CHAPTER FIVE

DISCUSSIONS

This study primarily concentrated on a particular group of healthcare workers who worked in a 3-shifts system. This indirectly removes any bias on the type of shift schedule which might differ according to the workplace (Juliana et al. 2022). The socio-demographic data in this study reported that women dominated the population of hospital shift workers (81.1%). This is comparable with a study by Sweeney et al. (2021) showing the over-representation of women among the healthcare workers and shift workers. The health workforce in Malaysia is also reported to be predominantly women across all types of healthcare professions except specialists and paramedics (Human Resources for Health Country Profiles 2020).

The majority of the respondents were under the age of 40 years old. Based on the career pathway in the Ministry of Health, most personnel start their career at early age and these are the workforce that dominates the shift work system. As they climb the job ladder usually over the age of 40, the seniority would enable them to be promoted for a steadier working schedule, especially with higher childbearing responsibilities carried by the majority-female workforce. Healthcare workers will either work in office-based departments or in positions with higher responsibilities that accommodates call during office hours like ward matrons, and healthcare administrators, who is typically desk-bound (Lim et al. 2019). Another explanation is suggested by the data showing that there are shifts

in healthcare workers towards the private sector after the age of 40 (Human Resources for Health Country Profiles 2020).

The proportion of respondents according to ethnicity in this study corresponds to the prevalence of ethnic groups in the Malaysian population. Malaysia is a multiracial-multicultural society with Islam as the official religion (Tan et al. 2021). Islam is the predominant religion among the Malays. Thus, most of the respondents in this study were Malays and Islam. The marital status of the respondents revealed that 66.6% of them were married. The analysis of educational status showed that the majority of them were educated up to tertiary education, with more than half of them (55.9%) up to the level of a Diploma. The healthcare sector is an industry with high-skilled service in which the majority of healthcare professionals require extensive education and thorough practical skills (Human Resources for Health Country Profiles 2020). All these findings were in accord with a study by Lim et al. (2019) that was conducted among healthcare shift workers in Malaysia which reported similar proportions of married respondents (57.2%), Malays (94.4%) and Islam, as well as respondents with diploma qualifications (79.7%).

Besides, half of them (50.1%) were from the middle-class socio-economic status that accounted for the household income ranging from RM4,850 to RM10,959. In Malaysia, this middle household income classification is referred to as the middle 40% (M40). Lim et al. (2019) showed that the majority of the nurses in Malaysian hospitals reported a lower monthly income. These variations might be because of the respondents in this present study involved not only nurses but also other health professionals such as doctors and paramedics.

The wage scales among healthcare workers depend on the level of basic qualification, the availability of promoted positions and eligibility for different allowances (Human Resources for Health Country Profiles 2020).

All of these respondents were hospital workers working in a 3-shifts system, particularly the morning shift (7 a.m. to 2 p.m.), evening shift (2 p.m. to 9 p.m.) and night shift (9 p.m. to 7 a.m.). Referring to the workplace, this study involved the hospitals in Klang Valley, with Ampang Hospital as the main site of the study and contributed to the majority of the respondents (28.3%). The Emergency & Trauma department was the department that widely practiced the 3-shifts work schedule (Zakaria et al. 2021). Thus, this department's healthcare workers made up the majority of the respondents (42.4%). It was also highlighted that most of the respondents (60.8%) worked as staff nurses. This is because registered nurses are the largest group of health personnels in hospital setting (Ministry of Health Malaysia 2016). In addition, the proportion of the respondents who did not involve in a part-time job was 89.3%. Similarly, a low prevalence of part-time employment was observed in China, South Korea, Thailand and Japan (Aiken et al. 2011). This might be because they were committed to the tight shift work schedule, and were having inadequate time and commitment to participate in the part-time job outside their working hours.

In view of comorbidities, 85.5% of the respondents had no underlying comorbidity. One of the explanations might be because of the factor of age, in which the majority of the respondents in this study were younger adults. The result is not in agreement with previous

research that highlighted multiple comorbidities suffered by shift workers. Nena et al. (2018) emphasised on the comorbidity of hypertension, diabetes mellitus, hypercholesterolemia, chronic obstructive pulmonary disease and snoring among hospital shift workers in Greece. This is comparable with a previous study that reported metabolic syndrome as the commonest disorder among shift workers (Hansen et al. 2016). The majority of respondents in this study were non-smokers/vapers (94.4%) and non-alcohol consumers (96.6%). This is in accord with the healthy lifestyle campaigns promoted by the Ministry of Health targeting the risk factors of smoking and alcohol abuse (Malaysia Health System Review 2013). In view of the majority of them are Islam, religious faith may be part of the underlying cause that result in the low prevalence of alcohol consumption (Al-Ansari et al. 2016).

