CHAPTER THREE

METHODOLOGY

3.1 Study Design

The study was organised in two phases. It was a cross-sectional study on shift workers' psychosocial well-being and its association with physical activity and eating habits of the hospital shift workers. Phase I involved a survey among the healthcare shift workers. The respondents were given a series of self-administered questionnaires in Malay version, either in printed form or through an online platform. The first section of the questionnaires included the components of socio-demographic data, information of shift work schedule as well as the self-reported height and body weight. The consequent section of the questionnaires concentrated on physical activity, eating habits as well as psychosocial well-being. The domains of psychosocial well-being were gathered based on the previous studies that included the components of mental health, quality of life, work engagement and sleep quality as part of the individual psychosocial well-being (Pieh et al. 2020; Chari et al. 2018).

Meanwhile, Phase II was subjected to the development of a module aiming to educate shift workers on psychosocial well-being maintenance. The development of module for Phase II referred to the outcome of the quantitative data gained from Phase I. Subsequently, the content and face validity level of the developed module on psychosocial well-being maintenance among the shift workers were assessed.

UNIVERSITI SAINS ISLAM MALAYSIA ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

3.2 Overview of Healthcare Workers

Internationally, healthcare workers are either working in an 8-hour shift (morning, afternoon, or evening shift) or working in a 12-hour shift (night or day shift). In Malaysia, there are two patterns of working shifts: 7-hours morning, 7-hours afternoon and 10-hours night shifts, or 12-hour shifts (day and night shift). The Ministry of Health (MOH) Malaysia is the biggest provider of public healthcare, alongside healthcare providers under the jurisdiction of the Ministry of Education (facilities of university healthcare) and the Ministry of Defence (facilities of military healthcare). Malaysia is consistently targeting to improve the accessibility of the community to the healthcare services as well as putting effort towards enhancing the quality of services in the 11th Malaysia Plan of 2016 to 2020. The health services include a team of health personnel consisting of a doctor, nurse, assistant medical officer, healthcare assistant, pharmacists, assistant pharmacist and others. Meanwhile, the oral healthcare service team comprises of dentists and dental therapists (Planning Division 2019).

The total number of doctors, nurses, and assistant medical officers in the Ministry of Health, Malaysia are 33 545, 64 016 and 12 198, respectively. Selangor had the biggest number of doctors (public and private combined) with a total of 9,483 doctors, and it was also one of the most heavily populated states in Malaysia, therefore, the doctor density (1.51) was lower than national at 1.58 per 1,000 population. The state with the highest doctor to 1,000 population ratio was Wilayah Persekutuan Putrajaya (52.63), followed by Wilayah Persekutuan Kuala Lumpur (2.99). Selangor had the highest number of nurses (15,123) both in public and private, but the ratio per 1,000

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

population was 2.66 (approximately 1 nurse per every 383 populations); still below the national average of 3.24. Wilayah Persekutuan Putrajaya had the highest ratio of nurses to 1,000 population at 35.01, followed by Wilayah Persekutuan Kuala Lumpur (8.46) (Malaysian Healthcare 2018). This study focused on the healthcare workers involved in 3-shift systems in Klang Valley, Ministry of Health, Malaysia.

3.3 Sampling and Study Population

Data randomisation was applied in this study, in which the process of assigning respondents to the study and assuming that each respondent had an equivalent possibility of being assigned. The probability sampling approach was used as it was the better alternative to non-probability sampling, in view of each respondent in the population had an equal opportunity of being chosen for the survey.

The target population of this study was all the healthcare shift workers in Klang Valley. From all 14 hospitals of the Ministry of Health in Klang Valley, six hospitals agreed to take part in the survey. Study population was the shift workers from the selected six hospitals of Ministry of Health in Klang Valley that included Ampang Hospital, Serdang Hospital, Tengku Ampuan Rahimah Hospital (Klang Hospital), Shah Alam Hospital, Kajang Hospital and Banting Hospital. The sampling frame included the list of all shift workers in the selected departments (strata) at the six hospitals. In addition, the data collection was conducted via face-to-face method and online platform

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

in view of the pandemic of COVID-19. Therefore, extension to additional hospitals such as Serdang Hospital, University Malaya Medical Centre, Kuala Lumpur Hospital and Selayang Hospital were included to distribute the survey via online platform.

Stratified random sampling was utilised in which a number of strata was randomly chosen to represent the hospital shift workers population. The departments in the hospitals were considered to be strata. Random samples of shift workers in these departments (strata) were selected by using the simple random sampling. The lists of the hospital shift workers working in the departments were obtained from the person-in charge from the respective departments. The sample was chosen by using the random number method, in which assigning every individual a number and randomly picked them with the random number generator. Those who consented to take part in this study were then included.

3.3.1 Sample Size

The sample size in this study was calculated by using Open Epi calculator. The determination of *p* value was obtained from the previous study conducted by Teixeira et al. (2020), that exploring about the psychosocial risk factors at work associated with the level of physical activity among shift workers. The number of required sample sizes were 392 respondents when taking into account the odds ratio of 1.77 of the association between physical activity and psychosocial distress, with 95% confidence interval, two-sided significance level of 0.05, and 80% power. In the end of data collection, the total number of samples was 413 respondents.

UNIVERSITI SAINS ISLAM MALAYSIA ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

3.3.2 Inclusion/Exclusion Criteria

1. The inclusion criteria include the workers that:

    i. Currently working in a 3-shifts system for at least one year.
    ii. Aged 19 to 60 years old.
    iii. Literate in Bahasa Melayu or English.

