

Abstracts of Theses Approved for the PhD/MMed/MSc at the School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia

THE RELATIONSHIP BETWEEN RELIGIOUS PRACTICES AND RELIGIOUS COPING ON SEVERITY OF DEPRESSION

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Introduction: An illness such as depression, could have a complex set of aetiology, whereby religion can be among the contributing factors. Whereby studies have pointed towards both a positive as well as a negative coping associated with religion.

Objectives: This study was conducted to investigate the influence of different constructs of religiosity, such as religious practices and religious coping, on severity of depression.

Materials and Methods: All participants completed a set of demographics questionnaire, The Duke Religiosity Index (DUREL), The Brief Religious Coping Scale (Brief RCope), and Beck's Depression Inventory-II (BDI-II), which is to measure religiosity, religious coping and severity of depression respectively.

Results: It was observed that Organised Religious Activity (praying in places of worship or joining other religious activities with other congregants) and Negative Religious Coping (detached or unhealthy relationship with god) significantly predicted depression.

Conclusion: By further understanding how religion can mediate psychological well-being, it can better assist mental health professional in providing comprehensive treatment plan. Limitations of the study includes the recruitment of participants whom are mostly from Kuala Lumpur, as well as having participants of mostly Muslims.

Supervisor:
Professor Dr Rahmattullah Khan bin Abdul Wahab Khan

Co-supervisor:
Dr Mohamed Faiz bin Mohamed Mustafar

BE GRATEFUL: INVESTIGATING THE EFFECTS OF GRATITUDE LISTS ON PSYCHOLOGICAL WELL-BEING AND SELF-ESTEEM AMONG UNDERGRADUATES

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Objectives: The study aimed to investigate the effects of gratitude list on PWB among undergraduate students of UPSI.

Materials and Methods: A 2×3 mixed factorial ANOVA design was conducted to measure the difference between pre-test and post-test intervention scores among three groups (intervention, placebo and control), among a sample size of 53 participants. A total of 240 students were screened and 61 participants with low PWB scores were recruited to participate in the intervention. There were five dropouts and three outliers which were removed from the data analysis. The 42-item Ryff's PWB questionnaire and Rosenberg's 10-item SE questionnaire was used as a measure.

Results: Results indicated that there was a significant main effect of group on PWB ($F [2, 50] = 6.31; P = 0.004$), significant main effect of time on PWB ($F [1, 50] = 11.21; P = 0.002$) and a significant interaction effect between group and time on PWB ($F [2, 50] = 19.35; P > 0.001$). PWB improved for the intervention group but not for the placebo and control group. The manipulation check indicated that gratitude increased for the intervention group. Meanwhile, in the placebo and control group, there was no significant difference between the pre-test and post-test for gratitude, $p > 0.05$. In addition, PWB and SE were also positively correlated.

Conclusion: In conclusion, gratitude practice does indeed improve PWB and SE. By practicing gratitude, students were able to reflect and shift our perspective on the positives contributing to a great appreciation of life. Therefore, in order to live a more fulfilling life, engaging in gratitude practices should perhaps become a daily habit or better yet, a lifestyle.

Supervisor:
Dr Asma Perveen

THE RELATIONSHIP BETWEEN LIFE SATISFACTION AND SELF-ESTEEM WITH PERCEIVED STRESS AMONG ALUMNI OF UPSI

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Objectives: The main purpose of the current study was to investigate the relationship between life satisfaction and self-esteem with perceived stress among alumni of Universiti Pendidikan Sultan Idris. The study also was conducted to know whether life satisfaction and self-esteem can predict perceived stress.

Materials and Methods: Hundred and thirty participants whom are alumni of Universiti Pendidikan Sultan Idris were involved in the study. The study is conducted using a survey research. Three instruments namely, Perceived Stress Scale (PSS), Satisfaction with Life Scale (SWLS) and Rosenberg Self-Esteem Scale (RSES) were used in the survey research.

Results: The result of Pearson correlation coefficient showed that there is a correlation between life satisfaction and self-esteem with perceived stress. The result of multiple regression also indicated that life satisfaction and self-esteem are able to predict perceived stress.

Conclusion: For future study, it is strongly recommended that the questionnaires be translated into Malay Language as well as allow respondents to respond to the items if they have difficulty understanding the items in English as needed. This is also to ensure the accuracy and reliability of the data obtained.

Supervisor:
Dr Saeid Motevalli

THE RELATIONSHIP BETWEEN THE PROCRASTINATION AND FLOW STATE AMONG UNIVERSITY STUDENTS IN MALAYSIA

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Introduction: Procrastination is a common phenomenon among university students. It is related to plenty of problems which including poor academic performance and psychological distress. It is believed that students who experienced flow were less likely to procrastinate their task.

Objectives: The purpose of this study was to explore the relationship between flow experience and procrastination in first and final year Malaysian university students.

Materials and Methods: The study findings are to represent the population of university students in Malaysia. The sample is university students enrolled in UPSI. Students were recruited from a number of classes. The data were collected from 225 Malaysian undergraduates. The design of this study was quantitative methodology. It employed self-reported questionnaire where 16-item Tuckman Procrastination Scale was used to measure students' procrastination while 36-item FSS-2 assessed university students' flow experience.

Results: The study found most of students were procrastinators with moderate flow. It reported a significant weak negative correlation between procrastination and flow. The dimensions of flow accounted for a significant 30% of the variability in every student who procrastinate in doing tasks, $R^2 = 0.30$.

Conclusion: It suggested the students in their final semester tend to procrastinate more than first year. Therefore, this study benefits students to understand their flow experience in order to minimise academic procrastination.

Supervisor:
Dr Salami Mutiu Olagoke

IMPACT OF BODY-FOCUSED GRATITUDE ON ATTENTIONAL BIASES AMONG BODY-SATISFIED AND BODY-DISSATISFIED INDIVIDUALS UTILISING EYE-TRACKING SYSTEM: A PILOT STUDY

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Objectives: Individuals of different body dissatisfaction (BD) level might demonstrate various attentional biases towards body-related information, thus perpetuate social comparisons and negative self-evaluation. Moreover, gratefulness might have beneficial effects in reducing one's BD by redirecting attention towards own positive internal traits and possibly alter one's perception when viewing body images. Therefore, the present study aims to examine the association between gratitude intervention

and attentional biases among individuals of different BD, using eye-tracking paradigm.

Materials and Methods: A total of 24 participants from USM Health Campus, aged 19 years old–35 years old, were recruited and Body Shape Questionnaire (BSQ-8C) was used to measure their BD. Participants were asked to perform gratitude listing exercise in between of eye-tracking tasks. In the eye-tracking task, participants were shown 20 pairs of same-identity body images for pre- and post-intervention conditions with each image presented for 6 seconds. Dwell time, fixation count and first fixation duration were calculated for the total means per image types and AOIs. Mixed between-within group ANOVA were used to analyse the data.

Results: Main findings indicated that female participants of all BD to have attentional preference towards thin bodies, while not for male participants. Moreover, all participants were found to have greater eye-gaze allocation at the head as compared to other body parts. Although there were no significant difference found in participants' selective attention on image types, gratitude listing exercise appeared to affect the overall viewing pattern in body images.

Conclusion: Current findings demonstrated a general preference towards thinness among female participants of all BD. The tendency to view thinness as idealised body type might suggest upward social comparisons, which consequently promote negative self-evaluation and BD. Eye-tracking system could thus be utilised in early detection for those who at risk of eating disorders. The benefits from gratitude listing exercise in promoting one's body awareness and positive body image are worth to explore further.

Supervisor:
Dr Fatanah Ramlee

PERCEIVED STRESSORS, COPING STRATEGIES AND SOCIAL SUPPORT EXPERIENCED BY MOTHERS WITH CHILDREN WITH AUTISM SPECTRUM DISORDER IN SELANGOR

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Introduction: Autism Spectrum Disorder (ASD) is a rising neurodevelopmental disorder that affects not only the individual but also every single family member in that child's life. Autistic individuals struggle with multiple developmental delays such as speech, motor skills, play skills, sensory issues and the list goes. No one autistic individual is like the other. This poses a challenge for their caretakers, the parents.

Objectives: This study focuses on mothers as mothers are often the main caretaker and thus spend a large portion of their time caring and aiding the autistic individuals. All effort to which seems to be closely related to poorer mental health, higher rates of anxiety and depression and lower quality of life.

Materials and Methods: This study takes a qualitative approach on mothers experience with ASD children and focuses on three main aspects, stressors, coping strategies and social support. Fourteen mothers with ASD children within the Selangor area were interviewed.

Results: Themes emerged for stressors were post diagnosis stressors, on-going stressors, external stressors and future stressors. Themes for coping strategies used were to gain knowledge, make changes to life, maintaining self-control and practicing self-care and seeking solace in religion. Two themes emerged for social support with mothers receiving lack of understanding from others and identifying important support sources.

Conclusion: The results of this qualitative study reflects how complex the lives of mothers of ASD children are and more emphasis for family centered therapies should be practiced and endorsed.

Supervisor:
Dr Asma Perveen

DEPRESSIVE SYMPTOMS AS POTENTIAL MODERATOR AND MEDIATOR: REJECTION SENSITIVITY AND EMOTIONAL RECOGNITION OF FACIAL EXPRESSION IN ADULTS WHO ARE PURSUING TERTIARY EDUCATION

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Introduction: This research aims to extend some of research findings found in previous studies on rejection sensitivity level. Most research of rejection sensitivity was conducted in western country and none in Asian population. This research aims to investigate if the findings in Asian population is in line with findings in western population.

Objectives: Examine if there is a difference in rejection sensitivity level between male and female adults who are currently pursuing tertiary education; examine the relationship of rejection sensitivity level and emotional recognition of facial expression. Examine if depressive symptoms moderate or mediate the relationship of rejection sensitivity level and emotional recognition of facial expression.

Materials and Methods: This study is a correlational quantitative research design. Eighty-five participants were recruited for the study. Each participant was required to attend a face-to-face session and answered several self-report questionnaires which are Adults Rejection Sensitivity Questionnaire (ARSQ), Beck Depression Inventory, 2nd edition (BDI-II) and a computerised test named Emotion Recognition Task (ERT). Results was analysed using SPSS software. The difference in rejection sensitivity level was analysed using independent sample *t*-test, relationship of rejection sensitivity level and emotional recognition of facial expression as analysed using regression analysis and mediator and moderator effect was analysed using built in PROCESS in SPSS.

Results: Result from the study shows there is no significant difference in rejection sensitivity level between male and female adults who are pursuing tertiary education. There is also no significant relationship between emotional recognition of facial expression. Lastly, result indicates that depressive symptoms does not moderate or mediate the relationship of rejection sensitivity level and emotional recognition of facial expression.

Conclusion: Results obtained from the research within Asian population is not in line with results in previous research within western population. All hypothesis in research study failed to be rejected indicating non-significant results in all objectives. However, there are a lot of limitations identified in this research especially when research was conducted during the pandemic of corona virus 2019 (COVID-19).