The findings revealed that 43.8% of the respondents were either overweight (25.9%) or obese (17.9%). A similar trend was reflected by the local studies, proving that there was a prevalence of 29 to 40% for the problems of overweight and obese among healthcare workers (Kit et al. 2020; Singh et al. 2021). This was also on par with findings in a study by Hng et al. (2019) which revealed the high prevalence of overweight (37.1%) and obesity (31.4%) among nurses in Malaysia. This high prevalence might be in view of a lack of physical activity, increased intake of carbohydrates and unhealthy eating behaviour like skipping meals and a preference for eating fast food (Hng et al. 2019). This is despite the fact that it is assumed that healthcare professionals are aware of the health-related risks of obesity and effective ways to overcome it. This rise in the prevalence of obesity among healthcare shift workers also increases their risk of developing chronic

diseases, which will ultimately contribute to a detrimental effect on the human resources availability for the healthcare system (Ondicho et al. 2016; Singh et al. 2021).

5.1 Physical Activity of Hospital Shift Workers

Although a standard questionnaire was utilised to assess physical activity, most questionnaires only have acceptable to moderate reliability and validity, making it challenging to differentiate the findings of the present study with those of earlier investigations, especially among hospital shift workers. A recent systematic review and meta-analysis by Monnaatsie et al. (2021) stated that research assessing the prevalence of physical activity and sedentary behaviour among shift workers demonstrated assorted findings. This might be because the data can be presented in a variety of ways (for example, as total physical activity minutes per week, MET-minutes per week, or in terms of categories; low, medium, and high), and even while the IPAQ protocol advises using median scores, means are frequently reported in place of these values (Matei & Ginsborg 2020).

Additionally, another study recorded that some respondents had difficulty in differentiating between moderate and vigorous-intensity activities and disagree on what constitutes physical activity. Moreover, they may count the same activities more than once if they categorise them as both moderate and vigorous (Kapteyn et al. 2018). These

explained why the distribution of data by using IPAQ-Short form Malay (IPAQ-M) in this study varied from previous studies. Based on current guidelines, it is recommended for healthy adults to be engaged in at least 150 minutes in a week of moderate to vigorous aerobic physical activity to obtain advantages for the health (US Department of Health and Human Services 2008; Tremblay et al. 2011).

Babiolakis et al. (2015) recorded a median of 500 MET-minutes/week of vigorous-intensity physical activity, 960 MET-minutes/week of moderate-intensity physical activity, and 3000 MET-minutes/week of walking among the nurses in Canada. Another study by Reed et al. (2018) found that nurses accumulated an average of 8176 ± 2351 steps per day and engaged in 123 ± 87 (median = 120) min/day in moderate-to-vigorous intensity physical activity. The median total physical activity per week in this study was 1571 MET-minutes (IQR = 4172), which consisted of contribution from vigorous-intensity activity with 240 MET-minutes (IQR = 720), moderate activity with 240 MET-minutes (SD = 480), and 594 MET-minutes (IQR = 2170) by walking.

In comparison to a study in Malaysia among nurses, Lim et al. (2019) reported the median physical activity per week of 720 MET-minutes (IQR = 3140) for vigorous-intensity activity, 2145 MET-minutes (IQR = 3938) for moderate-intensity activity, 2277 MET-minutes (IQR = 4653) for walking, and 6572 MET-minutes (IQR = 9553) for overall physical activity. The differences can be partly explained by the use of self-reported questionnaires and the fact that various assessment techniques yielded different outcomes (Van Hecke et al. 2016). There is the possibility that respondents either over-reported or

under-reported their physical activity levels. Self-reported measures can lead to recall bias in comparison to the device-based measures (Sylvia et al. 2014; Monnaatsie et al. 2021).

The majority of the respondents in this study were classified as either physically inactive (31.7%) or minimally active (43.6%). This could be correlated with the findings of overweight (25.9%) and obese (17.9%) in this study. This is comparable with a research by Abu Saad et al. (2020) that found 45.6% of healthcare workers were physically inactive. Healthcare shift workers may have demonstrated higher occupational physical activity than leisure-time physical activity (Monnaatsie et al. 2021; Peplonska et al. 2014; Vandelanotte et al. 2015). Nevertheless, this present study did not explore the specific types of physical activity as it is the limitation of IPAQ-Short form Malay questionnaire.

According to 'physical activity paradox', shift workers may not benefit from increased physical activity due to high occupational physical activity (Gupta et al. 2020). Loef et al. (2017) demonstrated that no significant correlation was found between shift work and non-occupational physical activity, suggesting that shift workers could still be at greater risk of developing health complications on the assumption that majority of the reported activities come from occupational physical activity. This could be explained that occupational physical activity is frequently of minimum intensity to effectively encourage the fitness of cardio-respiratory system, tends to increase average heart rate, blood pressure and inflammation, and is usually conducted in static and constraint postures without enough recovery time, all of which rising the likelihood of developing cardiovascular complications (Holtermann et al. 2018).