2. The exclusion criteria include those who were:

    i. Diagnosed with sleeping disorders
    ii. Diagnosed with mental illness
    iii. Diagnosed with terminal disease

3.4 Phase I: Cross-sectional Study

3.4.1 Study Instruments

The questionnaires in the survey of Phase I comprised seven components of validated questionnaires in Malay version including International Physical Activity Questionnaire-Short form Malay (IPAQ-M), Dutch Eating Behaviour Questionnaire (DEBQ), Malay Depression, Anxiety, and Stress Scale 21 (Malay-DASS-21), WHO-5 Well-Being Index Malay (WHO-5-Malay), Malay 36-Item Short Form Survey (Malay-

UNIVERSITI SAINS ISLAM MALAYSIA
جامعة العلوم الإسلامية الماليزية
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

SF-36), Utrecht Work Engagement Scale Malay (UWES-M) and also Pittsburgh Sleep Quality Index Malay (PSQI-M). Permissions to use all the questionnaires had been granted by the respective authors. Listed below are the details of the questionnaires that were used in this study.

1. *Socio-Demographic Components, Height and Body Weight*

The first part of the questionnaires was the socio-demographic components to assess the background of the respondents. The socio-demographic components included age, gender, ethnicity, religion, educational status, marital status, monthly household income and comorbidity. Additional information of smoking/vaping status and alcohol consumption were also included in this section. The shift work schedule information was gathered, particularly on the time and duration of the shifts, name of hospital and department, healthcare position and how long the respondents had been working in the shift work system as well as the part-time job involvement. Besides, self-reported height and body weight were also documented. Body mass index (BMI) of the respondents were then computed and labelled accordingly into distinct category based on the WHO classification; underweight < 18.5 kg/m^2; normal 18.5 – 24.9 kg/m^2; overweight 25.0 – 29.9 kg/m^2; and obese ≥ 30 kg/m^2.

2. *International Physical Activity Questionnaire-Short form Malay (IPAQ-M)*

The assessment involved the physical activity intensity as well as sitting time of the respondents in everyday life to measure overall physical activity in min/week and time spent for sitting. This IPAQ-short form questionnaire in Malay version assessed the particular types of physical activity which include walking, moderate-intensity

UNIVERSITI SAINS ISLAM MALAYSIA ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

activities, vigorous-intensity activities and sitting; the frequency measured in days per week; and the duration measured in time per day. It comprised of seven open-ended questions about the last seven-day physical activity recall. The structured items in IPAQ-short form Malay were then computed by providing the addition of the duration (in minutes) and frequency (days) of each specific type of activity based on the IPAQ protocol.

The measure of the volume of activity was also quantified by weighting each type of activity by its energy requirements characterised in METS (METs are multiples of the resting metabolic rate) to produce a score in MET-minutes (IPAQ Research Committee 2004). One MET was what they expend when they were at rest. The values of the metabolic equivalent of energy expenditure (MET)-minutes/week were calculated for each type of activity based on the following pattern: 3.3 for walking; 4.0 for moderate-intensity; and 8.0 for vigorous-intensity physical activity. Subsequently, MET-minutes/week scores were computed. For example, walking MET-minutes/week = 3.3 x walking minutes x walking days. This was similar to the other type of activities respectively. The total scores of MET-minutes/week referred to the combination of total physical activity MET-min/week from the sum of walking, moderate and vigorous MET-min/week scores (Matei & Ginsborg 2020).

According to the IPAQ analysis algorithm, there was a suggestion of three levels of physical activity for grouping populations, taking into consideration of the total physical activity from all domains. These physical activities classified the respondents into the new proposed levels that include inactive, minimally active and health-

enhancing physical activity (HEPA) active, a high active category. The cut-off scores were utilised, in order to classify the respondents as engaging in the categories as follow: i) Inactive – respondents who did not meet the criteria for “minimally active” or “HEPA active”; ii) Minimally active – respondents who met one of the following conditions: (a) three or more days of vigorous-intensity activity of at least 20 min per day or (b) five or more days of moderate-intensity activity and/or walking of at least 30 min per day or (c) five or more days of any combination of walking, moderate-intensity, or vigorous intensity activities achieving a minimum total physical activity of at least 600 MET-minutes/week; iii) HEPA active – respondents who satisfied one of the following conditions: (a) vigorous-intensity activity on at least 3 days achieving a minimum total physical activity of at least 1500 MET-minutes/week or (b) seven or more days of any combination of walking, moderate-intensity, or vigorous intensity activities achieving a minimum total physical activity of at least 3000 MET-minutes/week (Matei & Ginsborg 2020).

For this questionnaires, the intra-class correlation coefficient (ICC = 0.54-0.92; $P < 0.001$) on items categorised by intensities and domains, kappa (κ) = 0.73 for total activity, correlation coefficient (ρ) = 0.67-0.98 that indicated good reliability and validity for the assessment of physical activity level among the Malaysian population (Chu & Moy 2012).

3. Dutch Eating Behaviour Questionnaire (DEBQ)

Eating behaviour pointed to a complicated connection between social, psychological, physiological and also genetic factors affecting the quality of food intake, preference

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

of food and timing of meals taken. These questionnaires evaluated eating behaviour in three domains; emotional eating (Question 1, 3, 5, 8, 10, 13, 16, 20, 23, 25, 28, 30, 32), external eating (Question 2, 6, 9, 12, 15, 18, 21, 24, 27, 33) and restrained eating (Question 4, 7, 11, 14, 17, 19, 22, 26, 29, 31). Emotional eating defined the eating in response to emotional arousal; external eating referred to eating in response to food-related external cues such as sight and food palatability; and dietary restrained confined to the dietary control via cognitive cues to affect the body weight and disinhibition that is overeating in response to external stimuli including negative emotion, stress and food palatability (Subramaniam et al. 2017).

These questionnaires consisted of 33 items with Likert scales, and higher scores indicated greater endorsement of eating behaviours. The scores from each item according to the three domains were computed and averaged to gain the final score. The score cut-off points were adapted from previous study by Sze et al. (2021); cut-off point of 3.25 for emotional eating habit, and cut-off point of 2.5 for the external and restrained eating habits, in classifying the groups of low score (good eating habit) or high score (poor eating habit) based on the DEBQ scores. The higher DEBQ scores proposed more severe symptoms of negative eating habits. According to a study by Subramaniam et al. (2017) among the Malaysian population, the Malay version of DEBQ questionnaire demonstrated Raykov's construct reliability of 0.914 for the component scale of emotional eating, 0.786 for the scale of external eating, and 0.856 for the scale of restrained eating.