Supervisor:
Professor Dr Hairul Anuar Hashim

Co-supervisor:
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THE EFFECTS OF AN ONLINE BRIEF MINDFULNESS ACTIVITIES TRAINING ON THE PSYCHOLOGICAL FUNCTIONING OF MEDICAL OFFICERS: A PILOT STUDY

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Introduction: Empirical evidence suggested that psychological interventions can be successfully delivered online. Medical officers are under high levels of stress as the main frontliners managing the COVID-19 pandemic alongside their day-to-day roles, family obligations and research work.

Objectives: This study aimed to examine whether a brief mindfulness activities training for medical officers improve outcomes for depression, anxiety, stress and mindfulness.

Materials and Methods: A randomised, controlled trial (RCT) was conducted at Hospital Universiti Sains Malaysia where participants were randomly assigned to one of four groups of: i) low frequency intervention group (daily session over a week), ii) medium frequency intervention group (daily session over two weeks), iii) high frequency intervention group (daily session over three weeks) or iv) the control group. Outcome measures included the Depression, Anxiety, and Stress Scale (DASS-21) and the Mindful Attention Awareness Scale (MAAS).

Results: Of the 22 participants, an increase in mindfulness, as measured by the MAAS, was found in the intervention group ($P = 0.002$). There was also a reduction in depression levels ($P = 0.01$) as measured by the DASS-21. The increase in mindfulness was observed in the low frequency and high frequency group, while the reduction of depression levels could not be observed between frequency groups. Participants self-reported increased relaxation and stress reduction.

Conclusion: This study provides insights into the feasibility and acceptability of an online, brief mindfulness activities training for medical officers. Findings will inform the future design and implementation of larger studies.

Supervisor:
Associate Professor Dr Azizah Othman

Co-supervisor:
Professor Dr Azizah Abdul Kadir

THE EFFECTS OF SINGLE SESSION INTERVENTION ON PERCEIVED CONTROL: A PILOT STUDY TESTING GROWTH MINDSET AMONGST MALAYSIAN ADOLESCENTS

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Introduction: Growth mindset has previously been used as a therapeutic content in ameliorating internalising symptoms amongst adolescents. Growth mindset has been associated with greater perceived control and cognitive flexibility which in turns reduces internalising symptoms. The current study aims to provide pilot data for a localized version of single session intervention utilising growth mindset as the therapeutic content in improving levels of perceived control amongst adolescents.

Objectives: The objectives of the pilot study are to adapt the single session intervention into local content and to investigate the efficacy of single session intervention on primary perceived control and secondary perceived control measures.

Materials and Methods: The current study utilise a within-subjects design with a total of 28 participants recruited. The levels of primary perceived control divided into three subdomains (social, academic and behavioural) and secondary perceived control were measured at baseline and post-intervention time points utilising the PCSC and SCSC as outcome measures. Every participant received the intervention session individually via online platform—Zoom for 2 h.

Results: The results indicate improved level of primary perceived control related to social situations and overall secondary perceived control. There were no significant effects observed for primary perceived control related to academic and behavioural domains. The implication and limitations of the current pilot study were discussed.

Conclusion: Growth mindset has shown to serve as potential therapeutic effect in increasing levels of perceived control amongst adolescents. This raises the possibility of utilising growth mindset with a single session format in order to strengthen the level of perceived control and facilitate therapeutic effects.

Supervisor:
Associate Professor Dr Azizah Othman

Co-supervisor:
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A QUALITATIVE STUDY OF OCCUPATIONAL STRESS AMONG ABA THERAPISTS WORKING WITH CHILDREN WITH AUTISM

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Introduction: Making a difference in the lives of children with autism have been gratifying for ABA therapists. It aimed to highlight the importance of their roles in providing ABA therapy for children with autism, simultaneously offering professional help for the parents. With more children being diagnosed with ASD, parents need professional help for their children with autism, showing the urgent need for ABA therapists. This study might help shine a light to ABA therapists as most studies mostly focus on the stress parents endure with children with autism. Therefore,

this study can bring attention to the role and importance of ABA therapists in society.

Objectives: The objectives of this study were to explore ABA therapists' experiences in occupational stress working with children with autism, their sources of stress as well as their coping strategies.

Materials and Methods: This is a qualitative study with a phenomenological design. A total of seven Malaysian ABA therapists were recruited using purposive and convenience samplings. All participants were virtually interviewed using Google Meet with a semi-structured format due to the Movement Control Order (MCO). The interviews were audio-recorded separately and privately in an individual session. The resulting transcriptions from the interviews were then analysed using thematic analysis.

Results: Themes obtained for the experiences of occupational stress are high-stress work and poor support from the management in the workplace. For sources of stress, the themes are role overload working with children with autism, working from home during Movement Control Order (MCO), powerlessness and challenging interactions with children with autism. As for coping strategies, the themes are self-care, grit towards working with children with autism and social support from colleagues.

Conclusion: In order to continue providing adequate services and therapy for children with autism, it is important that ABA therapists acknowledge their personal well-being by prioritising their mental health and continuing effective coping strategies such as reported in this study.

Supervisor:
Dr Mohd. Zulkifli Abdul Rahim

Co-supervisor:
Dr Asma Perveen

GUIDED IMAGERY RELAXATION TECHNIQUE: ITS EFFECT ON STRESS AND WELL-BEING OF PRIMARY SCHOOL CHILDREN IN KUBANG KERIAN, KELANTAN

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Introduction: With the global pandemic of COVID-19 circling around the world population since the beginning of 2020, to learn effective coping with negative emotional and behavioural experiences is especially a concern to the children and adolescents, who face restrictions on their physical movement and to do virtual learning at home.

Objectives: To study the effect of mindfulness-based approach, guided imagery relaxation technique on stress and well-being of elementary school children.

Materials and Methods: A randomised controlled trial study, pre-test post-test with a waitlist control group was designed to examine the objective stated above. Thirty-four Standard 5 Al-Biruni and Al-Farabi students of Sekolah Kebangsaan Kubang Kerian II (SKKK-II) participated in current study were randomly assigned to intervention ($N=17$) or waitlist-control ($N = 17$) groups. The participants from intervention group were required to attend four consecutive weekly monitoring session and practise to the audio guided imagery relaxation technique on daily basis. The children and their caregivers successfully completed the Stress in Children (SiC) Questionnaire Strengths and Difficulties Questionnaire-Parent Reported (SDQ-PR) and tracking form across pre- and post-intervention time points.

Conclusion: The insignificance of result could possibly be discussed from four different factors: time availability, drop-out and adherence rates, Internet accessibility and connectivity, and differences in between making physical and virtual contact. Several useful implications and limitations of current study as well as recommendations for future studies are being explored to gain insights about the result of present study and add up the mindfulness based intervention-related experience to fill in the existing gap of knowledge.

Supervisor:
Associate Professor Dr Azizah Othman

Co-supervisor:
Professor Dr Hairul Anuar Hashim

THE EFFECT OF VIRTUAL MODE DEEP BREATHING INTERVENTION ON ANXIETY AMONG PRIMARY SCHOOL CHILDREN DURING COVID-19 PANDEMIC

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Introduction: COVID-19 pandemic that hits the world in 2019 impacts people in various aspects of life including the psychological aspect. It has induced anxiousness among people due to the uncertainty and fear of the pandemic and it is not exclusive towards adults only. Concurrently, a national survey suggested the prevalence of anxiety among children in Malaysia is alarming.

Objectives: Due to that, the current study was conducted to investigate the effect of deep breathing on the level of anxiety among primary school children via virtual-based intervention as well as to examine its feasibility.

Materials and Methods: A pre-test, post-test randomised controlled design was carried out with 28 students at a primary school in Kelantan. The students in the intervention group participated in a 4-week deep breathing intervention with weekly meetings with the researcher, whereas the participants in the control group did not receive any intervention.

Results: A repeated-measures ANOVA was conducted and showed no significant difference between the intervention and control group after 4-week of intervention. However, a paired sample t -test indicated a significant difference in the level of state anxiety within the participants in the intervention group and no significant difference for the control group. In contrast, there was no significant difference in the level of trait anxiety for both groups.

Conclusion: Despite the primary findings showed no significant result, there was a trend of declination for both state and trait anxiety, particularly for state anxiety. Thus, it could be suggested that the deep breathing exercise could help in reducing the level of anxiety and it is simple, quick, and easy to be learned as well as applied by the children via virtual mode.

Supervisor:
Associate Professor Dr Azizah Othman

Co-supervisor:
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THE EFFECT OF GRATITUDE INTERVENTION ON ANXIETY AND DEPRESSIVE SYMPTOMS AMONG UNIVERSITY STUDENTS IN MALAYSIA

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Introduction: Gratitude has been found to be related to lesser depression and anxiety level. In this study, we tested the effectiveness of a newly developed gratitude intervention protocol which combines several gratitude-based activities that have been thoroughly studied in previous research with some modifications on the available activities.

Objectives: To measure the effect of the 4-week gratitude intervention programme on anxiety and depressive symptoms, positive affect, negative affect and gratitude.

Materials and Methods: Participants ($N = 43$) were recruited among undergraduate students of one public university in Malaysia. A total of 22 participants were assigned to the gratitude intervention group and another 21 participants were assigned to the control group. Instruments used to measure the outcome variables include the 21-item Malay translated Depression Anxiety Stress Scale (Malay-DASS), Positive and Negative Affect Schedule (PANAS), and the six-item Gratitude Questionnaire (GQ-6), given as pre- and post-assessment.

Results: The results of the study show that the gratitude intervention program led to a significant reduction in depressive and anxiety symptoms, lower negative affect, as well as increase in positive affect and gratitude level.

Conclusion: These findings suggest that gratitude intervention may be helpful to improve the psychological state of university students in Malaysia. These findings are in agreement with the broaden-and-build theory which suggests that gratitude as a positive emotion helps to broaden people's way of thinking instead of just focusing on the negatives. These skills developed from the experience of gratitude are important to help people cope with emotional difficulties and life adversities, which explain why the gratitude intervention caused reduction in depressive and anxiety symptoms.

Supervisor:

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EXAMINING THE EFFECTIVENESS OF SELF-COMPASSION INTERVENTION TO REDUCE BODY DISSATISFACTION AMONG MALAYSIAN YOUNG ADULTS

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Introduction: With the rise of mental health issues among adults, the exploration of psychological interventions can be diversified to cater to this need as a public health measure of improving general wellbeing. One issue of concern is body dissatisfaction which influences individuals' perception of their physical appearance negatively. Research shows high levels of self-compassion is positively linked to better aspects of mental health and has benefits for body dissatisfaction. Previous studies found benefits of self-compassion intervention in reducing psychopathology including symptoms of body dissatisfaction.

Objectives: The current study aimed to examine whether there is a benefit of self-compassion intervention techniques in reducing levels of body dissatisfaction among

young adults. To examine this, the pre-and post-experimental design was conducted to see whether online self-compassion intervention has benefits on two aspects which are self-compassion and body dissatisfaction.