It had been demonstrated that high occupational physical activity with low leisure-time physical activity engagement was linked to a higher BMI, sleep impairments and several psychological problems among nurses (Lim et al. 2019). Monnaatsie et al. (2021) documented that those involving in shifts are less sedentary as compared to those operating in the basis of normal working hours. Furthermore, it is predictable that shift workers recorded lower sedentary time in comparison to non-shift workers since the majority of normal day workers are engaged in the office work that require long periods of sitting. This is in line with this study where it was found that respondents spent less time sitting. The median for sitting time was 240 minutes (IQR = 225).

Besides, the additional data in this study showed that more than half of them (61.3%) did not perform the intentional exercise. Hospital shift workers' physical activity levels have been the subject of numerous research by using different measures, some of which concluded that shift workers were less physically active, lending credence to the idea that shift workers could lack the energy and time to engage in physical activity in their free time. Differences in physical workload brought on by varied work tasks, patients and resource available throughout different types of shifts may also be a contributing factor (Loef et al. 2018; Chappel et al. 2017). On top of that, another explanation might be because the pandemic of COVID-19 enforced the closure of sports club, fitness centres, and exercise facilities (Skinner & Smith 2021). As a result, the intentional exercise of the hospital shift workers might be affected.

5.2 Eating Habits of Hospital Shift Workers

Shift work may influence eating habits in view of the aspects of biology, culture and social. The eating habits and dietary patterns of shift workers were altered by irregular meal timing and poor quality of diet (Almajwal 2015; Farias et al. 2020). Based on Nea et al. (2015), tight shift schedules, shortage of breaks, poor food options and availability, insufficient cafeteria opening times, inadequate time and fatigue from long working hours were among the most frequently stated perceived barriers among the shift workers across research. Most of the shift workers are not given suitable food selections, adequate time or enough spaced breaks to consume their meals in a pleasant setting. There is also documentation supporting that eating during the night shift is driven more by restriction of schedule rather than actual hunger. Additionally, in the workplace, it has been demonstrated that meal content and timing are influenced by work demands and workload. In this study, eating habits among the shift workers were assessed, and poor eating habits were indicated by higher scores eating habits, involving three different domains of emotional, external and restrained.

The majority of the respondents in this study (86.9%) obtained lower scores for emotional eating habit, which concluded that most of them were non-emotional eaters. Emotional states including anxiety, depression and stress, encourage dietary behaviours that go against recommended diets such as increased food consumption or poor food preferences (Devonport et al. 2019). Poor emotional eaters have been shown to eat more sweets, food rich in fats and energy-dense meals, and are more prone to establish poor eating habits like overeating and gaining weight (Sapian et al. 2021). Nevertheless, the food

intake of the respondents was not evaluated in this study. The reason for the non-emotional eaters in this study might be due to the complexity of human responses to surrounding or situations with food, as some may eat more or less (Wardle et al. 2011). In fact, both positive and negative emotions could influence the food preferences (Małachowska et al. 2021; Sze et al. 2021). Indeed, this study was conducted during the health crisis of COVID-19 in which might contributed to collective emotional responses to the pandemic. Another study suggested that the emotional eating might not reveal the desire to eat during emotional settings, but rather it represented the concern about the habit of the eater itself that will consequently result in weight gain (Hng et al. 2019). In addition, healthcare workers might have more awareness of healthy eating habits based on the exposure of health education from Ministry of Health.

There were higher scores for external eating habit (78.0%) in this study, which concluded that the respondents were having poor external eating habit. However, this is contradicted by a study by Almajwal (2016) in Saudi Arabia which found that nurses who worked in shift schedules were less likely to have abnormal external eating habit. External eating habit is described as a change in attitude towards environmental factor cues, and they become more likely to eat (Almajwal 2016). This pattern of outcomes could be caused by the wide discrepancies in environmental influences present in a diversified working environment (Sapian et al. 2021). This might be because this study accumulates shift workers from different backgrounds of departments and hospitals. In addition, one of the environmental factor cues might be delicious or pleasant food available in the hospital. Normally, the Malaysian hospital shift workers would spend their time break by eating in

the ward pantry. Therefore, sometimes they might be influenced by their colleagues to eat the similar delicious food and they tend to eat more than usual. This might be one of the explanations of the high prevalence of poor external eating habits among the respondents.

The findings on abnormal restrained eating habit in this study were in comparable with previous studies among shift workers (Almajwal 2016; Wong et al. 2010). This can be explained by the reasons for limited food options and time available during the night shift (Almajwal 2015). In fact, in urban and suburban areas food availability after midnight is abundance, especially fast food and restaurants that serves calorie-dense food. Similarly, shift workers reported that they consume fast food and snacks during their night shift. The preferences for fast food and snacks are to help them stay awake and to conserve energy in view of their burdensome tasks and workload (Wong et al. 2010). Some of the shift workers who worked at night may eat dinner too early and eat a very small amount of food before going to work, and then they try to compensate by taking snacks. Another study by Sahu and Dey (2011) revealed that the consumption of carbohydrates, protein, fats and vegetables in daily life is remarkably lower during the night shift. The night shift also affects their appetite, number of full meals, and eating satisfaction.