4. Malay Depression, Anxiety, Stress Scale-21 (Malay-DASS-21)

The Malay Depression, Anxiety, and Stress Scale 21 (Malay-DASS-21) is one of the most common instruments for mental health evaluations. This approach measured the psychological distress along the constructs of depression, anxiety and stress over the past week. The three Malay-DASS-21 scales consist of seven items and are divided into subscales, with four-point Likert scale ranging from zero (none of the time) to three (all the time). The depression components (Question 3, 5, 10, 13, 16, 17, 21) evaluated dysphoria, hopelessness, devaluation of life, self-deprecation, and lack of interest or involvement, anhedonia and inertia. The anxiety components (Question 2, 4, 7, 9, 15, 19, 20) focused on the autonomic arousal, skeletal muscle effects, situational anxiety and subjective experience of anxious affect. Meanwhile, the stress scales (Question 1, 6, 8, 11, 12, 14, 18) was sensitive to levels of chronic non-specific arousal that assessed difficulty relaxing, nervous arousal, being easily upset or agitated, irritable or over-reactive and impatient.

The scores for these three primary psychological aspects were calculated by adding the scores for the relevant items and multiplied by two to provide the final score. The emotional states were then categorised into the suggested cut-off scores for conventional severity labels; normal, mild, moderate, severe and extremely severe (Nordin et al. 2017, Lovibond & Lovibond 1995), as portrayed in Table 2. The Cronbach alpha was 0.863 for the component of depression, 0.837 for anxiety, 0.850 for stress, and overall was 0.940 according to the study done by Nordin et al. (2017) for the Malay version of DASS-21 among the Malaysian population.

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

Table 2: The cut-off scores for severity labels of depression, anxiety and stress

	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely severe	28+	20+	34+

5. WHO-5 Well-Being Index Malay (WHO-5-Malay)

WHO-5-Malay questionnaires focused on subjective psychological well-being. This five-item instrument of six-point Likert scale ranging from zero (none of the time) to five (all the time), measured the positive mood, vitality, as well as general interests among the respondents over the last two weeks. The five positively phrased items of WHO-5-Malay yielded a raw score of 0 (absence well-being) to 25 (maximal well-being) and were then multiplied by 4 to provide the total score. The scores were then subsequently classified into good well-being and poor well-being with a cut-off score of 50 (Topp et al. 2014). High scores represented best possible well-being. The Cronbach's alpha was 0.91 for these questionnaires, according to a study by Suhaimi et al. (2022) among the Malaysian population.

6. Malay 36-Item Short Form Survey (Malay-SF-36)

Malay-SF-36 is a series of quality of life interventions which are standardised, consistent and easily implemented. The interventions depend on self-administered questionnaires from the respondents. The 36-item of Malay-SF-36 questionnaires assessed the health on eight multi-item scales, covering physical functioning, role limitations due to physical health, role limitations due to emotional problems,

energy/fatigue or vitality, general mental health, social functioning, bodily pain and general health perceptions.

The scales were then classified into physical health and mental health scores. Physical health dimension included the scale on physical functioning, role limitations due to physical health, bodily pain and general health. Meanwhile, the dimension of mental health referred to general mental health, role limitations due to emotional problems, social functioning and vitality. The scores were calculated and averaged together to create a total score of Malay-SF-36. Each domain was scored separately from 0 (lowest level of functioning) to 100 (highest level of functioning). High scores indicated better quality of life. The spreadsheet to score the questionnaires was referred from a previous study by Laucis et al. (2015), calculating on the overall scores of Malay-SF-36, as well as the scores for dimensions of physical health and mental health. The scores were then categorised into good quality of life and poor quality of life with a cut-off score of 50 (Laucis et al. 2015). Generally, these questionnaires examined overall assessment of the health of the respondents in the aspects of the functional status and well-being. Referring to a study by Musa et al. (2021) among the Malaysian population, the Cronbach alpha for Malay-SF-36 questionnaires ranged from 0.73 to 0.90.

7. *Utrecht Work Engagement Scale-9 Malay (UWES-M)*

Work engagement is a positive state of psychology which is regarded as the burn out syndrome antidote. Contrary to those suffering from burnout syndrome, workers who are engaged have a sense of positive and successful links with their work activities and

UNIVERSITI SAINS ISLAM MALAYSIA ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

regard themselves as able to manage the demands of their jobs well. These questionnaires assessed work engagement in three aspects including vigour (Question 1, 2, 5), dedication (Question 3, 4, 7) and absorption (Question 6, 8, 9).

Vigour is described as high energy levels and mental resilience during working, the enthusiasm to invest effort in one's work and persistence even facing the struggles. Dedication is characterised by being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride and challenge. Absorption refers to being fully concentrated and happily engrossed in one's work, whereby time passes quickly, and one has difficulties with detaching oneself from work (Tan et al. 2017). Each item of the questionnaire included seven-point Likert scale ranging from zero (never) to six (always). The scores for each domain were added up separately and averaged to obtain the final score. Each domain was then classified accordingly based on the category of low, average and high scores as shown in Table 3. Raykov's construct reliability for the UWES-M questionnaire from a study done by Tan et al. (2017) among the Malaysian population was 0.95 for the component of vigour, 0.93 for dedication, 0.93 for absorption and 0.98 for overall.