Materials and Methods: Nine undergraduate students fully completed the brief online self-compassion group intervention. They participated in a bi-weekly 1-h online group intervention for four weeks, for eight sessions. Self-Compassion Scale (SCS) and Body Shape Questionnaire (BSQ) were used to measure their levels of self-compassion and body dissatisfaction respectively. The participant's pre- and post-intervention levels of self-compassion and body dissatisfaction were compared to identify any significant differences.

Results: Paired sample *t*-test showed no difference in both self-compassion levels and body dissatisfaction levels before and after the intervention.

Conclusion: The current study lacks a sample size to arrive at a conclusive result. However, the intervention did not negatively affect levels of self-compassion or body dissatisfaction and can be considered safe. Implications are discussed and recommendation for future research is included.

Supervisor:

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PERSONAL RECOVERY IN DEPRESSION: THE ROLE OF PEER SUPPORT IN MALAYSIA

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Introduction: Rising depression burden of disease on individuals themselves and society at large has spurred efforts to uncover appropriate recovery-oriented practices. In Malaysia, the role of peer support has not been adequately understood nor implemented into frameworks of recovery for depression despite its efficacy shown in overseas studies.

Objectives: This study investigates service users' experiences of personal recovery and its conceptualisations, processes and outcomes through peer support and peer support mechanisms that support personal recovery in depression.

Materials and Methods: A qualitative study design was undertaken and guided by the constructivist grounded theory methods with a pragmatic approach. Semi-structured

interviews were conducted with nine participants; verbatim transcripts were coded and analysed with a constant comparison method, until theoretical saturation was achieved.

Results: The analysis showed that personal recovery is conceptualised as a journey through the four prominent stages of: i) awareness, ii) acceptance, iii) adaptation and iv) advancement, generated by intrapersonal (i.e. cognitive flexibility and self-efficacy) and interpersonal (i.e. connectedness to support and resources and prosocial engagement) processes when service users are engaged in peer support mechanism consisting of identity (i.e. lived experiences and commonalities), relation (i.e. accessibility and safety) and impact (i.e. modeling and words) dimensions. These emergent concepts were integrated to construct the Peer Support Depression Recovery Framework.

Conclusion: Peer support in Malaysia is experienced as helpful for service users to catalyse personal recovery in depression, similar to preceding studies. The implications and limitations of this study are discussed along with recommendations for future studies.

Supervisor:

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Co-supervisor:

Associate Professor Dr Azizah Othman

THE EFFECT OF GENERAL AND BODY-SPECIFIC SELF-COMPASSION ON WOMEN'S BODY IMAGE AND SELF-COMPASSION VIA INSTAGRAM

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Introduction: Since the past decade, social media has been known for its negative effects towards body image. Recent studies have shown that social media can be used to deliver positive messages (e.g. self-compassion) as well.

Objectives: Thus, this study generally aimed to investigate the effects of viewing general and body-specific self-compassion captions and quotes on Instagram on women's body image and self-compassion. This study plays a role in understanding the positive use of social media in reducing body dissatisfaction which tends to lead to disordered eating behaviours and eating disorders.

Materials and Methods: A two (general self-compassion and body-specific self-compassion) × two (captions and quotes) between-group design was conducted among Malaysian women ($n = 144$) where they are briefly exposed to Instagram content that are conveying self-

compassion messages. The participants were also measured on their body dissatisfaction, body appreciation and self-compassion pre- and post-exposure.

Results: Results found that: i) there were no significant differences between pre- and post-exposure measures for all outcome variables, ii) there were no significant differences between general and body-specific self-compassion, and between captions and quotes, iii) appearance comparison and thin-ideal internalisation significantly predicted the outcome variables. The major findings showed that both type of self-compassion and type of Instagram content did not cause an effect towards women's body image. It also supported the role of appearance comparison and thin-ideal internalisation between media influence and body image.

Conclusion: This implies that the tripartite model and social comparison theory is supported. However, brief self-compassion exposure may not be enough to affect women's body image.

Supervisor:

Professor Dr Rahmattullah Khan bin Abdul Wahab Khan

EXPERIENCES TOWARDS DISTANCE EDUCATION DURING COVID-19: EXPLORING THE PSYCHOLOGICAL DISTRESS AND COPING STRATEGIES AMONG UNIVERSITY STUDENTS

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Objectives: The purpose of this exploratory study is to obtain first-hand accounts of Malaysian university students' experiences who had to continue distance education during COVID-19 pandemic disease period, about the psychological distress they experienced and the strategies to cope with the challenges in distance education.

Materials and Methods: The design of this study was qualitative and explorative in nature. One-to-one interview were carried out in individual setting with several semi-structured questions used as a guidance. A total of 10 participants were included in this research study.

Results: Nine themes emerged from the data regarding the causes of distress experienced by the final year university students. They are digital fatigue and technological difficulties, being trapped indoors, less opportunities to bond physically, poor discussion, adapting to new routine, poorer physical health and incompetency for clinical and technical skills. As for the coping strategies, two themes emerged from the data which are problem-focused and emotion-focused coping strategies.

Conclusion: In conclusion, the nine causes of distress are linked to increased risk factors of developing poorer mental health such as anxiety disorder and depression. The result of this study can help aid relevant agencies and groups to create effective strategies to tackle the students' concerns and create a better future for the education system in Malaysia.

Supervisor:
Mrs Nor Firdous binti Mohamed

A STUDY ON KNOWLEDGE, EXPERIENCE AND ATTITUDE OF TEACHERS TOWARDS AUTISM SPECTRUM DISORDER

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Introduction: The recent approach of the Malaysian education system to provide an equal education for individuals with special needs, including those with autism spectrum disorder has presented challenges for public school teachers.

Objectives: This study was conducted to investigate the relationship between the three main constituents of autism awareness; knowledge, attitude and experience.

Materials and Methods: In order to satisfy the main objective, quantitative research was designed, using Autism Awareness Scale. Hundred and twenty school teachers from the public schools around Johor Bahru were anonymously surveyed. Survey questions included: demographics, educating experience, professional development and/ or training, educators' knowledge about autism, educators' experience with individuals with autism and attitude towards them. Descriptive statistics, Pearson correlation and regression analysis were employed to analyse the data.

Results: Results highlight significant positive relationship between teaching experience and autism knowledge ($r = 0.87, P < 0.001$). Quantitative experience exhibits significant positive correlation with autism knowledge ($r = 0.71, P < 0.001$) and attitude ($r = 0.54, P < 0.001$). Based on the regression model the teachers' knowledge about autism predicts their attitude towards individual with autism.

Conclusion: Findings of this research are important in understanding the importance of increasing autism knowledge and exposure among school teachers in facilitating a quality learning environment for individuals with ASD.

Supervisor:
Dr Asma Perveen

A QUALITATIVE STUDY ON MALAYSIAN POLICE OFFICERS EXPERIENCES TOWARDS SUSPECTS WITH MENTAL ILLNESS

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Introduction: With the influx of individuals with mental illness in community and prison, law enforcers, specifically police officers, have become frontline professionals who manage these persons when they are in crisis. Despite that, little is known about police officers' experiences in this process especially in Malaysian settings.

Objectives: The present qualitative study aimed to explore police experiences towards suspect with mental illness.

Materials and Methods: Using in-depth semi-structured interview, a total of eight female police officers from Sexual, Women and Child Investigation Division (D11) of the Criminal Investigation Department took part in the study.

Results: Four main themes emerged from the thematic analysis which are: i) understanding of mental illness, ii) opinions towards suspects with mental illness, iii) interaction with suspects who are mentally ill, and iv) initiatives required to improved responses in mental illness.

Conclusion: These findings contribute to current understanding on Malaysian police settings specifically in mental health. Also, this study helps to raise awareness on police officers' current needs and initiatives needed to improve responses in mental health. Limitation of the study include the lacked actual representation of Malaysian police officers in the sample and possible interviewer bias. Future research should include police officers in different demographic such as male police officers, police officers from different division and police officers from other districts or states.

Supervisor:
Dr Fatanah Ramlee

THE ROLE OF PERCEIVED SOCIAL SUPPORT ON THE PSYCHOLOGICAL WELL-BEING BETWEEN DEPRESSED AND NON-DEPRESSED UNIVERSITY STUDENTS DURING THE COVID-19 PANDEMIC IN MALAYSIA

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Objectives: The present study aims to examine the role of perceived social support on psychological well-being between depressed and non-depressed university students during the COVID-19 pandemic in Malaysia.

Materials and Methods: A stratified sampling method was utilised to invite participants to participate in the online self-report questionnaires on Google Form and the inclusion criteria of being Malaysian citizens, 18 years old–25 years old and undergraduate students in Malaysia were written on the e-flyer and e-announcement.

Results: A total number of 244 (male = 112, female = 132) university students participated in the study and a prevalence rate of 50.41% of depression. The present study found a strong significant positive correlation between perceived social support and psychological well-being among depressed university students ($r = 0.769$). The present study reported there are significant differences on the perceived social support and psychological well-being between depressed and non-depressed university students. The present study discovered perceived social support from family and significant other was reported lowest among university students who experienced significant depressive symptoms. Their positive relations with others and self-acceptance on the domain of psychological well-being were also found to be weakest. Non-depressed university students reported significantly higher on their perceived social support and psychological well-being than university students with significant depressive symptoms. The significant role of perceived social support should be promoted as an effective intervention for university students due to its accessibility and cost during the period of the COVID-19 pandemic.

Conclusion: Future research should look into the effectiveness of perceived social support for university students with different mental health concerns.

Supervisor:
Mrs Nor Firdous binti Mohamed

THE PREDICTING EFFECT OF CHILDHOOD TRAUMA ON EMOTION REGULATION LEADING TO ANXIETY, STRESS AND DEPRESSION AMONG ADULTS IN MALAYSIA

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Objectives: The primary objective of the current study is to identify the predicting effect of childhood trauma on emotional regulation leading to anxiety, stress and depression among adults in Malaysia.

Materials and Methods: A cross-sectional survey method was adopted as the study design. An online survey which consist of three different instrument of measurement (Childhood Trauma Questionnaire [CTQ], Emotion Regulation Questionnaire [ERQ] and Depression Anxiety Stress Scale [DASS21]) was distributed out via emails and invitations through social media.

Results: A total of sample size of 390 (male = 207, female = 183) participated in the study. Participants were in the age range of 21 years old to 40 years old. The findings indicated that there is a significant predicting effect of childhood trauma on emotional regulation leading to anxiety, stress and depression among adults in Malaysia. Each type of childhood trauma was found to have a significant relationship with emotion dysregulation leading to potential development of psychopathology. The current study identified that childhood trauma affects the emotion regulation ability of an individual negatively which may cause a high chance of development of anxiety, stress and depression symptoms.

Conclusion: This study lays out a platform with the information given for future research to take place in order to have a deeper understanding on the etiology of psychopathology from different point of view and factors that can contribute to the onset of mental illness.