5.3 Psychosocial Well-being Status and the Associated Factors

5.3.1 Mental Health

Working in the healthcare shift system greatly influences the mental health and well-being of the shift workers. There were multiple studies that recorded evidence of adverse mental health problems among healthcare workers (Elbay et al. 2020; Arafa et al. 2021). This study highlighted the prevalence of depression, anxiety and stress of 27.4%, 34.6% and 11.6% respectively, with 60.0% of them having normal mental health. The findings of this study on the prevalence of mental health problems are comparable with a study by Yahaya et al. (2018) among shift workers in Malaysian hospitals. A study by Singh et al. (2021) recorded a slightly lower prevalence of depression (16%), anxiety (26%) and stress (12%) among healthcare workers in Sabah, Malaysia.

Furthermore, this is comparable with the national prevalence published by the Malaysian Ministry of Health with the epidemiological data of 29% for the prevalence of mental disorders among adults (Institute for Public Health 2015). Previous literatures demonstrated that rotating shift workers had poorer mental health status in comparison to the workers who involved in the office-hour duties. It was indicated that shift work imposed circadian strain and contributed to multiple psychological and physical comorbidities in comparison to the normal working hours schedules (Ferri et al. 2016; Gu et al. 2015). This study did not assess the comparison of mental health among the office-hour hospital workers and hospital shift workers, and only focused on the shift workers.

It gives overwhelming pressure and challenges to be working in the shift systems of healthcare setting. This is because shift work alters the circadian rhythm of an individual. The biological clock controls daytime wakefulness that gives rise to increased alertness during the day and reduced attention at night for the normal individual (James et al. 2017). However, there is a misalignment of this circadian rhythm in the shift workers. Those who worked in shift work systems are found to be more susceptible to develop issues mentally and psychologically (Azmi et al. 2020). All these underlying issues may justify the prevalence of depression, anxiety and stress in this study among the hospital shift workers who worked in the 3-shifts system. The significant predictors that were associated with depression, anxiety and stress in this study include gender, age, ethnicity, religion, marital status, healthcare position, working hospital, physical activity, BMI, eating habits, and sleep quality.

It was shown that women had double the chances of suffering anxiety than men. This is supported by Lai et al. (2020) that found similar results. A study by Lai et al. (2020) recorded that nurses were more prone to have depression and distress than physicians. In addition, higher levels of mental health problems were reported by younger or single nurses compared to married ones (Yoon & Kim 2013; Cheung & Yip 2015). In accordance with previous studies, it was stated that having a partner in a steady relationship contributes to emotional stability and considerably reduces the risk of developing psychiatric illness (Perry et al. 2015; Kaur et al. 2013). The likelihood of depression, anxiety and stress may be higher in single nurses who may be more mentally devoted to their work, lessening any gender disparity in these phenomena's occurrence (Cheung & Yip 2015). In Malaysia, the

highest prevalence of depression was among the Indians (Malaysian Healthcare Performance Unit 2016). However, a study by Yahaya et al. (2018) found no association between ethnic groups with the mental health of the healthcare workers in Malaysia.

The most possible place to be predisposed by the psychosocial problem is the hospital environment, in view of the daily routine, work demands and job pressure that were experienced by the healthcare professionals and leading to depression, anxiety and distress. The stresses of working in the hospital surroundings are cumulative and progressive, and the health issues that resulted from this stress can be brought on by several considerations, including working night shifts on weekends and public holidays, distressing psychological consequences of observing patients deteriorating, and the internal psychological problems experiencing by the healthcare personnels (Oliveira et al. 2015; El Kissi et al. 2014). Findings from the studies highlighted above are consistent with this study which found the association between working hospitals and mental health problems among hospital shift workers.

This study is in agreement with previous studies that indicated the association between inactivity and depression (Antunes et al. 2016; Lindwall et al. 2014; Cheung & Yip 2015). There may be a reciprocal relationship between physical activity and depressive symptoms. Either engaging in physical activity lowers the likelihood of experiencing depression symptoms, or the symptoms themselves may cause a reduction in physical activity (Silva et al. 2020). The significance of lifestyle factors in fostering excellent mental health was also addressed by Lam et al. (2015). The high workload among healthcare shift

workers might be one of the contributing factors of lacking time for physical activity beyond working hours (Lu et al. 2020).

Meta-analyses and research findings over the last decade have shown a link between obesity and depression in young age and specific gender of women (Wang et al. 2019; Vittengl 2018; Anversa et al. 2021). Coherent findings in this study supported a similar theory which was echoed in the pool of respondents who were under the age of 40 years old and women. The abrupt change in lifestyle factors and job pressure that could have a significant impact on the observed correlation are some potential explanations for these results. Limiting outdoor activities could contribute to a rise in body mass index (BMI) which indirectly lead to obesity. Consequently, it predisposes individuals to develop mental health problems because of a decline in social connection and daily life activities (Moussa et al. 2019; Juliana et al. 2022).