Table 3: The cut-off scores for the domains of UWES-M

	Vigour	**Dedication**	**Absorption**	**Total Score**
Low	≤ 3.25	≤ 2.90	≤ 2.33	≤ 2.88
Average	3.26 – 4.80	2.91 – 4.70	2.34 – 4.20	2.89 – 4.66
High	≥ 4.81	≥ 4.71	≥ 4.21	≥ 4.67

8. Pittsburgh Sleep Quality Index Malay (PSQI-M)

Pittsburgh Sleep Quality Index Malay (PSQI-M) was used as a tool in identifying respondents' sleep quality throughout the last 30 days. PSQI-M consists of 19 self-rated questions. The items are combined to illustrate seven "component" scores, with a range of zero to three points. In all cases, a score of zero represents no difficulty, meanwhile a score of three determines severe difficulty. The seven component scores are then summed up to produce one "global" score, with a range of 0 – 21 points, with a score of "21" indicates severe difficulties in all areas. The seven components from this questionnaire generally represented the subscales of sleep duration, sleep disturbance, sleep latency, daytime dysfunction due to sleepiness, habitual sleep efficiency, overall sleep quality, and use of sleeping medications. The summation of scores provided a "global" score, with higher global scores showing poor quality of sleep. A PSQI-M global score of more than five was indicative of poor sleep (Beaudreau et al. 2012). In previous tests, the PSQI-M scores had shown strong test-retest reliability with a correlation coefficient of about 0.85. A study by Yunus et al. (2017) among the Malaysian population emphasised the Cronbach alpha of 0.60, and composite reliability of 0.63 for the questionnaire. The scoring instructions for each component of PSQI-M was included in detail in Appendix 4 (Yunus et al. 2017).

3.4.2 Data Collection and Research Ethics

The respondents who met the inclusion and exclusion criteria were supplied with a series of questionnaires in Malay version either in printed form or online. The respondents were briefed about the purpose of study, confidentiality issues, and the

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

respondents' right to withdraw from the study at any time without any penalty. Written informed consent was also obtained from the respondents prior to the survey, and they were given adequate time to respond to the survey.

Any information about the respondents was listed as numbers rather than names. Study data for the respondents were analysed collectively, not by individual results. The study was carried out in compliance with the protocol and standard operating procedure (SOP) of the Clinical Research Centre (CRC) in the respective hospitals. The study was also conducted following the ethical principles listed in the Declaration of Helsinki (World Medical Association 2001). All gathered information and data were kept confidential to the researchers.

One of the highlighted ethical issues in this study was encountering the respondents with severe mental health problems. The respondents who had either severe depression, anxiety or stress had been suggested to seek for help from the experts that include counsellors, psychologists, and psychiatrists. The data of the respondents were kept as private and confidential, thus the researchers did not refer the respondents directly to the experts. Suggestions and recommendations to the proper channel were offered to the respondents in order to help them dealing with the problems.

This study had been approved by the Medical Research & Ethics Committee, and National Medical Research Registry with code reference NMRR-19-2796-50756. This study was supported by the Universiti Sains Islam Malaysia Grant with the grant number of USIM/FRGS/FPSK/055002/50419, FRGS/1/2019/SS05/USIM/02/3.

3.4.3 Data Analysis

The statistical analysis was conducted by using the IBM Statistical Package for Social Science (SPSS) version 26.0 (SPSS Inc., Chicago, IL, USA). Data analysis included descriptive analysis, which comprised frequency, percentages, mean and standard deviation (SD). All quantitative data were checked for their normal distribution prior to conducting any more advanced statistical analyses. Depending on the normality of the data, data was analysed descriptively and statistically using either parametric or non-parametric analysis.

Categorical data were analysed by using Chi-square test ($\chi 2$) at the significant level of $p < 0.05$. The probability of the incidence of poor psychosocial well-being was estimated by using simple and multivariable logistic regression in order to establish the potential associated factors. The measure of association between the factors and outcome was demonstrated as an odds ratio (OR) with 95% confidence intervals (CI). Statistical significance was defined as a p-value of < 0.05.

3.5 Phase II: Module Development

Phase II focused on the development of a module that aim to educate shift workers on psychosocial well-being maintenance. This module development was a continuation of Phase I, in which the module development was in accordance to the outcomes from the quantitative data gained from the survey. Health education aimed at changing lifestyle

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

behaviour based on physical activity, eating habits and psychosocial well-being from the evidence gained in Phase I of the study. The data analysed from the survey on physical activity, eating habits and psychosocial well-being in Phase I demonstrated the level of problem and the priority of conflict among the healthcare workers that was addressed in the module.

The content of the module was developed mainly based on the evidence from Phase I, together with the literature from previous studies for better recommendations on psychosocial well-being maintenance among healthcare shift workers. The module was prepared in the form of booklet printed material and soft copy or known as Portable Document Format (PDF form) to be easily accessed by the healthcare shift workers at any time. The content and face validity level of the developed module on psychosocial well-being maintenance among the shift workers were then assessed. The benefits of health education include the contribution towards better health, quality of life, well-being, self-sufficiency and productivity.

It was shown that sleep quality and inactivity were associated with poor psychosocial well-being among the shift workers referring to the preliminary results of the cross-sectional study of Phase I. The developed module was focusing on this highlighted issue, about enhancing good psychosocial well-being by having good quality of sleep and by physically active. The module was named as SHiFT booklet module, which represented *'Sleep Healthily Focus Training'*.

3.5.1 Development of SHiFT Booklet Module

Several steps were involved in the process of developing the booklet module (Wizowski et al. 2014; Sidek Mohd Noah 2001). It started with the first step in establishing a multidisciplinary team that consist of experts who were related to the intended audience and to the topic of educational material. Referring to this study, a research team consisted of physiologist, physician, physiotherapist, nutritionist and dietitian were formed. Few hospital shift workers were also selected to assess their understanding and acceptance of the booklet module in the process of validation.

It was followed by the second step in which to establish the objective of the educational booklet and the proposed audience. The prime strategy of this booklet module was to focus on enhancing good psychosocial well-being by having a good quality of sleep and by being physically active according to the preliminary findings. The aim was to focus on having a good quality of sleep to improve psychosocial well-being among the shift workers. Previous research emphasised that good sleep quality is important for well-being and is known to be affected by biological and lifestyle factors (Wang & Boros 2021).

The third step was to assess the available materials. This booklet module's content was developed through intensive literature and findings from the cross-sectional study. An extensive search on the available articles on the respective topics in the module was conducted, and thorough readings were done. The subsequent step was to decide and construct the content that was practical and can be easily understood by the adult population namely the shift workers.