Supervisor:
Dr Asma Perveen

IDENTIFICATION OF ATTITUDES THAT PREDICT THE INTENTIONS OF PARENTS WITH SPECIAL NEEDS CHILDREN TO SEEK FOR PSYCHOLOGICAL HELP

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Objectives: The present study aims to examine specific attitudes that would predict the intention of parents with children with special needs to seek for psychological help.

Materials and Methods: A stratified sampling method was utilised to invite participants in an online self-report questionnaire on Google Form with the inclusion criteria that the respondent must be Malaysian, a parent whose child has been formally diagnosed with a disability, and that the respondents must be able to read and understand written English.

Results: A total of 150 (female = 99, male = 51) participated in this study whom were recruited across various social media platform, from parents with children

with special needs. The present study found two attitudes that were strongly endorsed by parents and have shown to be a significant contributor to the intention to seek for psychological help. These attitudes were “The idea of talking about problems with a psychologist strikes me as a poor way to get rid of emotional conflicts”, and “Considering the time and expense involved in psychotherapy, it would have doubtful value for a person like me”. The two attitudes relate to recognition of the value of and need for, treatment. Both items relate to recognition of problematic symptoms.

Conclusion: Therefore, the attitudes that are associated with intentions to seek personal treatment in this study relate to the recognition of symptoms, and the value of, and need for, professional help. Other than that, this study further determined with significant correlations that social-stigma, gender and age are contributory.

Supervisor:
Dr Asma Perveen

HAVE YOU ‘REDDIT’: ONLINE COPING AS A MODERATOR BETWEEN FREQUENCY OF SOCIAL MEDIA USE AND DEPRESSIVE SYMPTOMS IN THE R/MALAYSIA AND R/MYHAPPYPILL POPULATION?

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Introduction: The rise of social media use has created interest in researching how does it impact the health of its users. Some association has been shown to link depression with social media use. However, concurrent with the growth of social media is the increase engagement in online coping to mitigate stressors such as depression.

Objectives: The purpose of this was to investigate the presence of interaction of online coping between the relationship of social media use and depressive symptoms.

Materials and Methods: After initial screening process, A total of 135 participants from the subreddit r/Malaysia and r/Myhappypill answered the Beck Depression Inventory-II (BDI-II), Depression domain from DASS-21, the online coping scale and the Frequency of activity on Reddit, extracted and modified from the Media and Technology Usage and Attitudes Scale (MTUAS).

Results: Multiple regression analysis indicated that adaptation of online coping in the form of disengagement moderate the association between frequency of social media use and depressive symptoms ($R^2 = 0.185$). The prevalence of depression was also found to 68% within the r/Malaysia and r/Myhappypill.

Conclusion: There is an interaction between online coping and the relationship between frequency of social media use and depression. However, the interaction was only to be found with one out of three coping strategies. Future research calls for a more representative sample size and different forms coping.

Supervisor:
Dr Salami Mutiu Olagoke

THE RELATIONSHIP BETWEEN GRATITUDE AND RESILIENCE ON DEPRESSION AMONG MALAYSIAN ADULTS

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Introduction: To understand the relationship between gratitude and resilience on depression among Malaysian adults.

Objectives: The objectives of this research are to determine the relationship between gratitude, resilience, and depression among Malaysian adults, to determine the relationship between gratitude and depression among Malaysian adults, to determine the relationship between resilience and depression among Malaysian adults and to determine if gratitude is a predictor of depression among Malaysian adults.

Materials and Methods: Three hundred and nineteen participants from Kuala Lumpur and Selangor participated in the 4 months of an online survey through Google Form. Using Gratitude Questionnaire-6, Beck Depression Inventory-II, and Brief Resilience Scale to assess the gratitude, depression, and resilience levels.

Results: The results showed a negative but not significant relationship between gratitude and depression among Malaysian adults ($r = -0.135^*$, $P > 0.05$). There was no significant correlation, or positive and weak relationship between the resilience and depression of Malaysian adults ($r = 0.013$, $P > 0.05$). The results for the best contributors for depression is Gratitude ($\beta = -0.155$, $t = -2.640$, $P > 0.000$). While for resilience, as the value of standardised coefficient is a bit lower ($\beta = 0.064$, $t = 1.087$, $P > 0.000$).

Conclusion: This indicates that there is no correlation between gratitude, resilience and depression because both variables have no significant result. Therefore, it is suggested that gratitude and resilience have no significance on depression among Malaysian adults.

Supervisor:
Dr Asma Perveen

Co-supervisor:
Associate Professor Dr Azizah Othman

THE MENTAL HEALTH IMPACT ON HEALTHCARE WORKERS DURING THE COVID-19 PANDEMIC IN HOSPITAL SUNGAI BULOH

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Introduction: COVID-19 is the latest pandemic in the 21st century to have made its way to every corner of the globe. The number of cases in Malaysia had a high peak of 20,000 cases per day. Death was rampant and the healthcare system was at full capacity. This made working conditions for the healthcare workers stressful and hazardous which led to an increase in risk of healthcare workers developing some form of psychological distress. As seen in past pandemics, healthcare workers are at high risk of developing psychological distress due to their sociodemography and working environment.

Objectives: This research was conducted to determine if there are any mental health impacts amongst healthcare workers in Sungai Buloh Hospital during the COVID-19 pandemic.

Materials and Methods: A quantitative, non-experimental cross-sectional survey was performed amongst the healthcare employees in Hospital Sungai Buloh. Two instruments were used in this research which is the DASS-12 and ISI in order to measure the variables being studied—depression, anxiety, stress and insomnia.

Results: A total of 119 healthcare workers took part in this study, where 97.5% were female, 33.6% were between the ages of 30 years old to 34 years old, 89.9% were married and 91% were nurses. Based on the results obtained, out of 26 hypotheses, six were rejected. The allied health group reported a higher number of psychological distress (anxiety and insomnia) with higher severity compared to the medical professionals. It was also found that older staff reported higher psychological distress compared to the younger staff. The finalised model is complex with four sub-models: stress, insomnia, anxiety, depression.

Conclusion: This study showed that there were significant psychological distresses being experienced amongst the healthcare workers. This emphasised the need for psychological intervention or services to the healthcare workers, in order for them to be able to better cope and attend to their mental health needs. This study also makes the point of raising awareness and upholding the importance of taking care of one's own mental well-being and actively engaging in activities that reduce stressors contributed by

the pandemic or encouraging healthcare workers to seek out help.

Supervisor:
Dr Asma Perveen

Co-supervisor:
Associate Professor Dr Geshina Ayu Mat Saat

PERCEIVED SOCIAL SUPPORT AS THE MEDIATOR BETWEEN RELIGIOUSNESS AND DEPRESSION AMONGST MALAYSIAN ADOLESCENTS

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Introduction: Depression has been a concerning issue worldwide, especially during the COVID-19 outbreak, people are more vulnerable to developing depressive symptoms. Particularly adolescents as many religious social activities are prohibited which may be a risk factor for developing depression as religious activities provide people opportunities to develop social connections and support.

Objectives: Therefore, the current study aims to examine the mediation role of social support in the relationship between religiousness and depression among Malaysian adolescents.

Materials and Methods: This study is a cross-sectional quantitative study, and a self-report survey method was used to collect data. 128 participants were recruited through the purposive sampling technique as only the participants who hold either Islamic, Christianity or Buddhism beliefs would be accepted. The Religious Commitment Inventory-10 (RCI-10), the Multidimensional Scale of Perceived Social Support (MSPSS) and the Beck Depression Inventory (BDI-II) were used to measure religiousness, social support and depression levels.

Results: Logistic regression path analysis results evidenced social support as a significant mediator in the negative relationship between religiousness and depression ($a*b = -0.13$, Bootstrap CI95 = -0.25 and -0.05). However, after controlling for social support, religiousness was indicated to have no significant effect on depression, $b = -0.015$, $t(126) = -1.50$, $P > 0.001$.

Conclusion: To conclude, the findings have filled in the gap regarding social support as a significant mediator in the relationship between religiousness and depression in the Malaysian context regardless of different religions. This study reasserts the Uncertain-Identity Theory that religions are meaning-making frameworks that provide social

identification, connection, and a sense of certainty. Hence, self-related uncertainty could be reduced and promote good mental health.

Supervisor:
Dr Salami Mutiu Olagoke

Co-supervisor:
Dr Asma Perveen

THE RELATIONSHIP BETWEEN DEPRESSION, LONELINESS AND THE PATTERN OF SOCIAL MEDIA USAGE (SMU) AMONGST MALAYSIAN YOUNG ADULTS

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Introduction: Social media (SM) has gained rapid adoption and provided new opportunities for communication. However, the usage in social media was reported significantly associated with the well-being of mental health.

Objectives: The purpose of this study is to investigate the relationship between depression, loneliness, and social media use (SMU) pattern (active and passive) among young adults in Malaysia.

Materials and Methods: Depressive symptoms were measured using the Patient-Reported Outcomes Measurement System (PROMIS) scale and loneliness symptoms were measured using the revised University of California, Los Angeles (UCLA) Loneliness scale. Both passive and active SMU were measured with seven items originally developed for general Internet use. A snowball sample of participants ($N = 111$) was collected from different social media platforms and correlation analysis was used to test the hypothesis.

Results: The results of this study show that there is no significant relationship between depression and the pattern of SMU but the relationship between loneliness and the pattern of SMU has appeared to be significant. The pattern of SMU is more relevant to loneliness issues in comparison with depression among the Malaysian population.

Conclusion: The alterations of social interaction during the pandemic of coronavirus could be the major reason of the significant results between the pattern of SMU and loneliness. This study has also extended the concepts of active SMU and passive SMU by exploring the relationships with mental health issues. The proposed theories (Social Compensation Theory and Erikson's Stages of Development) are helpful to understand the behaviour in using social media by focusing on the development of young adults. The findings

in this study enriches the existing literature and provides important practical implications.

Supervisors:
Professor Rahmattullah Khan Abdul Wahab Khan
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Co-supervisor:
Associate Professor Dr Geshina Ayu Mat Saat

MENTAL HEALTH HELP-SEEKING BEHAVIOR: THE INFLUENCE OF MENTAL HEALTH LITERACY AND SELF-STIGMA OF SEEKING HELP

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Introduction: The prevalence of mental illness rate among Malaysian workers are alarming, yet the frequency of help-seeking is low. Understanding factors influencing help-seeking such as mental health literacy and self-stigma is useful to investigate since past studies are limited.

Objective: Primary objective of this study is to examine the relationship between factors influencing mental health help-seeking behaviour and identify the strongest factors influence mental health help-seeking behaviour among civil servants in Wilayah Persekutuan Putrajaya.

Materials and Methods: This study adopted a cross-sectional quantitative survey design which is an online survey that required participants to answer questions through the online form link distributed. Mental Health Literacy Scale (MHLS), Self-Stigma of Seeking Help (SSOSH) and Mental Help Seeking Intention Scale (MHSIS) are used in this study. Civil servants from various ministries and departments in Wilayah Persekutuan Putrajaya ($N = 394$) completed the online survey.