In addition, studies emphasising on the relationship between diet, adiposity and negative emotional states of psychological distress suggest that there might be changes in hormones derived from adipose, insulin, glucocorticoids and inflammatory signals the nature of central obesity (Jantaratnotai et al. 2017). This is supported by the findings that increasing physical activity reduces anxiety may be due to blocking negative thoughts, diverting people from unnecessary worries, boosting social connection and altering the brain chemistry in a way that eventually alleviates mood, which seems to establish the link between anxiety and sedentary lifestyle-induced obesity (Ejike 2013).

According to Azmi et al. (2020), the period of time breaks has a substantial impact on the eating habits of the shift workers. This is because time constraints make it difficult to maintain a regular eating routine, which is essential for well-being. A person that has intensive dieting, limiting food consumption of particular macronutrients or food groups, and intermittent periods of overeating is referred as a restrained eater. There may be a back-and-forth interaction between the factors of restrained eating habit with stress symptoms. The stressful atmosphere in the working environment could cause irregular eating behaviours linked to restrained eating, or the opposite could occur (Herhaus & Petrowski 2021; Juliana et al. 2022). Previous research also stated that anxiety may promote impulsive eating habits, leading to a higher intake of daily calories from consuming more high-calorie food including sweets, fried foods, fast foods and processed products (Christofaro et al. 2022; Coletro et al. 2022; Ramalho et al. 2021). This can explain the association between emotional and external eating habits with anxiety in this study.

The respondents' sleep quality in this study was associated with their mental health status, with those who had poor sleep quality being more likely to have mental health problems. It is known that working in night shift disrupts the rhythms of cortisol and melatonin hormones, which are significantly linked to the quality of sleep (Azmi et al. 2021). Hospital shift workers normally have the problem of inadequate sleep following their night shifts in view of the disturbed circadian rhythm. This finding is coherent with a study by Oh et al. (2019) who recorded a significant relationship between sleep quality with depression and anxiety. Another study by Vinstrup et al. (2018) also highlighted the association between sleep quality and stress among healthcare workers. In a recent well-

controlled experimental study, individuals showed higher levels of cortisol and subjective stress after just one night of sleep deprivation. The impacts of persistently high levels of stress may adversely affect the workability of this population, as the consequences of poor sleep and stress are likely to compound over time (Schwarz et al. 2018; Vinstrup et al. 2018).

In this study, the factors of educational status, household income, working department, part-time job, comorbidity, smoking/vaping status, and alcohol consumption were not significantly associated with the mental health of the hospital shift workers. Nevertheless, previous studies documented a significant association between the composition of the household, having a child, years of service and the presence of lifetime psychiatric disorders with the mental health of the hospital workers (Singh et al. 2021; Elbay et al. 2020).

5.3.2 Quality of Life

Local research in Malaysia that focused on the issue of quality of life among hospital shift workers is lacking (Woon & Tiong 2020). Referring to the scores from WHO-5-Malay questionnaires, the reported mean in this study was 53.64 ± 19.9, with a prevalence of 55.4% of good well-being. This is similar to a study by Skoufi et al. (2017) carried out in Greece with a mean of 55.4 ± 20.6. It can be concluded that healthcare workers might have different perceptions of quality of life (Soric et al. 2013; Skoufi et al. 2017; Kheiraoui et al. 2012).

In our study, the respondents had a good quality of life based on the scores of Malay-SF-36 questionnaire in both physical (90.3%) and mental (89.3%) domains. Similar findings were reported by Woon and Tiong (2020) in Malaysia and Kheiraoui et al. (2012) in Italy on the quality of life among healthcare workers. Nevertheless, it was found that the healthcare personnel in Spain had lower quality of life in comparison with the reference population values, specifically in Malay-SF-36 dimensions comprising mental domains (Suner-Soler et al. 2013). These findings may propose that the respondents in this study did experience a fairly high degree of overall quality of life. It can be suggested that healthcare workers are more optimistic about their health. This is likely in view of their daily tasks that are intimately related to pain, physical suffering and emotional distress (Kheiraoui et al. 2012).

In comparison with a study by Osman et al. (2019) among the general population in Malaysia, it is supported that quality of life is influenced by the economic well-being of the individual especially the economic capacity, living condition, transportation as well as educational satisfaction. The quality of life depends on the individual itself as it includes border concept that influences the individual in the aspects of surrounding, economy and community (Osman et al. 2019).