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

The fifth step was to provide the first draft of the module. The originality of the booklet module was preserved by the usage of the own words and terms by the research team. The booklet module was interactive with the utilisation of simple words in Malay language to ensure the readers can easily understand the content and apply the recommendations in their daily life wisely. The module was prepared in the form of booklet printed material and soft copy or known as Portable Document Format (PDF form), to be easily accessed by the healthcare shift workers at any time.

Last but not least, the final step was the illustration and design of the booklet module. Relevant and interesting illustrations were added to the booklet to attract the attention of the readers and help clarify the context. In the effort to create the booklet module to look more presentable and practical, a professional application was utilised to facilitate the production of the final design of the booklet module. The designed booklet module was then reviewed by the research team, and necessary amendments were implemented until the finalised version of the booklet was produced. The subsequent step was the validation of the booklet module by the panel of experts and shift workers.

The following are the primary key recommendations for the SHiFT booklet module to provide valuable information on having a good quality of sleep to improve psychosocial well-being based on the literature search:

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

1. Key message 1: 10–minutes custom made simple exercise

Flahr et al. (2018) pointed out that physical activity interventions may positively influence many aspects of the health of shift workers, including stress levels, mental health, sleep quality, musculoskeletal functioning, physical activity behaviour, body composition, and productivity. This module used the approach of custom-made simple exercises to be practiced by the shift workers conveniently to improve their sleep quality. This custom-made simple exercise was proposed with the help of a physiotherapist, physiologist and medical specialist in the team. It focused on the suitable movement to increase the flexibility of the shift workers to be utilised on their own before or after shifts prior to sleep. The information about when the proper time to perform the exercise was and how much they should exercise was included in this module.

2. Key message 2: Breathing exercise

One of the practical non-pharmacological method of improving sleep is by performing physical activity (Wang & Boros 2021). Previous study by Udaykumar et al. (2021) proved that alternate nostril breathing was known to have an immediate effect on cardiorespiratory parameters and muscle strength in improving the disturbed circadian rhythm among rotating hospital shift workers. Thus, in this study, it was recommended for the respondents to aim for the practice of breathing exercise which a simple exercise that exerts effect on the cardiovascular system and respiratory system. Instructions were given on how to perform breathing exercise at any time during the shifts, and advisable to be done prior to their sleeping time in order to obtain good quality of sleep.

3. Key message 3: Sleep tight

National Sleep Foundation characterised that the fundamental elements of good quality of sleep include sleeping more time in bed (for at least 85% of the total time), falling asleep in 30 minutes or less, waking up not more than once per night and being awake for 20 minutes or less after initially falling asleep (National Sleep Foundation 2019). This module emphasised on the components of sleep, particularly the preparation for sleep, how to obtain good sleep hygiene, as well as the recommended hours to sleep in a day. The module was constructed referring to the systematic review by Fauzi et al. (2019) discussing sleep hygiene education.

4. Key message 4: When to eat, what to eat

Previous literature demonstrated that low intake of vegetables and fish, high consumption of confectionary and noodles, as well as high intake of carbohydrates are linked with poor quality of sleep (Katagiri et al. 2014). Daily incorporation of sleep-promoting foods such as milk, fatty fish, and kiwifruit, had been researched for their possible advantages for immediate and acute sleep enhancement without requiring significant nutritional modifications (St-Onge et al. 2017; Lin et al. 2012; Hansen et al. 2016). Besides, sleep deprivation is linked to the frequent consumption of sugary beverages or caffeine-containing beverages, such as energy drinks or sugar-sweetened beverages (St-Onge et al. 2017; Katagiri et al. 2014). The intake of malted milk and natural melatonin-enriched milk, obtained by milking cows at night time also been demonstrated to affect sleep quality, and sleep efficiency and decreased the number of awakenings (Campbell 2015). This is important because the timing and nutrient content absolutely affect the quality of sleep. The key message in this module was to encourage

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

the consumption of fatty fish, fruits, vegetables, and milk as well as the right time to eat healthy meals for each shifts.

3.5.2 Validation of SHiFT Booklet Module

SHiFT booklet module was validated by content validity and face validity after the process of module development was completed. The validation process is a stage to assess the module regarding the fulfilment of certain requirements in the aspects of content and presentation. Content validity indicated the scientific accuracy, relevance as well as clarity of the content. Meanwhile, the face validity was focusing on the subjective assessments of the module's presentation as well as the relevance of the items. The content validity process was evaluated by a panel of experts. The hospital shift workers were involved in the process of face validity. Content and face validity were carried out to determine the adequacy of the items assessment in the aspects of content, conformity of appearance of the module, particularly the literary presentation, illustration as well as understandable material. These processes were performed by obtaining an agreement between the judges (de Oliveira et al. 2014).

This test of content validation necessitated the participation of at least five experts (Zamanzadeh et al. 2015). Yusoff (2019) also recommended the presence of at least six to ten experts for the process of content validation. Nine experts were chosen to take part in the content validity of this study. A timeframe maximum of two weeks was given to the experts to complete the evaluation. A set of questionnaires that were adopted from Rahmad and Teng (2020) were distributed to the experts. The

UNIVERSITI SAINS ISLAM MALAYSIA ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

questionnaires consisted of socio-demographic information and evaluation items based on Evaluation of the Printed Educational Material (EVALPEM).

The content validity was evaluated according to the item content validity index (I-CVI) and content validity index by scale (S-CVI). The expert panels utilised the I-CVI to score the relevance of each item. The four-point Likert scale (1= totally disagree; 2= partially agree; 3= agree; 4= totally agree) was created based on the degree of agreement that was answered by the experts. The I-CVI was calculated from the total number of experts contributed to a score of 3 or 4, divided by the total number of experts. The I-CVI used the four-point Likert scale for the scoring system. For the calculation, the score was 0 if the expert rated 1 to 2, and one if their rate was 3 to 4 for the item. As a result, I-CVI was determined using the expert panel's rate, in which the score was either 0 or 1, and the total scores from all experts were then divided by the total number of experts who participated. The I-CVI scale ranged from 0 to 1. If the I-CVI value was more than 0.78, the item was considered relevant. The item was revised if the value was less than 0.78 (Lima et al. 2017; Rahmad & Teng 2020).