Results: The finding revealed the level of mental health literacy of civil servants is moderate while the level of self-stigma is low. The Pearson correlation between mental health literacy and mental health help-seeking behaviour showed a positive, weak correlation ($r = 0.321$). The Pearson correlation between self-stigma of seeking help and mental health help-seeking behaviour showed a negative, moderate correlation ($r = -0.441$). The strongest factor that influenced mental health help-seeking behaviour was self-stigma.

Conclusion: In summary, mental health literacy positively influences mental health help-seeking behaviour among civil servants in WP Putrajaya. On the other hand, self-stigma of seeking help is a negative factor that can affect mental health help-seeking behaviour among the civil servants in Wilayah Persekutuan Putrajaya.

Supervisor:
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THE ROLE OF RESILIENCE IN MEDIATING ATTACHMENT STYLE AND ANXIETY IN UNIVERSITY STUDENT

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Introduction: Anxiety has always been a growing interest across various population. University students were one of those population that experienced or experiencing anxiety due to various stressors. Despite the present stressors, the outbreak of COVID-19 heightened their anxiety level, which was alarming to mental health and psychological well-being.

Objectives: Keeping that in mind, the present study investigated the relationship between parental attachment and anxiety in university students, as well as the mediating role of resilience and difference in anxiety level among four types of attachment style (secure, preoccupied, dismissing and fearful).

Materials and Methods: In total, 90 university students were recruited by convenient sampling method. Data was collected through administering the Relationship Scale for attachment style, Brief Resilience Scale and Beck Anxiety Inventory virtually using Qualtrics.

Results: The results showed that: i) anxious attachment predicted anxiety level but not avoidant attachment, ii) resilience played a mediating role between parental attachment and anxiety, and iii) there was no significant difference in anxiety level across different attachment style.

Conclusion: These findings revealed that the mechanism of parental attachment affecting anxiety and that resilience mediated the mechanism. The study contains theoretical and empirical value for enhancing the strength of students' resilience and alleviating anxiety via identifying their attachment style. Future research is encouraged to explore the mechanism of resilience and attachment style on various mental health as they could be effective interventions for clinicians and counsellor to provide treatment.

Supervisor:
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Co-supervisor:
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SCHIZOTYPY AMONG MALAYSIAN ADULTS AND ITS RELATIONSHIPS WITH THE BIG FIVE TRAITS

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Introduction: Schizotypy is a useful framework to investigate the aetiology, development, course and prevention of schizophrenia-spectrum disorders. There have been unresolved arguments as to whether its underlying structure is categorical or dimensional. Factors influencing its manifestations are also rarely examined in the Malaysian context.

Objectives: This quantitative cross-sectional online survey aimed to clarify the underlying structure of schizotypy by investigating its relationship with the Big Five traits. This study also aimed to examine the sex- and ethnic-related differences in schizotypy among Malaysian adults, after controlling for their health status.

Materials and Methods: Schizotypy and the Big Five traits were assessed using the Schizotypal Personality Questionnaire Brief Revised (SPQ-BR) and Big Five Inventory-2 (BFI-2). The questionnaires were administered online to a convenience sample of 271 participants (131 males, 141 females) from Malay ($n = 82$), Chinese ($n = 100$) and Indian ($n = 89$) ethnics, recruited from Kuala Lumpur, Selangor and Johor.

Results: Weak to moderate ($r = 0.10-0.46$) correlations were found between SPQ-BR and BFI-2 domains. Only neuroticism showed positive correlation with schizotypy, whereas the other four traits demonstrated negative correlations. MANCOVA revealed main effects of sex and ethnicity and sex \times ethnic interaction in all SPQ-BR domains and total scores. The follow-up ANCOVA only found a main effect of ethnicity in disorganized schizotypy. Pairwise comparison revealed that Chinese participants had higher disorganised schizotypy than Indian participants.

Conclusion: The linear relationships between schizotypy and the Big Five traits support the dimensional model, which views schizotypy as a personality trait normally distributed in the population. The sex- and ethnic-related differences in schizotypy suggest that complex bio-psycho-social interactions are involved in its development.

Supervisor:
Dr Asma Perveen

RELATIONSHIPS AMONG ANXIETY, DYSFUNCTIONAL SLEEP BELIEFS AND SLEEP QUALITY AMONG UNIVERSITY STUDENTS

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Introduction: The well-being of university students is deteriorating at an alarming rate, in which their sleep quality is declining and anxiety is rising dramatically. Dysfunctional sleep-related cognitions have been found to be associated with poor sleep quality. However, only few research has been conducted to examine the relationships among anxiety, dysfunctional sleep beliefs and sleep quality among university students in Malaysia.

Objectives: This study aimed to identify the levels of anxiety, dysfunctional sleep beliefs and sleep quality as well as to examine the relationships among these three variables among university students.

aterials and Methods: Cross-sectional correlation design was used in the study. Questionnaire which comprises the Beck Anxiety Inventory (BAI), Dysfunctional Beliefs and Attitudes about Sleep Scale-16 (DBAS-16) and Pittsburgh Sleep Quality Index (PSQI) was distributed through social media. The data from 133 undergraduate university students was analysed.

Results: It was revealed that the levels of anxiety and dysfunctional sleep beliefs among the university students were moderate while their sleep quality was poor. Besides, significant associations were found between anxiety and sleep quality ($\rho = 0.45, P < 0.01$) as well as between dysfunctional sleep beliefs and sleep quality ($\rho = 0.28, P < 0.01$). Also, anxiety was identified as a better predictor of sleep quality ($\beta = 0.10, P < 0.01$) compared to dysfunctional sleep beliefs ($\beta = 0.12, P > 0.05$).

Conclusion: Results indicated that necessary steps should be taken to improve the university students' sleep quality. Anxiety and dysfunctional sleep beliefs could be the elements of the interventions but tackling anxiety might be more effective as it was demonstrated to be the best predictor of sleep quality.

Supervisor:
Dr Fatanah Ramlee

Co-supervisor:
Dr Mohamed Faiz bin Mohamed Mustafar

NEURAL SIGNATURE ON EASY TO DIFFICULT LEVEL OF N-BACK WORKING MEMORY LOAD TASKS IN HEALTHY SUBJECTS—A STUDY OF COGNITIVE PROCESSING USING EEG

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Issue in cognitive process is linked with deficit of working memory. The purpose of this study is to assess the neural processing during easy to difficult level of n-back working memory load task in healthy subjects from EEG data. Twenty-eight healthy subjects (25 male, 3 female) who have completed at least 9 years of education were involved in the experiment. They were required to complete four level of working memory load task which level as easy (0-back to 1-back), moderate (2-back) and difficult (3-back). Instructions were provided before each task start. Cross-sectional design with convenient sampling was applied in the study. EEG was recorded using ANT Neuro 64-channel. Data was collected with participant consent form and pre-processing was done in Besa Research 6.1 software. The processed data then analyse with one-way ANOVA and Friedman test where $P < 0.05$. Theta oscillation shows it was statistically difference in frontal [F (3, 108) = 10.91, $P = 0.000$], central [F (3, 108) = 14.11, $P = 0.000$], left temporal [F (3, 108) = 5.24, $P = 0.002$], right temporal [F (3, 108) = 4.09, $P = 0.009$], parietal [F (3, 108) = 3.83, $P = 0.012$] and occipital [F (3, 108) = 4.40, $P = 0.026$]. Additionally, central theta indicated 0-back was statistically significant difference in all conditions of n-back working memory load task ($P < 0.05$). There was only certain n-back working memory load task show statistically mean difference in another region. Gamma shows statistically difference between 0-back and the increase level of n-back working memory load tasks, $c_2(23) 296.962, P < 0.000$. Bonferroni correction revealed that gamma was statistically difference in the right temporal on 0-back with 1-back ($P = 0.016$), 2-back ($P = 0.023$) 3-back ($P = 0.030$) and left temporal on 0-back with 3-back ($P = 0.009$). All other regions do not show any significant finding for gamma oscillations apart from the two regions of left and right temporal. The EEG results generally indicated that increase of working memory load influences the decline of theta oscillatory whereas gamma oscillation occurs in two regions with specified working memory load task condition. Thus, the study presented the role of WM component such as attention, inhibition and recall in healthy adults.

Supervisor:
Dr Mohammed Faruque Reza

Co-Supervisor:
Professor Dato' Dr Jafri Malin bin Abdullah

NEURAL CORRELATES OF EMOTIONAL AROUSAL PROCESSING IN N200 AND P300 EVENT-RELATED POTENTIAL (ERP) COMPONENTS: A STUDY IN YOUNG ADULT MALAYSIAN

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The event-related potentials were ideally suited for the study of cognitive processes comprising high temporal resolution as it was for the study of the processing of emotional regulation in the whole of neuroscience and psychological field. This study aims to determine the difference of amplitude and latency of N200 and P300 ERP component as evoked by different levels of visual arousal stimulus and to identify which part of the brain was involved in emotion processing. A total of 30 participants between age of 18 years old–24 years old participated for this cross-sectional study which were recruited from Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan. Affective visual stimuli were chosen randomly from the International Affective Picture System (IAPS) based on the normative value given and the pictures were grouped into three levels of arousal (low, moderate and high). An event-related potential (ERP) recording using 128 HydroCel Geodesic Sensor Net was done on participants during the passive viewing of the affective visual stimuli. A non-parametric test (Friedman test) indicated that all the midline electrodes (Fz, Cz, Pz and Oz) were statistically not significant ($P > 0.05$) with regards to different arousal levels of affective visual stimuli (low, moderate, and high), except for electrode Cz N200 latency a statistically significant result was shown ($\chi^2 = 12.940$, $df = 2$, $P = 0.002$). Hence, follow up post hoc analysis using the Wilcoxon signed-rank test (adjusted bonferroni α of 0.017) results indicated that there was no statistically significant difference between N200 latency Cz low and Cz high ($z = -1.78$, $P = 0.075$) or between the Cz moderate and Cz high ($z = -1.190$, $P = 0.234$). However, Wilcoxon post-hoc test indicated that the low arousal (mean rank = 1.53) was perceived as significantly more aroused (shorter time were taken) than the moderate arousal, in which the latency was longer for Cz electrode (mean rank = 2.45, $t = 79$, $z = -2.83$, $P = 0.005$). There were no differences for source localisation between both N200 and P300 ERP components which was found to be located in the temporal lobe but with a separate Brodmann area (BA). In addition, low and moderate arousal was found in the BA 20 while high arousal was found in the BA 38. Low arousal images display a higher stimulation compared to moderate and high images. This is because it includes memory that we call as priming under implicit memory (recognition task). Besides, we can say that different individuals respond differently to each situation, since the brain is still controlled. Some people will need a greater degree of stimulation, which would inspire them to look for relaxing and enjoyable experiences. Others

may do best at low levels of arousal, and may feel motivated to look for calming and stimulating tasks.