As was demonstrated in this study, the prevalence of good well-being from WHO-5-Malay questionnaires might differ from the prevalence of good quality of life from Malay-SF-36 questionnaires. The WHO-5-Malay is assessing subjective psychological well-being. Meanwhile, the Malay-SF-36 is generally a scale focusing on the health-related

quality of life, specifically on domains of physical and mental health. Hence, this explains why there were variations in the prevalence of good quality of life according to the scores of WHO-5-Malay and Malay-SF-36 in this study. This might be because the quality of life of the hospital shift workers were not really affected, as they still have to be physically active and fit at work according to the Malay-SF-36 scores. However, their perception or feeling towards their well-being were actually affected by the shift work based on the WHO-5-Malay scores.

The significant predictors of quality of life in this study include the presence of comorbidity, healthcare position, working hospital and department, external and restrained eating habits as well as sleep quality. A study by Oliveira et al. (2015) is in agreement with this study that emphasised the presence of comorbidity to be associated with poor quality of life among nurses. For example, the comorbidity mentioned by Oliveira et al. (2015) was the temporo-mandibular joint disorder that includes a group of clinical changes involving the masticatory muscles, temporo-mandibular joint and related structures, characterised by limitations of function and pain, which further worsened their quality of life. Other study by Rahimi et al. (2014) found a relationship between low back pain and quality of life among hospital shift workers.

This study highlighted the association between healthcare position, working hospital and department with their well-being. There may be variations in how different positions of healthcare workers perceived stress and workload, as well as differences in stress levels in various departments and hospitals (Kheiraoui et al. 2012). Wu et al. (2011)

also indicated that the physical environment was one of the significant factors related with quality of life among shift workers. Quality of life is actually closely linked to the physical, psychological, and social perception of the environment where an individual lives. It is obvious that the shift workers' daily life expectations might be adversely impacted by their working environment in hospitals. In fact, the work demands frequently extend into the night, which restricts social activities, family time, and sleeping time (Oliveira et al. 2015).

Suner-Soler et al. (2012) documented that physicians had better perceived physical health as compared to nurses and other professionals. In addition, Kheiraoui et al. (2012) discovered that nurses and women appear to have more negative outcomes in terms of emotional aspects of quality of life, as contrasted to other healthcare workers and men. It is significant to note in this context that workplace, individual factors and social connections appear to influence the quality of life among healthcare workers. Meanwhile, this study demonstrated that doctors had poorer quality of life as compared to nurses and paramedics. One of the explanations might be because of the complex jobscope, high workload and insufficient staff among the doctors in the hospital setting which consequently influenced their quality of life.

There is a paucity of studies exploring the association between eating habits and quality of life among hospital shift workers. Wu et al. (2011) stated that diet irregularity was significantly associated with shift workers' quality of life. Another study by Burkert et al. (2014) showed that a vegetarian diet, which is known for its reduced intake of saturated fat and cholesterol, due to a higher consumption of fruits, vegetables and whole-grain

products, is linked to poorer quality of life. This study reported the association between external and restrained eating habits with the quality of life of shift workers. It is known that inconsistent meal routines, improper meal arrangement and lower diet quality were among the commonest issues among the shift workers. Hence, these altered eating habits indirectly affect the quality of life of the shift workers.

In agreement with this study, Palhares et al. (2014) found a significant correlation between sleep quality and quality of life among nurses working in shifts. It can be concluded that inadequate sleep has a direct consequence on the quality of life of shift workers, leading to social isolation, mental health issues, on top of a number of physical symptoms. This is in view of the important role of sleep-in life, and how sleep deprivation could contribute to detrimental effects. Sleep quality and quality of life are closely associated. This idea is supported by the findings of this study, which demonstrated that poor sleep quality was consistently linked to a lower quality of life.

In addition, there was no significant association between age, gender, ethnicity, religion, marital status, educational status, household income, part-time job, BMI, smoking/vaping status, alcohol consumption and physical activity with the quality of life of the hospital shift workers in this study. Nevertheless, findings from previous studies recorded a significant correlation between age, marital status, smoking and exercise with quality of life among shift workers (Nena et al. 2018; Wu et al. 2011; Rahimi et al. 2015).

5.3.3 Work Engagement

Work engagement is a metric of well-being that is characterised by vigour or energy level, degree of absorption when time passed quickly, and the amount of dedication made to the work environment (Mason et al. 2014). The present study demonstrated average scores of overall work engagement as well as in the aspects of vigour, dedication and absorption. However, a study among nurses in China showed a lower level of work engagement (Wang et al. 2017). Meanwhile, other studies reported higher scores of work engagement (Ge et al. 2021; Shahidan 2019). These results inconsistencies might be due to the working environment and workload of the shift workers. It can be shown that the work engagement of the hospital shift workers in this study was not severely affected.

The strong predictors of work engagement in this study include several factors. This study highlighted the significant association between age, gender, ethnicity, educational status, marital status, healthcare position, working department with work engagement of the hospital shift workers. Physical activity, external and restrained eating habits, and sleep quality of the hospital shift workers were also significantly associated with work engagement in this study.