S-CVI was used to evaluate the overall scale of content validity. S-CVI could be calculated by using two approaches. The first approach was the Universal Agreement (UA) among experts (S-CVI/UA), and the second approach was the Average S-CVI (S-CVI/Ave). The universal or total agreement between experts was the S-CVI/UA. Thus, the I-CVI score was 1 for the items for which the experts agreed and provided the rate of 3 or 4. All I-CVI with a score of 1 were combined and divided by the total number of items. Meanwhile, S-CVI/Ave was the average score for I-CVI. It was calculated by

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

dividing the sum of the I-CVI with the total number of items. S-CVI/UA values of ≥ 0.80 and S-CVI/Ave ≥ 0.90 were regarded as excellent content validity (Afifi et al. 2017; Rahmad & Teng 2020).

Subsequently, the process of face validation was conducted to evaluate the module based on the respondents' understanding and acceptance of all information provided in the module (Rahmad & Teng 2020). This was performed by the hospital shift workers and respondents with health sciences-related backgrounds. A total of 15 to 20 respondents were needed for face validation (Yau et al. 2015). In this study, face validation involved the participation of 20 respondents. Following content validation, the respondents evaluated the revised module. They were given three days to provide a subjective assessment of the items in order to determine their clarity and comprehension. The questionnaires for the face validation were referred from Johari et al. (2011), Teng et al. (2017), and Rahmad and Teng (2020).

The evaluation of face validity was focusing on the content, graphics and design of the module and was carried out among the respondents with health sciences-related backgrounds and hospital shift workers in Klang Valley. The respondents were instructed to answer a self-administered questionnaires comprising of socio-demographic information and acceptance evaluation for the SHiFT module with regard to the content, graphics and design, as recommended by Johari et al. (2011). The consideration of an index of less than 80% was regarded as unacceptable and decided for elimination or modified accordingly (Teng et al. 2019). Figure 1 summarizes the flow chart of module development.