Supervisor:
Dr Mohd Nasir Che Mohd Yusoff

Co-supervisor:
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ATTENTION CUES FOR GAME-BASED LEARNING IN XYZ: AN EYE TRACKING STUDY ON DIGITAL GAME

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Attention cueing has been widely discussed in multimedia learning but studies focusing on game-based learning (GBL) are still very limited. Attention cue and GBL were both contribute to enhance learning outcome but cueing effect in GBL is still subtle. Eye tracking methodology helps in examining the cueing effect in GBL and learning performance which were examined through the knowledge transfer test. This study primarily aims to examine how the cueing effect in game-based learning influences eye movements and knowledge transfer performance. Eye movements and knowledge transfer performance of 34 first-year medical students (cue group, $n = 17$; no cue group, $n = 17$) were assessed using eye tracking methodology and knowledge transfer test. The observed eye movement parameters was time to first fixation, first fixation duration, average fixation duration, fixation count, saccade count and average saccade duration during the game-based learning. A pre-test and post-test were used to examine the knowledge transfer performance. Eye movement parameters and knowledge transfer test scores were compared among cue and no cue groups. Eye movement results showed that the time to first fixation for size cue group had a statistically significant difference from no size cue group while first fixation, average fixation duration, fixation count, saccade count, average saccade duration showed no statistically significant differences between the two groups. All of the eye movement parameters revealed no statistically significant differences between the colour cue and no colour cue groups. A statistically significant difference was found only in no cue group instead of cue group for knowledge transfer performance, and only no size cue group revealed the statistical improvement in knowledge transfer score. Reaction time to AOI also showed no statistically significant differences between both groups. Utilizing eye tracking method can help researchers to understand learner's cognitive processes during the game-based learning. Implementation of salient size cue could guide learner's attention to relevant information but is unnecessarily improve the learning outcome. This study concluded that

proper cue may guide learner's attention, and game-based learning has the potential to improve learning outcome.

Supervisor:

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Co-supervisor:

Associate Professor Ts Dr Tan Wee Hoe

ALPHA AND LOW GAMMA EMBEDDED WITH WHITE NOISE BINAURAL BEATS MODULATING ATTENTIONAL FOCUS AMONG MALAYSIAN YOUNG ADULTS: A PRELIMINARY STUDY USING FUNCTIONAL MAGNETIC RESONANCE IMAGING (FMRI)

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Introduction: Currently, there are many investigations of possible methods for attentional function improvement, which few are already established by the community. Binaural auditory beats (BB) has recently been identified as a plausible utility.

Objective: The main objective of the current study was to examine the behavioural performance (reaction time and accuracy) and neural correlates related to attentional focus (AF) modulated by BB.

Materials and Methods: Six young adults ($M = 23.67$, $SD = 0.816$) participated in this study. The current study was outlined according to a repeated-measures design. The experimental study commenced with pre-tests to check participants' inclusion and exclusion criteria, especially of attentional and hearing abilities. The main experimental sessions consisted of attentional tasks before and after each type of auditory stimuli. Each task was completed in an MRI scanner for 10 minutes. The utilised auditory stimuli were regarded as alpha embedded with white noise (AWN) and low gamma embedded with white noise (GWN), in which the frequency difference of the former and latter respectively produced alpha and gamma BB that was embedded with white noise (WN). Each stimulus was presented for 16 min in a sparse paradigm. Pink noise was presented after each BB type for one minute. Behavioural performance was analysed according to a two-way repeated-measures ANOVA whereas neural correlates of AF modulated by BB was analysed according to a full factorial ANOVA.

Results: A significant difference in reaction time (RT) ($F[1, 5] = 90.78$, $P < 0.001$) and accuracy ($F[1, 5] = 244.00$, $P < 0.001$) was only shown for stimuli type. Nevertheless, there was no significant difference in terms of the sessions. The findings of neural correlates comparisons based on the BB applicability sessions showed varied activations. However, each comparison yielded activations of neural correlates which are related to the domain of attention such as superior frontal gyrus, middle frontal gyru, inferior frontal gyrus dan inferior parietal lobule. The findings of brain activation for

BB type were also varied, where alpha BB produced by AWN showed wide activations in central, temporal, sub cortical, occipital, limbic and frontal areas, whereas gamma BB produced by GWN were more focused in frontal, sub cortical, cerebellum dan limbic regions.

Conclusion: The current preliminary study shows that AF was not modulated by any type of BB despite there was a slight improvement after application of alpha BB which was followed with low gamma BB and baseline. Each type of BB exposure elicited different activated regions which might have later influenced the neural activations of AF processes. Further future investigation is needed to examine the possibility of AF modulation by BB through the improvement of study design and increasing sample size.

Supervisor:

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Co-Supervisor:

Dr Mohamed Faiz bin Mohamed Mustafar

VISUAL PERCEPTION OF ABSTRACT ART IMAGES IN EXTRAVERSION AND AMBIVERSION AT P300 AND N200

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Introduction: Over decades, psychologist has been trying to bridge the gap between art preference and personality. Art and personality as we know are difficult areas to quantify. Therefore, social neuroscientist tried bridging the gap between art, personality, arousal intensity and neural substrates.

Objective: This study aims to investigate the differences of neural substrates in abstract art of extraverts and ambiverts in the processing of emotion using the Event Related Potential (ERP) as well as its source of localisation of N200 and P300 in the emotional processing of the two personalities—extraverts and ambiverts.

Materials and Methods: A total of 28 participants ($N = 14$ for each personality) aged 18 years old–25 years old were recruited from USM Health Campus, Kubang Kerian and Kota Bharu area for this cross-sectional study. As for the pictures used, 12 pictures (six abstracts, six non-abstracts) were taken randomly from the International Affective Picture System (IAPS) based on the normative value of IAPS (low and moderate). An event-related potential (ERP) recording was done using the 128 HydroCel Geodesic Sensor Net on participants during active viewing of abstract and non-abstract visual stimuli.

Results: A 2×3 mixed ANOVA results showed that there was a significant difference in the main effect (the effect of types of pictures, regardless of personality type) and between subject effect (type of personality, regardless type of pictures) on the P300 latency of the Fz electrode, a significant difference main effect for both Pz and Oz electrode for the

P300 amplitude and a significant difference in the main effect in the Oz electrode of the N200 amplitude where $P < 0.01$. The source of localisation for both N200 and P300 lies in two main lobes. The most common lobe was the occipital lobe as this study is based on visual perception, followed by the temporal lobe. In this study, two different Brodmann areas (B.A) was identified for the source of localisation for N200 and P300 in extraversion and ambiversion which is B.A 18 and 38. The specific areas identified are fusiform gyrus, inferior occipital gyrus, lingual gyrus and superior temporal gyrus.

Conclusion: In conclusion, ambiverts have a higher emotional response than extraverts at the Pz electrode in the P300 latency for non-abstract art images. This may be due to non-extraverts preferences on semantic content images or better known as complex structured images that can be found in non-abstract art images. As all the participants that volunteered in this study were not from an art expertise background, the preference of non- abstract art is understandable.

Supervisor:

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Co-supervisors:

Dr Mohammed Faruque Reza

Dr Sabarisah Hashim

EEG-BASED STRESS RECOGNITION AMONGST UNIVERSITI SAINS MALAYSIA (USM) STUDENTS

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Introduction: Many students struggle with stress associated with their studies regardless of school, college, or university. Research has revealed that students who have excessive stress will have difficulty focusing on learning, which has a negative impact on academic outcomes that lead to health problems.

Purpose: This study aimed to detect stress among undergraduate and postgraduate students from various faculties of Universiti Sains Malaysia (USM), Main Campus, Penang.

Materials and Methods: The electroencephalography (EEG) system was used to identify student's brainwave patterns while exposing different stress levels. EEG was chosen because it offers several advantages such as non-invasive data acquisition, ease of use, low-cost preparation, and a high temporal resolution in milliseconds. Besides that, the researcher used the Perceived Stress Scale—the self-assessment instrument, to assess students' stress levels. In this study, the researcher applied four Stroop Tests to induce stress.

Results: The results showed that the alpha and beta waves were the most common higher frequency bands among undergraduate and postgraduate students. The researcher

decided to apply the study from Priyanka (2016); therefore, the beta wave was considered the stress detection level. Entropy and standard deviation were the accurate classifiers to detect stress levels. Statistical analysis showed the mean values for PSS10 Score undergraduate ($n = 24$) = 21.67 and for postgraduate ($n = 6$) = 21.17 with the P -value of 0.228. The P -value was greater than 0.05 ($P > 0.005$), therefore, there were no significant mean differences of the perceived stress scale between undergraduate and postgraduate students from various faculties of Universiti Sains Malaysia (USM), Main Campus (Pulau Pinang) during stress-inducing tasks. For perceived stress scale score between gender (male and female) revealed that the mean values for male ($n = 15$) = 21.47 and female ($n = 15$) = 21.67 with the P -value of .847 and the P -value was greater than 0.05 ($P > 0.05$). As a result, there were no significant differences in perceived stress scores between males and females from various faculties of Universiti Sains Malaysia (USM), Main Campus (Pulau Pinang) during stress-inducing tasks. The two-way repeated-measures ANOVA for duration revealed no significant difference in the duration of the Stroop tests ($F [3, 87] = 1.860, P = 0.142$, and for between-group interaction showed no significant difference in the duration of the Stroop tests between programs within the four Stroop tests ($F [3, 84] = 0.061, P = 0.980$).

Conclusion: It can be concluded that this study that detects the stress level among students using an EEG system could alter the way of detection and treatment of some severe health problems over other current practices. It provided us with a more diverse assessment of stress conditions that might not be possible for one to express. The combination of signal processing techniques such as Wavelet Transform and Coiflet1 with three formulas from Energy, Entropy and Standard Deviation features developed by the time-frequency analysis of EEG signals proved to enhance accuracy.

Supervisor:

Professor Dr Putra bin Sumari

Co-supervisor:

Dr Mohamed Faiz bin Mohamed Mustafar

THE EFFECT OF FIBOD SMART BALANCE WITH 'ENDLESS RUN' GAME IN IMPROVING MEMORY AND ATTENTION IN HEALTHY YOUNG ADULTS: AN EYE TRACKING STUDY

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Introduction: Exergames are physically active video games that regarded as an attractive training approach to promote interest in physical exercise while also enabling improvement in cognitive function through neuroplasticity.

Objective: This study aimed to investigate the effect of Fitness Balance Board (FIBOD) which is a balance-based exergame composed of smart balance board and video game

'Endless Run' in improving working memory and visual attention of young adults.

Materials and Methods: A randomised control trial study with pre- and post-test design was applied where the effect of FIBOD intervention was measured after one-month. A total of 34 participants (mean age = 22.41 ± 1.2 years old) were recruited from Universiti Sains Malaysia (USM), Health Campus, Kubang Kerian, Kelantan. The participants were randomly allocated into two different groups (Experimental group: $n = 17$ and Control group: $n = 17$) and underwent pre- and post-test of Balance Error Scoring System (BESS) assessment, Mnemonics Similarity Task (MST) and Visual Search Task (VST) paired with an eye tracker. The experimental group received 12 sessions of FIBOD training with three times a week over a period of 4 weeks with each session lasted for 15 min meanwhile no intervention was applied to control group. The pre- and post-test of response accuracy and reaction time from both MST and VST task were analysed between both groups.