These findings were in line with Baumgardner (2014) that found an association between age and work engagement, in which older nurses had more work engagement as compared to younger nurses. A study by Othman and Nasrudin (2012) showed that nurses who are married were having better work engagement in comparison to single nurses. Higher educational status among nurses was demonstrated by Lovejoy (2012) to be

associated with considerably higher work engagement scores. Diab and El Nagar (2019) indicated a significant association between age, gender, educational status, working hospitals and experience years with work engagement. Work engagement is substantially linked to the factors of individual and organisation, which include numerous occupational stressors from poor work organisation and management as well as distressing working situations (Wang et al. 2017). Due to limitations of work engagement among healthcare shift workers in Malaysia, results between studies highlighting the association of ethnicity with work engagement are difficult to be compared.

A review by Bakker et al. (2014) highlighted the link between physical health and work engagement. It showed that workers with problems of work engagement reported more complaints of physical health issues such as poor sleep quality, headaches, respiratory infections, gastrointestinal diseases, and musculoskeletal problems. The findings on physical activity were consistent with a study by Toker and Biron (2012) that emphasised the relationship between physical activity and work engagement, in which those who involved in high levels of physical activity contributed to better work engagement.

It is challenging to compare the association between eating habits and work engagement as previous studies exploring these variables among shift workers are still scarce. This study found the association between external and restrained eating habits with work engagement. A study by Nishi et al. (2017) documented the association between dietary fish intake with positive psychosocial well-being and work engagement. This is

because of omega-3 fatty acids that have anti-inflammatory effects which indirectly be relevant to the enhancement of work engagement.

No significant association were observed between the factors of religion, household income, part-time job, comorbidity, BMI, smoking/vaping status and alcohol consumption with work engagement in this study. Meanwhile, Bakker et al. (2014) documented the predictors of personality profile and job resources that include social encouragement from the fellowship, supervisory coaching, and performance evaluation as an important role in work engagement. Fiabane et al. (2013) showed that there was a significant association between mental health and work engagement. According to Nishi et al. (2017), abstinence from tobacco has positive effects on work engagement, where the usage of tobacco was linked to lower scores on the overall work engagement and the absorption subscale. A study similarly demonstrated a negative association between tobacco use and work engagement (Airila et al. 2012).

5.3.4 Sleep Quality

Findings from this study of poor sleep quality (58.1%) supported previous studies that emphasised on sleep impairment among healthcare shift workers (Zhang et al. 2016; Alshahrani et al. 2017). A study by Palhares et al. (2014) documented the prevalence of poor sleep quality at 65.1% among the shift-working nurses in Brazil. This is also in accord with another study by Ganasegeran et al. (2017) in Malaysia that found poor sleep quality among hospital shift workers. When melatonin levels are affected by prolonged light

exposure during working night shifts, desynchronicity between the internal hormonal environment and the external environment may happen which could justify why shift workers who involved in night schedules are prone to poor quality of sleep (Lin et al. 2012). This circadian disruption might be temporary for the majority of shift workers depending on the degree of the circadian phase shift experienced, which they might be recovered within a few days after going back to a regular sleep-wake schedule. However, this might be different for some individuals where they may have significant sleep impairment leading to insomnia, extreme sleep debt and excessive sleepiness during the day with a longer recovery time (Waage et al. 2014; Booker et al. 2018).

The relationship of gender and sleep quality in this study highlighted that men had double the odds of having poor sleep quality. However, this is contradicted by another study that reported vice versa (Surani et al. 2015). Meanwhile, Kolo et al. (2017) reported no association between gender and sleep quality among healthcare workers in Nigeria. The reason behind these inconsistencies remains unclear, but might be in view of the difficulties in balancing work schedules with domestic responsibilities. This study suggests that men are quite struggling to adjust to circadian phase shifting and are unable to quickly transition into a regular sleep-wake cycle following shift work (Sletten et al. 2015).

Another significant predictor of sleep quality in this study is a workplace and working characteristics, as per emphasised by previous studies (Zhang et al. 2016; Chien et al. 2013). This can be explained by the working environment, as different workplaces might have different surroundings, workloads, working culture and other organisational

factors. This indirectly might influence the sleep quality of the hospital shift workers in the working hospitals. Healthcare workers frequently work in environments that vary from place to place and are extremely stressful as they have to cope with traumatic situations, patients who are terminally ill and grieving person. As a result, these may worsen sleep problems and it can be more challenging to return to a normal cycle of circadian rhythm after shift work (Portela et al. 2015; Booker et al. 2018).

Zhou et al. (2020) found that nurses reported the higher odds of having poor sleep quality in comparison to other health personnels such as doctors and medical technicians. These contradicted findings could be explained by the work load and work period encountered by the health personnel in different hospital settings. This is because the timing of sleep opportunity and work period act as critical parts in establishing the sleep quality and job performance of the individual. As a result of the circadian rhythm that promotes sleep at night and wakefulness during the day, there is shorter sleeping time between night shifts and more sleep lost cumulatively across multiple night shifts (Ganesan et al. 2019).

