12/23</td> <td>~10</td> <td>~25</td> <td>~65</td> </tr> <tr> <td>04/12/23</td> <td>~18</td> <td>~32</td> <td>~50</td> </tr> </tbody> </table>	Date	Low (%)	Medium (%)	High (%)	04/12/23	0	~10	~90	04/12/23	~10	~25	~65	04/12/23	~18	~32	~50	Before-Normal
Date	Low (%)		Medium (%)	High (%)															
04/12/23	0		~10	~90															
04/12/23	~10	~25	~65																
04/12/23	~18	~32	~50																
Stress-Moderate	After-Normal	After-Normal																	
Anxiety -Moderate																			

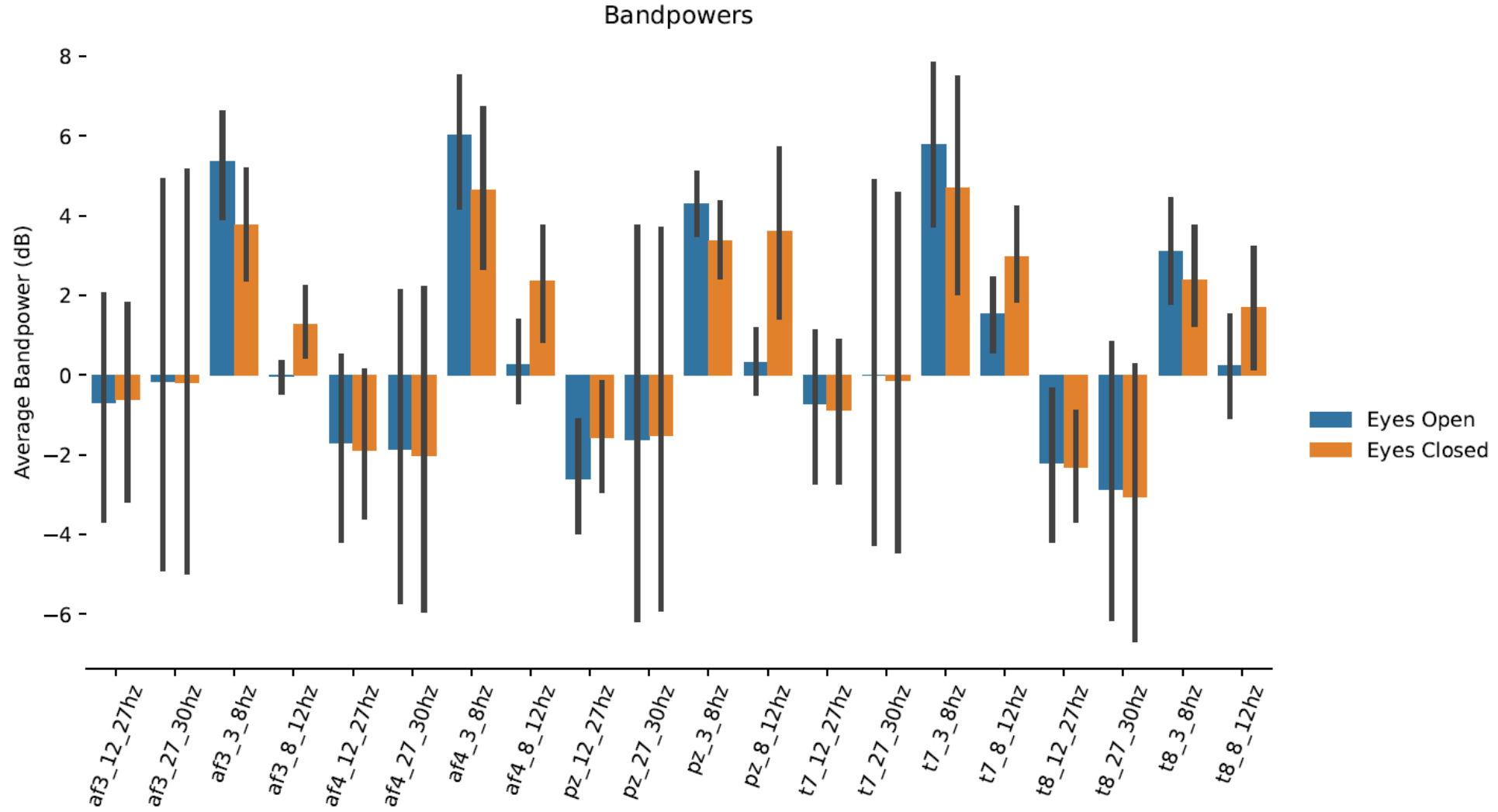
RESPONDENT 3

DASS	BDI	HRV	BAI																
<p>Depression-Mild</p> <p>Stress-Normal</p> <p>Anxiety –Moderate</p>	<p>Before-Mild</p> <p>After-Normal</p>	<table border="1"> <caption>Coherence Level Ratios Data</caption> <thead> <tr> <th>Date</th> <th>Low (Red)</th> <th>Medium (Blue)</th> <th>High (Green)</th> </tr> </thead> <tbody> <tr> <td>04/10/23</td> <td>~18%</td> <td>~25%</td> <td>~57%</td> </tr> <tr> <td>04/10/23</td> <td>~18%</td> <td>~12%</td> <td>~70%</td> </tr> <tr> <td>04/10/23</td> <td>~40%</td> <td>~20%</td> <td>~40%</td> </tr> </tbody> </table>	Date	Low (Red)	Medium (Blue)	High (Green)	04/10/23	~18%	~25%	~57%	04/10/23	~18%	~12%	~70%	04/10/23	~40%	~20%	~40%	<p>Before-Mild</p> <p>After-Normal</p>
Date	Low (Red)	Medium (Blue)	High (Green)																
04/10/23	~18%	~25%	~57%																
04/10/23	~18%	~12%	~70%																
04/10/23	~40%	~20%	~40%																

PRE-AROMA
THERAPY



POST-AROMA
THERAPY



COSH

2024

24th

CONFERENCE AND
EXHIBITION ON
OCCUPATIONAL
SAFETY AND HEALTH

SCICOSH

6th SCIENTIFIC CONFERENCE ON OCCUPATIONAL SAFETY AND HEALTH

THANK YOU