Results: The statistical test of repeated measure ANOVA showed that there was no significant difference in response accuracy ($F [1, 32] = 3.17, P = 0.085, \eta_p^2 = 0.09$) and reaction time ($F [1, 32] = 0.03, P = 0.856, \eta_p^2 = 0.001$) of working memory after FIBOD smart balance training. There was also no significant difference in response accuracy ($F (1, 32) = 3.13, P = 0.087, \eta_p^2 = 0.09$) of visual attention however there was a significant difference in reaction time ($F [1, 32] = 4.52, P = 0.041, \eta_p^2 = 0.12$) of visual attention after FIBOD smart balance training thus a planned comparison using paired samples *t*-tests, revealed that the experimental group showed a significant difference [mean difference = 48.35; 95% CI: 19.68, 77.03], $P = 0.003$ in the reaction time.

Conclusion: FIBOD smart balance training can be regarded as an effective balance-based exergame for improving visual attention in healthy young adults.

Supervisor:

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EFFECT OF SMART BALANCE EXERGAME ON ATTENTION AND INHIBITORY CONTROL IN HEALTHY YOUNG ADULTS USING EYE-TRACKING METHOD

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Introduction: The over-reliance of technology of the modern society had led to sedentary lifestyle, resulting in declination of motor and cognitive ability. Effective prevention measure needs to be implemented, especially among healthy young adults to prevent these consequences. Recently, it was suggested that exergame, a technology that combined motor training and cognitive training interactively,

could be an effective intervention to improve motor and cognitive function.

Objective: This study aimed to evaluate the effect of a balance-based exergame on static balance, dynamic balance, selective attention, and inhibitory control of young adults.

Materials and Methods: Thirty-two young adults from USM Health Campus, Kelantan were recruited and randomised into either intervention group ($n = 16$) or control group ($n = 16$). Both groups underwent baseline measurement of static balance, dynamic balance, selective attention and inhibitory control. Then, participants in the intervention group underwent 4 weeks of intervention (FIBOD exergame training) while the control group remained passive for 4 weeks. After 4 weeks, post-intervention measures (similar procedure as baseline measures) were conducted on both groups.

Results: Compared to participants in the control group, participants in the intervention significantly improved in static balance test score, dynamic balance test score, reaction time for selective attention task, and reaction time for inhibitory control task after the exergame intervention. However, there was no significant improvement in the accuracy score for inhibitory control task.

Conclusion: Exergame intervention is effective in improving static balance, dynamic balance, selective attention, and inhibitory control ability and hence, could be used as an innovative preventive measure to address the consequences caused by sedentary lifestyle.

Supervisor:

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Co-supervisor:

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CIRCUMPLEX MODEL OF AFFECT OF VALENCE DOMAIN AMONG YOUNG ADULT: AN ERP STUDY

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Introduction: This study is looking at the valence domain in the Circumplex Model of Affect. Valence domain in the model ranging from negative to positive emotion. Visual stimuli taken from the International Affective Picture System (IAPS) were used to evoke negative, neutral, and positive emotion (valence effect). IAPS is a standardised stimulus range that is regarded as the gold standard for affect ERP research and each pictures have its own normative value.

Objective: The aim of this research is to examine the correspondence of EEG-ERP valence data (P300, N200) with the normative valence from IAPS. This research also wants to identify the source of localization of P300 and N200 with regards to the different levels (high, moderate and low) of emotional valence processing.

Materials and Methods: Thirty-five young adults aged 19 years old–24 years old passively viewed 15 valence IAPS images and their brain's responses to the images were recorded using EEG Cap. Friedman test was performed on the midline electrodes; Fz, Cz, Pz, and Oz for all components; N200 amplitude, N200 latency, P300 amplitude and P300 latency.

Results: Statistic shows that valence effect (brain responses to the valence stimulus) is on ERP component P300 latency at Fz but the findings does not correspond with IAPS data. Different sources of localization were identified at Brodmann Areas 11, 17 and 38, with the frontal, temporal and occipital lobes in different levels of emotional valence but similar in both ERP components; N200 and P300.

Conclusion: Findings does not correspond to IAPS findings because the valence effect in this study is found in neutral and positive images where IAPS' finding is in negative images. Neutral and positive images evoke more valence effect in participant and it contradicts with IAPS. This shows that emotion and response to it is affected by factors such as culture and individual difference.

Supervisor:

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Co-supervisor:

Dr Mohammed Faruque Reza

ALPHA AND LOW GAMMA EMBEDDED WITH WHITE NOISE BINAURAL BEATS MODULATING WORKING MEMORY AMONG MALAYSIAN YOUNG ADULT: AN EXPLORATORY FMRI STUDY

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Introduction: Exposure to alpha and gamma binaural beats (BB) have provided inconsistent findings in its modulating role of working memory (WM). White noise (WN) has acted as a control condition.

Objective: The study aims to explore the effect of load on the effectiveness of WN embedded BB on WM performance using functional magnetic resonance imaging.

Materials and Methods: The research utilised experimental, block-design n-back task paradigm.

Results: Six young adults (3 males and 3 females) within the Kota Bharu vicinity were recruited with mean age of 23.5 ± 0.84 years old. The two-way repeated measures ANOVA ($P < 0.05$) on response accuracy shows there is no significant main effect for conditions and load. The interaction effect of conditions and load on response accuracy ($\eta^2 = 0.171$) demonstrates slight improvement in response accuracy. The two-way repeated measures ANOVA ($P < 0.05$) of reaction time (RT) shows a significant difference in the main effect of load, in particular during 1-back condition post BB. There is no interaction effect of conditions and

load on RT. For GWN and AWN exposure, one sample *t*-test ($P < 0.05$, uncorrected) suggests that the activation of posterior cingulate gyrus are associated with attentional modulation and supplementary motor area is closely related to WM mechanism respectively. Two-way repeated measures ANOVA ($P < 0.05$, uncorrected) of the WM task further supports the aforementioned modulation in post-BB activations with the activation of thalamic regions in GWN and frontoparietal regions in AWN.

Conclusion: The preliminary findings suggest that WN embedded BB should be considered further as a non-invasive WM improvement method amongst clinical and non-clinical population.

Supervisor:

Dr Aini Ismafairus binti Abd Hamid

Co-supervisor:

Dr Mohamed Faiz bin Mohamed Mustafar

AN FMRI STUDY OF RELATIVE CLAUSE IN COMPREHENSION AMONG NATIVE AND NON-NATIVE MALAY LANGUAGE SPEAKERS

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Introduction: Sentence comprehension is a cognitively demanding process. The comprehension of complex and non-canonical sentences like relative clauses caused the activation of particular brain regions.

Objectives: This study investigated whether there is functional neural activation at the frontal and temporal brain regions during the comprehension of the Malay relative clause. This study also aimed to find the differences in the activated areas among the native (L1) and non-native (L2) Malay language speakers.

Materials and Methods: This observational study was conducted at the Hospital USM Kubang Kerian, Kelantan from December 2020 to April 2021, involving native (L1) and non-native (L2) Malay language speakers. Four L1 (mean age = 24.2 years old, SD = 1.25) and four L2 (mean age = 23.5 years old, SD = 0.43) participated in this study. The subject relative clause (SRC), object relative clause (ORC) and subject-verb-object (SVO) were used as study stimuli. They were asked to do a sentence-picture matching task during fMRI measurement.

Results: The functional brain activation of L1 and L2 were observed and compared. The random-effect analysis (RFX) using two-ways repeated measure ANOVA was conducted for the fMRI data. The main effect of the group at the uncorrected < 0.001 , cluster size > 20 voxels found that the comprehension of Malay relative clauses had activated frontal and temporal brain regions in L1 and L2. The multiple comparisons of L1 $>$ L2 showed a significant difference left-lateralised in the temporo-parietal region. While for L2 $>$ L1, the significant activations were indicated distributed

to the frontal, temporal, parietal, and occipital regions that lateralised to the right hemisphere. Additionally, one-way repeated measure ANOVA of reaction time in the L1 group showed no significant difference between SRC, SVO, and ORC ($F [2, 82] = 2.43, P = 0.094, \eta^2 = 0.056$). Meanwhile, the one-way repeated measure ANOVA of reaction time in the L2 group showed no significant difference between conditions SRC, ORC, and SVO ($F [2, 54] = 3.13, P = 0.052, \eta^2 = 0.104$).

Conclusion: The findings suggested that comprehension of Malay relative clauses had caused the activation at different brain regions amongst its L1 and L2. It was also found that both L1 and L2 groups showed their preference in SRC than ORC. The findings from this study can also be applied in clinical language intervention, and it is expected to benefit children and adults with speech and language disorders.

Supervisor:
Dr Jong Hui Ying

Co-supervisor:
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SUSTAINED ATTENTION ON A PRE-RECORDED LECTURE: AN EEG STUDY

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Introduction: Pre-recorded lectures are an essential component of e-learning environments; these lectures should be delivered in a way that promotes learning. Providing pre-recorded lectures across various media channels is beneficial to improve student learning, satisfaction, involvement, and interest.

Objective: The primary aim of this study was to evaluate the effect of text-based slide presentation as activity 1 and interactive slide presentation as activity 2 on brain wave oscillation changes that affect attention.

Materials and Methods: Thirty samples in ASCII format were tested to meet the study objectives. The data were sampled at a rate of 1000hz per second. Data pre-processing removed the effect of AC lines and unwanted frequencies using the HFF, LFF and Notch filters. Different kinds of noise of either extrinsic or artefacts were then removed using DWT and applied over detail coefficients (d) to remove the noise. The DWT decomposed the signal into wavelet coefficients and was reconstructed. A t-test was used to assess whether the means of the two groups were statistically different from each other and to explain the importance of every independent variable in the demand model.

Results: The mean of max beta was determined and compared between activity 1 and activity 2. The findings indicated that the P -value was less than 0.05, which meant that both activity 1 and activity 2 affected the pre-recorded lectures when the t value was 5.663 and 7.850, hence the

H_0 was refused by the t -test. Similar findings were obtained for the frontotemporal region, which recorded the highest mean of max beta between two activities and the results also indicated that the P -value was less than 0.05. This implied that both the frontotemporal region in activity 1 and activity 2 affected the pre-recorded lectures when the t -value was 6.013 and 6.523, hence the H_0 was refused by the t -test.

Conclusion: Both activities were tested, and statistical analysis results based on the findings indicated that the study failed to accept the null hypothesis. There was enough evidence of notable differences in both learning approaches. In light of this, this study concluded that teaching should be more precise on what elements are required to develop student attention. This, in turn, would help teaching with the right choice of method to meet the requirements.