There is also an association between smoking/vaping status and sleep quality in this study. This is in accord with the findings from a study in Lebanon, which found a significant relationship between the number of cigarettes smoked with poor sleep quality, justifying that a higher amount of smoking is associated with poor sleep (Kabrita et al. 2014). Meanwhile, Abbas et al. (2021) recorded no significant association between smoking status with poor sleep quality. Smoking is one of the behavioural habits and it appears to give an

impact to sleep dimensions. Specifically, smokers are proven to experience a number of insomnia-like sleep disturbances (Jaehne et al. 2012).

Furthermore, this study reported no significant association between the predictors of age, ethnicity, religion, marital status, educational status, household income, working department, part-time job, presence of comorbidity, BMI, alcohol consumption, physical activity and eating habits with sleep quality of the hospital shift workers. However, previous studies reported factors of age, family structure, comorbidity, physical activity, and BMI as well as caffeine intake to be associated with sleep quality among shift workers (Booker et al. 2018; Korompeli et al. 2013; Abbas et al. 2021).

5.4 Validation of SHiFT Module

The significant correlation between sleep quality and psychosocial well-being among hospital shift workers summons deliberate attention to future interventions. This initiative helps to maintain the psychosocial well-being of the shift workers (Magnavita et al. 2020; Juliana et al. 2022). The SHiFT module (Appendix 8) in this study was developed for the hospital shift workers for the benefit of their psychosocial well-being maintenance. This is in accord with the findings of this study that emphasised the strong associations between sleep quality with mental health, quality of life and work engagement of the shift workers. The module focused on improving sleep quality by modification of a few associated factors

that are modifiable. This is actually to enhance the sleep quality of shift workers and subsequently preserve their psychosocial well-being. The module was developed based on the extensive literature review with additional input from the experts in the research team. The content was organised in sequence from more general information to more specialised information in the Malay language. The illustrations and figures were designed to be easily understood by the respondents and to attract their interest in the respective topics.

The results of content validity showed that the module achieved a satisfactory level of CVI values. The dissemination of reliable information to the target respondents requires review by an expert in the field (Guillot & Keenan 2016). It can be concluded that the expert panels acknowledge that the SHiFT module's content met the objective of the study. The module had been modified accordingly based on the comments and recommendations as per suggested by the expert panels. The terminologies and sentence structure were maintained as it was reported as clear, simple and easy to be understood. Other aspects of colour combination and font size had been amended with standardized formats throughout the module. The usage of figures and illustrations aimed to facilitate the understanding of the messages and information (Khurshid et al. 2018). In fact, it is also important to utilise a suitable combination of colour to attract the interest of the targeted audience (Knaflic 2015). The optimal font size of 10 to 12 points was used in this module. More examples of the recommended local food were included in the module to provide a variety of choices for better understanding. This is to help the respondents to find local food easily in the nearby shops or markets because the previous examples provided were mostly well-known in other countries.

The subsequent process of face validity among the hospital shift workers and respondents with health sciences related backgrounds by using the amended module also achieved a satisfactory level, in which the percentages for all items in the face validity analysis were more than 80%. The module can be utilised as guidelines and educational tools for improving sleep quality and psychosocial well-being maintenance for the benefit of the hospital shift workers. It is an initiative in conveying health messages and presenting information for the shift workers to be applied in their daily lives. Overall, this study demonstrated the validity and acceptability of the SHiFT module among the hospital shift workers.

The SHiFT module may benefit the healthcare workers and the policymakers in a way that it provides useful information on how to preserve shift workers' psychosocial well-being in regards of enhancing their sleep quality. Although shift work system causes the disturbance in the circadian rhythm, shift duties could not be abolished due to the global expansion of the industries that operate in twenty-four-hour basis. Shift workers are responsible to ensure the twenty-four-hour operation runs smoothly and efficiently. Thus, this module is part of the initiative to promote good psychosocial well-being among the shift workers in our community.

5.5 Limitations of the Study

The limitation that could be observed in this study include the fact that the cause and effect may not be able to be determined as it requires prospective cohort study to be implemented. Therefore, future study may consider this issue. This study focused on the hospital shift workers in Klang Valley, and the cultural effect might show different results. Additionally, the structure of shift schedules among hospital workers might differ depending on policy and regional laws. Thus, findings from this study should be cautiously accommodated because they might not accurately represent healthcare shift workers who work a variety of shift schedules.

Besides, other study limitation was the constraint of data collection through a face-to-face method as this study was carried out during the pandemic of COVID-19. Face-to-face interviews enable the researcher and the subject matter to have two-way communication. Online platforms restrict communication, but the researchers' contact number and email addresses were provided on the online platform to assist the respondents if facing any issues.

On top of that, the efficacy of the SHiFT module in this study had not been tested. Hence, future study needs to do intervention based on the proposed module. This is to give more beneficial outcome to the shift workers in order to maintain their psychosocial well-being and health.