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

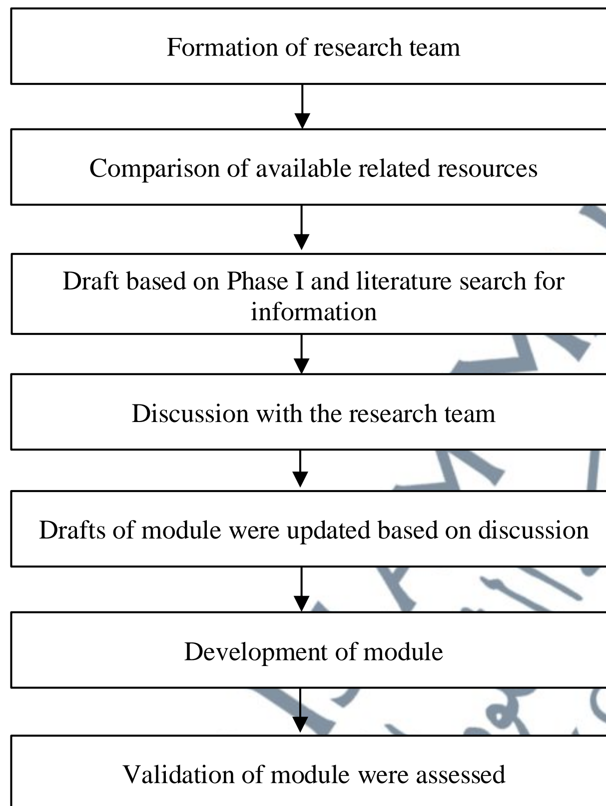

Figure 1: Flow Chart of Module Development

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

3.6 Research Theoretical/Conceptual Framework

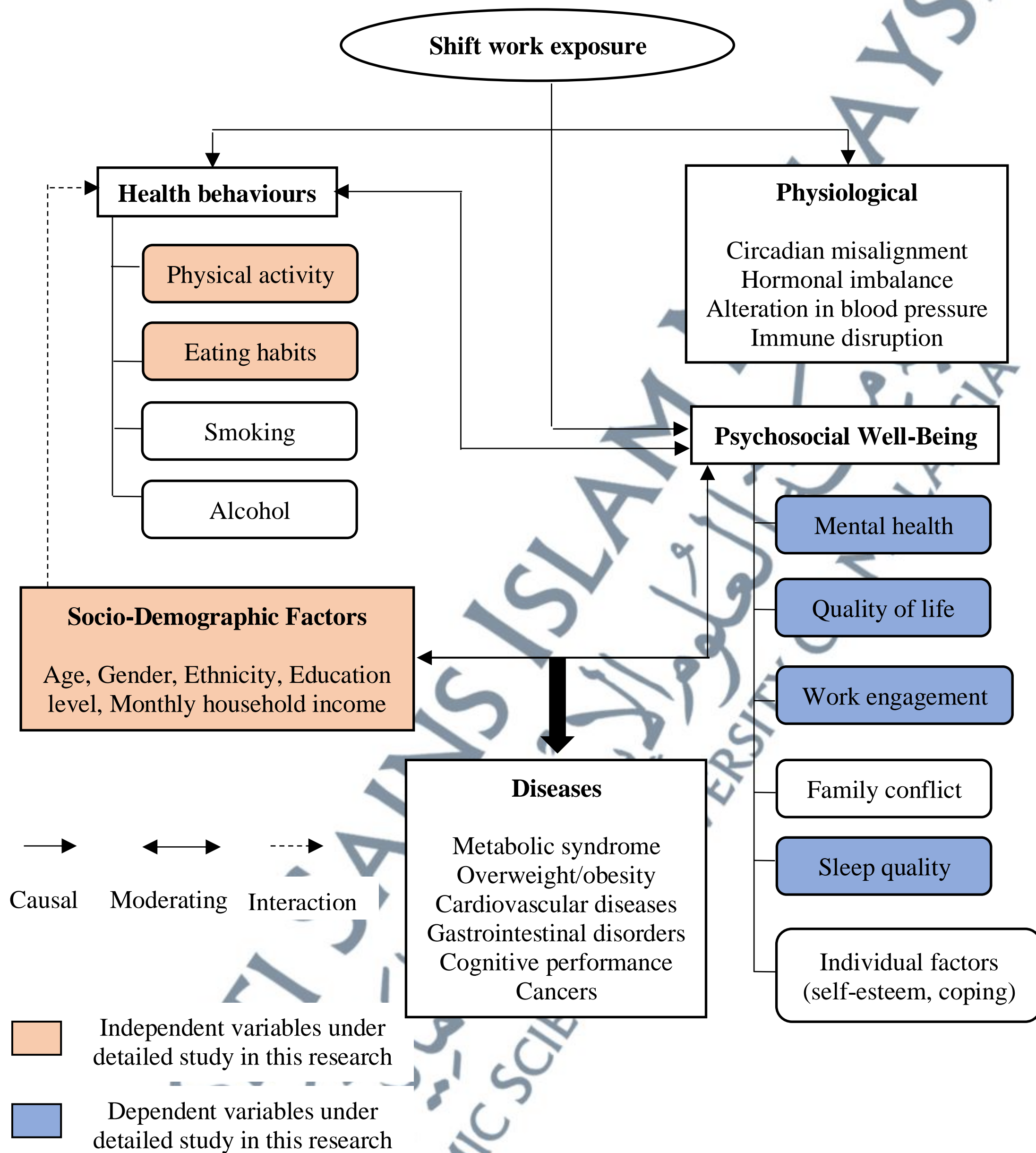

Figure 2: Conceptual Framework (Adapted from Nea et al. 2015; Nakata et al. 2012)

The conceptual framework was adapted from Nea et al. (2015) and Nakata et al. (2012), which incorporated the relationship between socio-demographic factors, health behaviours, physiological, psychosocial well-being and diseases. The variables included in this study are presented in Figure 2.

3.7 Study Flowchart

Shift Workers' Psychosocial-Being and Its Association with Physical Activity and Eating Habits among Healthcare Workers in Klang Valley and The Development of SHiFT Module

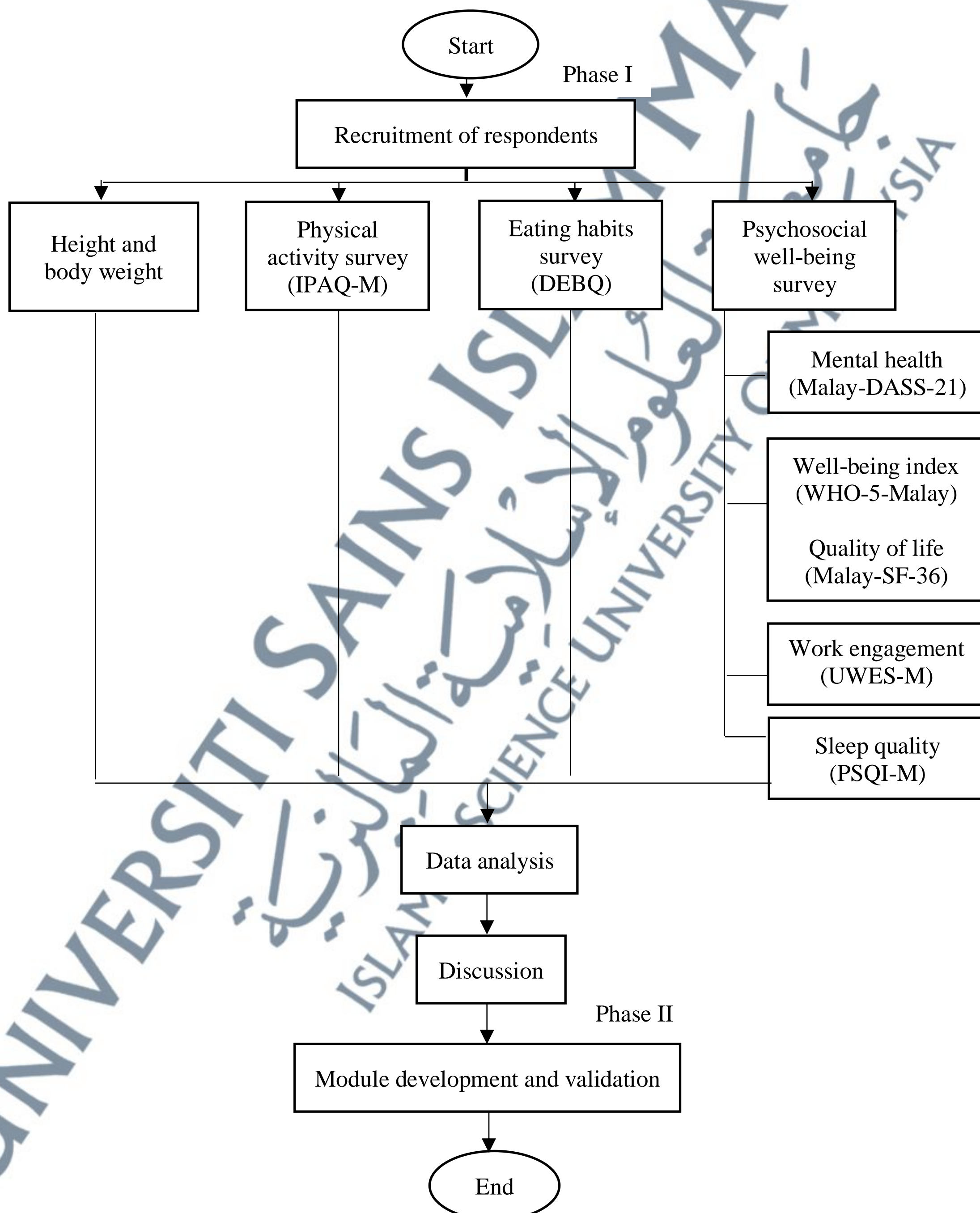

Figure 3: Study Flowchart

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

3.8 Operational Definition of Terms and Variables

1. **Socio-demographic factors**

   i. **Age:** The respondents' age was calculated when data were collected.