Supervisor:
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Co-supervisor:
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CHARACTERISATION OF THE REWARD STRUCTURAL CONNECTIVITY IN FEMALE MALAY ADOLESCENTS USING DIFFUSION MAGNETIC RESONANCE IMAGING

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Introduction: The reward network is highly investigated as it is known to be involved in substance addiction and reward sensitivity. Adolescents have been shown to be more reward sensitive compared to other age groups. Previous studies have also shown that the white matter tracts between the frontostriatal reward-related brain regions was associated with reward sensitivity.

Objective: Since the reward network of female Malaysian Malay adolescents is understudied, the aim of this study was to characterise the white matter structural connectivity of the frontostriatal reward circuit of 15 healthy female Malaysian Malay adolescents by determining the relative connection probability of nucleus accumbens (NAcc) seed region to amygdala, anterior cingulate cortex (ACC), medial orbitofrontal cortex (mOFC), hippocampus, ventrolateral prefrontal cortex (vlPFC) and dorsolateral prefrontal cortex (dlPFC). This study also investigated the pattern of distribution from the parcellation of the NAcc corresponding to the connectivity of the six targets.

Materials and Methods: Diffusion magnetic resonance imaging (dMRI) was used to study the reward structural connectivity via probabilistic tractography which was performed for each subject by calculating the number of streamlines between the seed (NAcc) and each target mask (amygdala, ACC, mOFC, hippocampus, vlPFC and dlPFC).

Results: The result showed that the sample with typical reward responsiveness for healthy participants had

significantly the highest relative connection probability of NAcc to mOFC, while the NAcc parcellation showed the widest distribution of connection to mOFC compared to the other five targets in both sides of the brain.

Conclusion: Both of these findings support that NAcc and mOFC have the highest connection strength compared to the other five targets. This supports previous study that shows NAcc is highly specific to the connection to mOFC. This finding can be explained by prior evidence showing early maturing of the NAcc-mOFC tract.

Supervisor:
Dr Asma Hayati Ahmad

Co-supervisor:
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ROLE OF HISTONE REGULATIONS AND MODIFICATIONS IN COGNITIVE FUNCTIONS OF MITRAGYNINE (A MAJOR INDOLE ALKALOID OF *MITRAGYNA SPECIOSA*)

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Introduction: Previous researchers reveal that drug addiction does alter cognitive mechanisms in humans and bring changes to cognitive behaviour. Experimental studies involving addiction of drugs like heroin, cocaine and many others have shown to have impact on memory and learning capabilities which results in cognitive decline. This condition can worsen if drug is constantly consumed in long run and high doses. In this study, we were looking at mitragynine, a main compound of *Mitragyna speciosa*, affects cognitive abilities and the changes of histone protein in the brain. Currently, there is no research that has been done to correlate mitragynine and epigenetics.

Objective: This study primarily aimed to investigate the cognitive function and histone modifications in the mitragynine treated rats.

Materials and Methods: Behavioural task was conducted in mitragynine-treated rats to analyse the memory and learning functions caused by different doses of mitragynine (1 mg/kg, 10 mg/kg and 30 mg/kg) at different time frames. Passive avoidance task (PAT) and western blot (WB) protocol were used for cognitive behavioural study and protein analysis, respectively.

Results: This study highlighted significant results of cognitive impairment at 1 h retention time, but not at 24 h and 7 days in PAT with no changes of histone H3K9 protein expression.

Conclusion: Mitragynine caused cognitive impairment during early stages of drug metabolism in the rat's body. This study concluded that mitragynine caused cognitive dysfunction with no changes of histone protein expression.

Supervisor:
Associate Professor Dr Zurina Hassan

Co-Supervisors:
Dr Mohd Zulkifli Mustafa

FACIAL CARE PRODUCTS: AN EXPLORATIVE STUDY OF CONSUMER PURCHASE BEHAVIOR USING FMRI

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Introduction: Facial care products are quickly expanding in terms of market size and global coverage, there are crucial needs for a better knowledge of consumer purchasing behaviours. The research model that was studied was a simplified form of the planned behaviour theory. The Theory of Planned Behaviour (TPB) was served as the primary theoretical frameworks for predicting intentions to purchase facial care products in this research.

Objective: The purpose of this study was to determine the effects of perceived purchase intention on subjective norms, perceived behavioural control and attitudes toward questionnaires and facial care products. Another objective was to examine consumers' brain responses that could modulate activity of the brain signals via functional Magnetic Resonance Imaging (fMRI).

Materials and Methods: There were two stages, with the first being a survey of 133 participants and the second involved fMRI with just eight subjects. Both designs were based on the TPB model in construct questionnaire. In stage 2, we re-used the questionnaire items that assessed participants in fMRI, which included images of global and non-global facial care products.

Results: Objective 1 was not supported, as only attitude influenced purchase intention positively ($\beta = 0.451, P < 0.01$). Due to the mismatch in scoring systems, this research could not reconcile objective 1 and objective 2. We used the same questions from the questionnaire with fMRI images in calculating yes and no response. There were statistically significant findings for brain signals concerning attitude ($P < 0.05$ uncorrected). We observed increased activities in the left superior parietal lobule, right angular gyrus, left hippocampus, left supramarginal gyrus, right precuneus and left middle occipital gyrus area ($P < 0.05$ uncorrected).

Conclusion: There was a limitation in terms of the products employed in the experiments. This study examined just facial care products using fMRI. Therefore, future research should duplicate this study utilising a variety of different items like car, food or household goods.

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A STUDY ON THE EFFECT OF GAME BASE BALANCE TRAINING AND GENDER DIFFERENCE ON ATTENTION AND MEMORY BY EYE TRACKING METHOD

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Introduction: Game base balance training was shown to be effective in improving cognition as more cognitive resources can be allocated to deal with cognitive tasks due to improve balance ability. In addition, there is gender difference in cognitive performances. Thus, in this study, game base balance training was conducted to examine its effect on improving visual attention and working memory among healthy male and female university students.

Objective: The aim of this study is to investigate the effect of balance training and gender difference on visual attention and working memory performances.

Materials and Methods: This study is an interventional study with randomised controlled trial. The target population is students from University Sains Malaysia, Kubang Kerian who fulfil the subject criteria and pass the screening tests. There were three screening tests which were the Ishihara Colour Blindness Test, Physical Activity Readiness Questionnaire (PAR-Q) and Balance Performance Assessment from Fitness Balance Board (FIBOD). The sample size is 48 participants. As this study is also interested in gender differences in cognition, an equal number of male and female was recruited and randomly assigned to either the experimental or control group. The intervention was carried out using FIBOD with Space Shooter. Pre- and post-tests included Balance Error Scoring System (BESS) to measure balance ability; Visual Search Task to measure attention; and Mnemonic Similarity Task to measure memory. The two cognitive assessments were conducted with eye tracking. The control group only underwent the pre and post assessments and was refrained from doing other balance training. Other than the pre- and post-assessments, the experimental group also underwent the intervention for one month, with three 15-min sessions in a week. To analyse the data, SMI BeGaze and Statistical Package for Social Sciences were used. The statistical test used to analyse the collected data was Repeated Measures ANOVA.

Results: There were two outcome measures in each cognitive tests, response time and accuracy. For visual attention, there was a significant interaction effect in response time between the two groups from pre- to post-assessment: $F(1, 46) = 16.80, P < 0.014, \eta_p^2 = 0.268$. As for the accuracy in visual attention, there was a significant interaction effect: $F(1, 46) = 20.47, P < 0.000, \eta_p^2 = 0.308$. To compare visual attention between gender, there were no significant difference in response time $F(1, 46) = 1.64, P = 0.213, \eta_p^2 = 0.069$ as well as in accuracy $F(1, 46) = 0.11, P = 0.745, \eta_p^2 = 0.005$ between gender from pre- to post-assessments. For working memory, there is no significant interaction effect in response time $F(1, 46) = 2.01, P = 0.163, \eta_p^2 = 0.042$ and accuracy $F(1, 46) = 0.06, P = 0.805, \eta_p^2 = 0.001$ between the two groups from pre- to post-assessments. To compare working memory between gender, there were no significant difference in response time: $F(1, 46) = 0.81, P = 0.378, \eta_p^2 = 0.035$ as well as in accuracy $F(1, 46) = 2.79, P = 0.109, \eta_p^2 = 0.112$ between gender from pre- to post-assessments.

Conclusion: Game base balance training used in this study was able to improve cognitive performances among healthy university students. The experimental group showed improved performance in visual attention and working memory between pre and post assessments. Yet, the experimental group only performed better than the control group in the visual attention task but in not the working memory task. No significant gender differences were found in both visual attention and working memory performances after the intervention.

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EFFECT OF EXERGAME BASED BALANCE TRAINING ON SELECTIVE ATTENTION AND INHIBITORY CONTROL MEASURED VIA EYE TRACKING AMONG HEALTHY YOUNG ADULTS

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Introduction: 'Exergames' or active video games have emerged as promising tools that provide additive benefits of both physical exercise and gaming in an interactive technology-based approach. Previous studies demonstrated exergaming induced cognitive improvements, however, exergames focusing on balance mostly studied its effect on reducing falls and improving posture. Hence, there exists a need to assess whether exergame-based balance training can generate cognitive enhancement.

Objective: To determine whether an intervention using an exergaming equipment called 'Fitness Balance Board' (FIBOD) can improve the cognitive abilities of selective attention and inhibitory control among healthy young adults (18 years old–35 years old).

Materials and Methods: A randomised control trial design with stratified randomisation was implemented. Thirty healthy undergraduate students (mean age: 22.3, SD = 1.4) from Universiti Sains Malaysia were recruited and completed the study, with 15 participants assigned to a 4-week exergaming group and 15 participants assigned to a passive control group. The study implemented eye-tracking in a 'Visual Search Task' (VST) and 'Antisaccade Task' (AST) paradigm as measures of selective attention and inhibitory control respectively.

Results: Separate 2×2 mixed ANOVAs tested four hypotheses of this study. As hypothesised, compared to pre-test, at post-test, exergamers were significantly more accurate (adjusted mean difference = 2.8%, $P = 0.008$), made less number of fixations (adjusted mean difference = 0.45, $P < 0.001$) and had faster time to first fixation (TTFF) on target (adjusted mean difference = 132.5 ms, $P < 0.001$) in VST. Exergamers also made less fixations and had faster

TTFF at search with most number of items (20 items) at post-test (mean number of fixations: 4.6, SD = 1.04; TTFF: 689.8 ms, SD = 136.9) compared to search with lesser number of items (15 items) (mean number of fixations: 4.7, SD = 1.29; TTFF: 738.6 ms, SD = 189.8). In AST, as hypothesised, exergamers had faster antisaccade reaction times at post-test compared to pre-test (adjusted mean difference = 51.9 ms, $P < 0.001$). Contrary to hypothesis, exergamers did not reduce antisaccade errors. In comparison, control group did not significantly improve in any outcome measures from pre to post-test.

Conclusion: Exergame-based balance training using FIBOD was feasible to improve selective attention and inhibitory control of healthy young adults. Future research can further explore changes in search patterns related to exergame play to establish an understanding of exergame related cognitive improvements.

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