   ii. **Gender:** Male or female as mentioned in the Malaysian identification card.

   iii. **Ethnicity:** Race as stated in the Malaysian birth certificate.

   iv. **Religion:** Religion as stated in the Malaysian identification card.

   v. **Marital status:** The lawful recognition of the relationship being husband and wife, that was categorised as single for those who have never been married; married for those who are still married during the data collection; widowed for those who are not remarried after the death of the spouse during the data collection; divorced or separated for those whose marriage has been annulled through divorce or religious law or who have not lived together for a long time and are unlikely to reunite.

   vi. **Educational status:** Any formal highest education received, namely the Malaysian Certificate of Education (SPM); Malaysian Higher School Certificate (STPM); or tertiary education of diploma; bachelor; and postgraduate.

   vii. **Household income:** Household income mean self-declared total income for the household of the respondents. The household income was then categorised according to the Department of Statistics Malaysia Official Portal (Department of Statistics 2019), that was classified into lower class socio-economic status with household income of less than RM4,850; middle class socio-economic

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

status with household income of RM4,850 to RM10,959; and upper-class socio-economic status with household income more than RM10,960.

viii. **Healthcare position:** Referred to the working position of the respondents in the respective hospital, for example, house officers, medical officers, staff nurses and paramedics.

ix. **Workplace (hospital):** The hospitals in Klang Valley in which the respondents were working. For instance, Ampang Hospital, Klang Hospital Shah Alam Hospital, Banting Hospital, Kajang Hospital and others. Others included other hospitals in Klang Valley that were Serdang Hospital, University Malaya Medical Centre, Kuala Lumpur Hospital and Selayang Hospital.

x. **Department:** The department that the respondents were working in the hospital such as emergency & trauma department, medical-based departments and surgical-based departments. The medical-based departments included the departments of Medical, Anaesthetic & Intensive Care, Psychiatry, and Paediatrics. The surgical-based departments represented the Surgical, Orthopaedics, and Obstetrics & Gynaecology departments.

xi. **Part time job involvement:** A flexible work arrangement in which working less than full-time hours, referred to the other jobs that were committed by the respondents other than the hospital's job, outside working hours.

xii. **Comorbidity:** Self-reported as being told by the doctors to have any diseases such as hypertension, diabetes mellitus, dyslipidaemia, asthma, anaemia, arthritis and others.

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

xiii. **Smoking/vaping status:** Current smokers or vapers defined as those who smoke any tobacco or vaping products on a daily or irregular basis during the study.

xiv. **Alcohol consumption:** Intake of any drink containing alcohol daily or occasionally during the study.

2. **Body mass index (BMI):** BMI was computed by using the respondents' self reported body weight and height, with the formula below:

$$\text{BMI} = \frac{\text{Body weight (kg)}}{\text{Height squared (m}^2\text{)}}$$

BMI was grouped according to the WHO guidelines (WHO 2000) with the cut-off as follow: underweight (< 18.5 kg/m^2); normal (18.5 – 24.9 kg/m^2); overweight (25.0 – 29.9 kg/m^2); and obese (≥ 30.0 kg/m^2).

3. **Shift workers:** Healthcare employees who work in 3-shifts system in hospitals of Klang Valley, Ministry of Health.

4. **Physical activity:** Determined by the IPAQ-M scores (MET minutes a week) in walking, moderate-intensity activities, vigorous-intensity activities and sitting, further divided into 3 categories; inactive, minimally active, health enhancing physical activity (HEPA) active.

5. **Intentional exercise:** The exercise that were performed by the respondents at least 3 times per week for 20 minutes during their free time.

UNIVERSITI SAINS ISLAM MALAYSIA
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

6. **Eating habits:** Determined by DEBQ-scale scores that categorised into 3 scales; emotional eating, external eating and restrained eating.

7. **Mental health:** Determined by the Malay-DASS-21 scores which have 3 components of depression, anxiety and stress; and further divided into the cut-off scores ranging from normal, mild, moderate, severe and extremely severe.

8. **Quality of life:** Determined by the WHO-5-Malay and Malay-SF-36 scores. WHO-5 contributed to scores with 0 represented the worst possible quality of life and 100 represented the best possible quality of life. Malay-SF-36 has 8 health concepts; physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, emotional well-being, social functioning, energy/fatigue, general health perceptions. High scores defined a more favourable health state in which each item was scored in the range of 0 to 100.

9. **Work engagement:** Determined by the UWES-M scores, which have 3 dimensions; vigour, dedication and absorption.

10. **Sleep quality:** Determined by the PSQI-M scores, which have 7 components; subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleep medication, daytime dysfunction, further component scores were summed to produce global score of range 0 to 21, with higher scores indicated worse sleep quality.

11. Content validity index (CVI) indices:

i. **I-CVI (item-level content validity index):** the proportion of content experts providing item a relevance rate of 3 or 4.

$$\text{I-CVI} = \frac{\text{Agreed item}}{\text{Number of experts}}$$

ii. **S-CVI/Ave (scale-level content validity index based on the average method):** the average of I-CVI scores for all items on the scale or the average of proportion relevance given by all experts. The proportion relevant is the average of relevance rating by individual expert.

$$\text{S-CVI/Ave} = \frac{\text{Sum of I-CVI scores}}{\text{Number of items}}$$

$$\text{S-CVI/Ave} = \frac{\text{Sum of proportion relevance rating}}{\text{Number of experts}}$$

iii. **S-CVI/UA (scale-level content validity index based on the universal agreement method):** the proportion of items on the scale that achieve a relevance scale of 3 or 4 by all experts. Universal agreement (UA) score is given as 1 when the item achieved 100% experts in agreement, otherwise the UA score is given as 0.

$$\text{S-CVI/UA} = \frac{\text{Sum of UA scores}}{\text{Number of item}}$$

UNIVERSITI SAINS ISLAM MALAYSIA ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA