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Assessing the Association Between the Night Shift Schedule and Mental Health Symptoms among Filipino Women Factory Workers: A Cross-Sectional Study

By Sophia Francesca Lu¹; Jinky Leilanie D. Lu²

Abstract

Within the fields of mental and occupational health, the “night shift” is one of the major concerns the work-time schedule. The association between working at night and the occurrence of mental health symptoms among women workers has been a subject of considerable debate. This study explores the association between working at night and mental health symptoms, and the mediating factors to this association. This study examined a database of 500 factory workers, about 90% of whom were women who had originally been part of a study of hazard exposures and the occupational health of workers in export processing zones in the Philippines. The database included variables relating to work schedule such as the night shift, overtime, and extended work, as well as mental and psychological health indices collected through a survey questionnaire. Descriptive statistics developed, and the crude associations between shift schedule and probable confounders with the frequency of occurrence of mental health symptoms were studied using a chi-square test of association. The confounding effect of each probable confounding variable including age, sex, educational attainment, tenure and workload towards the main association (the night shift and mental health hazard) was analyzed by obtaining the Mantel-Haenszel odds ratios of the association, controlling for the particular confounder. A multiple logistic regression was used to analyze the overall association of interest, simultaneously controlling for all confounders. The crude odds ratio for the association between shift schedule and frequency of occurrence of mental health symptoms is 2.13 (0.77-5.81). This means that without adjusting for confounders, those who work night shifts are 2.13 times more likely to have a frequent occurrence of mental health symptoms as compared to those who work in the daytime hours. Specifically, among women, those who work at night are 2.97 times more likely to have frequent occurrences of mental health symptoms compared to those who work in the day. Controlling for age, sex, educational attainment, tenure, workload, and exposure to occupational hazards, those who work at night are 2.13 (0.79-5.71) times more likely to have frequent episodes of mental health symptoms compared to those who work in the morning. Those who are frequently exposed to occupational hazards are 5.78 (1.17-28.71) times more likely to have frequent mental health symptoms as compared to those who are not. The evidence for this association is strong. The study has shown that among Filipino women factory workers, nightshift work is associated with mental health symptoms. There is a need to address the problems encountered by night shifters, especially the mediating exposure to occupational hazards. There may be conditions at work that predispose women workers to more hazards during night shifts compared to day shifts. Mental health among night shifters should be addressed as a concern in occupational health.

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Introduction

This study aimed to look at the association between working at night and mental health symptoms. The nightshift is one of the major issues in the work-time schedule. Work shift schedules include day and night schedules. In fact, the association between working at night and the occurrence of mental health symptoms has been a subject of considerable debate. On the one hand, some studies claim that working at night and changes in shift schedule does not cause significant mental distress (Berthelsen, Pallesen, Bjorvatn, & Knardahl, 2015) or impaired psychological functioning (Tahghighi, Rees, Brown, Breen, & Hegney, 2017). However, some studies claim that working at night is associated with the occurrence of some mental health symptoms (Angerer, Schmook, Elfantel, & Li, 2017; Cheng & Cheng, 2017; Dong et al., 2017; Moon, Lee, Lee, Lee, & Kim, 2015; Øyane, Pallesen, Moen, Åkerstedt, & Bjorvatn, 2013). A meta-analysis of 11 observational studies by Lee et al., (2017) claimed that those working during the night are 1.43 times more likely to develop depression as compared to those who work during the day (95% CI: 1;24-1.64). Another study shows that the disruption of circadian rhythms may cause depression (Salgado-Delgado, Tapia Osorio, Saderi, & Escobar, 2011). This secondary analysis aims to provide some evidence on whether there is association between night work and frequency of occurrence of mental health symptoms, especially in third-world settings where evidence is scant.

The setting of this study consists of factory workers in the manufacturing sector in export processing zones in Metro Manila, Philippines. Export processing zones are special economic enclaves that accommodate economic activities of multinational companies into the host countries. This is seen as a sub-regional response to attract foreign investments in order to boost local employment and raise national revenue, in exchange for benefits offered to investors (Lu, 2005). The benefits given to transnational corporations (TNCs) in export zones in the Philippines include—exemption from taxes, tariffs, license fees; ability to own 100% of the company, no minimum investment requirement; 100 percent ownership; unrestricted repatriation of capital and profits; and the freedom to sell 30 percent of the annual output to the local market, among others. These are special provisions not seen in local or foreign firms outside the zones. However, in the export zone in the Philippines, establishments employ about 75-90% females, because women are preferred by employers for their alleged feminine characteristics such as being docile, ambidextrous, attuned to find work such as in electronics assembly, and less prone to unionizing (Lu, 2005). Given this setting of the study, the work described in this article is mainly women's work, and a major concern of women workers.

Based on the April 2017 labor force survey (PSA, 2017), the industry sector comprised 18.5 percent of total employment. In the industry sector, workers in the construction and manufacturing subsectors made up the largest groups, accounting for 47.7 percent and 47.5 percent respectively. And among the total employed, 60.8% of them work for more than 40 hours per week, and night shifts. The extended work hours and night shifts lead to decreased sleep duration which may in turn predispose workers to occupational accidents. As for export processing zones, as of March 2017, the Philippine Economic Zone Authority (PEZA) currently operates 370 economic zones, and majority are from information technology and manufacturing sectors (PEZA, 2017).

Women especially, suffer from inequalities in the workplace; however, there is little information exists about their struggle. A systematic review done by Elser, Falconi, Bass, and Cullen (2018) found that women involved in skilled or blue-collared work tend to suffer from greater health conditions than their male counterparts. This reality provides further proof that there is still much to be done in compliance with the declaration of Decent Work being enforced by the International Labor Organization. The ten elements advocated by the ILO for Decent Work are “(1) employment opportunities, (2) adequate earnings and productive work, (3) decent working time, (4) combining work, family, and personal life, (5) work that should be abolished, (6) stability and security of work, (7) equal opportunity and treatment in employment, (8) safe work environment, (9) social security, (10) social dialogue, employers’ and workers’ representation (2019).” Yet developing countries fail to fulfill these ten elements for their workers, while women are often treated much poorly than men in terms of work conditions, wages, and benefits. In addition to this, women take up a greater proportion of those employed in the informal sector usually categorized by unregulated jobs, and therefore poorer working conditions. This is further aggravated by the reality that women are more at risk for remaining unemployed than men, which forces them to enter any job available. The ILO also found that men tend to work longer hours than women but when a woman’s unpaid work (in the form of their role as family caretaker) is taken into account, women work longer hours than men (ILO, 2016). This is why further research on the status of women’s occupational health is needed to give light to their struggle, and address the gaps present. This study focuses on the mental health of women subject to poor working conditions, such as irregular shift schedules and various occupational hazards. As health is recognized as a basic human right (WHO, 2017) and Decent Work entails safe work environments (ILO, 2019), this study will be useful in identifying areas needing improvement in terms of women’s work conditions, especially because women are disproportionately represented in this line of work.

This study looked at the association between night shift work and the occurrence of mental health symptoms among factory workers.

Methodology

This study looked at a database of women factory workers that originally investigated hazard exposures and occupational health of workers in export processing zones in the Philippines. The database was taken from the study of Lu in 2009 and 2014, making the data used in this study a form of secondary data. The database included variables relating to work schedule such as night shift, overtime, and extended work, as well as mental and psychological health indices through a survey questionnaire. As this study intends to assess the occurrence of mental and psychological health of an individual, data acquired from a survey questionnaire was the most appropriate form of inquiry. This method is not uncommon among researchers also seeking to understand the association of shift work and mental health disturbances and has proven to still yield insightful information (Ferri et al, 2016; Kang et al, 2017; Kim et al, 2016). The research from which the data on this study were collected complied with the appropriate ethical guidelines, such as acquiring informed consent and maintaining patient confidentiality. Informed consent for this study was no longer needed as the data was extracted only from the aforementioned research. No new data was taken directly from the respondents for the purpose of this research.

This study is a sequential analysis of the relationship between nightshift and mental health symptoms. The indices used for mental health symptoms in the questionnaire were the following-

extreme sadness, irritability, absenteeism, tardiness, lack of concentration at work, boredom, difficulty in sleeping, lack of appetite, insecurity, work interference due to psychological problems.

The main exposure variable was shift schedule (working at night versus working during the day). The outcome variable was the frequency of the occurrence of mental symptoms (frequent occurrence of mental symptoms versus rare or non-occurrence of mental symptoms). The variables included in the model based on literature were age, sex, educational attainment. (Cheng & Cheng, 2017), tenure, and workload (Dong, Zhang, Sun, Sang, & Xu, 2017). The probable confounders identified were the following- work schedule, occupational hazards, work area, physical exertions, harassment, chemical exposures, physical symptoms, injuries, pay, civil status, job satisfaction, medical checkups, use of personal protective equipment (PPE), seminars on occupational health, employee-employer relations, employee-employee relations, relationship with family and friends, benefits, unions, and living with relatives.

Data Analysis

Data on a wide range of socio-demographic, health and occupational data were collected on 500 Filipino factory workers. Socio-demographic data collected were age, sex, monthly-salary, civil status, educational attainment, and relationships with family and friends, colleagues, and employers. Health data gathered were self-reported frequency of occurrence of various mental health symptoms, physical health symptoms, and injuries. Employment data collected were workload, shift schedule, work schedule, quality of work area, physical exertion, tenure job satisfaction, usage of personal protective equipment frequency of annual medical checkups, presence of seminars on occupational health, exposure to occupational hazards and chemicals at work, and frequency of experiencing verbal harassment.

Frequency of exposure to various occupational risks and chemicals, as well as frequency of strenuous physical activities at work were recorded and combined into one variable, to show frequent occurrences of physical and mental health symptoms, as well as injuries. Data on employee benefits were combined on whether they were completely or incompletely given. Data on verbal harassment was combined as to whether or not the respondent had experienced any form of harassment at work.

Descriptive statistics were carried out, and the crude associations between shift schedule and probable confounders with frequency of occurrence of mental health symptoms were studied using a chi-square test of association, or Fisher's exact test, where appropriate. The crude associations between mental health symptoms and probable confounders with shift schedule were also measured in a similar manner. Probable confounders which were associated with both shift schedule and frequency of occurrence of mental health symptoms were included in the regression model for this association. Respondents with missing data were removed from the model prior to multivariate analysis.

We studied the confounding effect of each probable confounder towards the main association, by obtaining the Mantel-Haenszel odds ratios of the association controlling for the particular confounder. We also tested for the homogeneity of odds ratios, which if statistically significant, would show a probable effect measure modification. The difference between the crude odds ratio of the association of interest and the Mantel-Haenszel odds ratios was used to determine the order at which the variable is fitted into the model. Variables with larger differences are fitted into the model first.

We used a multiple logistic regression to study the overall association of interest, simultaneously controlling for all confounders. Drawing on the literature, confounders considered in the model include age, sex, educational attainment, tenure, and workload. For the other probable confounders, a variable selection was performed using a likelihood ratio test, and the model was built using forward selection.

The original study was registered with the Research Grants Administration Office of the National Institutes of Health, University of the Philippines Manila. Informed consent was secured from all subject respondents. Informed consent was secured from all subject respondents through the following process—the participants were informed about the nature of the study, the benefits that the data would generate for women’s studies, and eventual data dissemination. The participants were also informed that their participation was voluntary, and based on prior and informed consent, that they can retract even during and after their participation, and their anonymity was assured. Given this setting of the study, the work described in this article is mainly women’s work, and a major concern of women workers.

Results and Discussion

Of the 500 respondents, 89.8% were women and the rest were men, and 29.6% were single. The age ranged from 18 to 33, with a mean age of 23 and a median of 22.5. The majority (60.6%) reported working more than 8 hours a day. This means that they have acquired overtime work: 16% reported working the night shift and 87.4% were engaged on the production floor. The women’s overtime work was reported to be both forced and desired.

The occupational health hazards encountered by the factory workers which they perceive as having an adverse effect on their physical health (Table 3), mental health (Table 4), ergonomic hazards predisposing to back pain (72%), heat (67%), and overwork (67%) were among the most commonly reported (See Table 1). Even so, all other occupational hazards analyzed were present within the workplace of more or less half of the sampled workers. Poor lighting and radiation have affected the least number of workers sampled with 31% and 34% respectively.

Table 1. Distribution of Respondents According to Exposure to Occupational Health Hazards. (n=450)

| Occupational Health Hazards | Frequency | Percentage |
|--|-----------|------------|
| Noise | 207 | 41.4 |
| Heat | 333 | 66.6 |
| Cold | 214 | 42.8 |
| Vibration | 206 | 41.2 |
| Radiation | 171 | 34.2 |
| Chemicals | 254 | 50.8 |
| Smoke/Fumes | 214 | 42.8 |
| Dust | 240 | 48.0 |
| Viruses/Bacteria | 216 | 43.2 |
| Overwork | 333 | 66.6 |
| Standing many hours | 236 | 47.2 |
| Ergonomic hazards predisposing back pain | 360 | 72.0 |

| | | |
|------------------|-----|------|
| Boredom | 242 | 48.4 |
| Poor ergonomics | 193 | 38.6 |
| Poor lighting | 155 | 31.0 |
| Poor ventilation | 274 | 54.8 |

A majority of the women factory workers experienced adverse work situations at least once. Almost all of the factory workers had overtime (97%), which they reported was an unavoidable occurrence. Likewise, the workers reported having work that required speed and precision (94%). See Table 2.

Table 2. Distribution of Respondents According to Frequency of some Adverse Work Situations. (n=500)

| Adverse work situations | Frequency | Percentage |
|--|-----------|------------|
| Overtime | 486 | 97.2 |
| Excessive work | 410 | 82.0 |
| Work that requires speed and precision | 471 | 94.2 |
| Physically demanding work | 334 | 66.8 |
| Repetitive work | 428 | 85.6 |
| Work that affects back and/or gait | 382 | 76.4 |
| Perceptually demanding work | 422 | 84.4 |
| Visually demanding work | 445 | 89.0 |
| Boring work | 368 | 73.6 |
| Work that involves lifting | 283 | 56.6 |
| Work that involves force from hand | 359 | 71.8 |

As for occupationally related health symptoms, the women factory workers mostly reported cough and colds (57%), diarrhea or upset stomach (56%), and headache, nausea and migraine (54%). See Table 3.

Table 3. Distribution According to the Perceived Frequency of Occurrence of Occupationally Related Health Symptoms. (n=450)

| Perceived frequency of occurrence of occupationally related health symptoms | Frequency | Percentage |
|---|-----------|------------|
| Headache/Nausea/Migraine | 269 | 53.8 |
| Cough/Colds | 287 | 57.4 |
| Diarrhea/Stomach upset | 280 | 56.0 |
| Bone and joint pain | 268 | 53.6 |

| | | |
|-----------------------------------|-----|------|
| Tuberculosis | 240 | 48.0 |
| Hypertension | 225 | 45.0 |
| Urinary Tract Infection | 245 | 49.0 |
| Arthritis | 229 | 45.8 |
| Allergies and other skin diseases | 242 | 48.4 |
| Loss of hearing | 224 | 44.8 |
| Eyestrain | 263 | 52.6 |
| Sterility | 244 | 48.8 |
| Weakness | 266 | 53.2 |

Meanwhile, the reported mental health symptoms were mostly from lack of concentration leading to poor job performance (63%), sadness and depression (58%), and boredom (52%). See Table 4.

Table 4. Distribution According to Perceived Frequency of Occurrence of Mental Health Symptoms. (n=450)

| Perceived frequency of occurrence of mental health symptoms | Frequency | Percentage |
|---|-----------|------------|
| Irritability | 254 | 50.8 |
| Sadness/Depression | 289 | 57.8 |
| Frequent absenteeism | 246 | 49.2 |
| Frequent tardiness/absent-mindedness | 248 | 49.6 |
| Binge drinking | 231 | 46.2 |
| Smoking | 230 | 46.0 |
| Boredom | 260 | 52.0 |
| Insomnia | 244 | 48.8 |
| Eating disorders | 240 | 48.0 |
| Loss of control of self | 249 | 49.8 |
| Lack of concentration leading to poor job performance | 316 | 63.2 |

Statistical Association between Shiftwork at Night and Mental Health Symptoms

Using statistical analysis, the frequency of occurrence of mental health symptoms are associated with several variables. See Table 1. These were shift schedule, sex, exposure to occupational risk, quality of work area, harassment, exposure to chemicals at work, frequency of occurrence of physical health symptoms, frequency of occurrence of injuries, living with relatives, seminars on occupational health, and right to unionize. All these variables were measured based on the perception of the respondents, including variables involving work area and exposure. See Table 1. This data was taken from a database with responses of factory workers to a survey

questionnaire on occupational hazards and mental health symptoms. This makes the data of the secondary type. The method of data collection is also accompanied by a certain degree of bias since all responses are dependent on the perception of the respondents. However, despite this recognized limitation, surveys have still been utilized by various other studies, even with variables concerning work area and exposure to hazards (Asgedom, Bratveit, and Moen, 2019; Osinubi et al, 2017).

Table 5. Association of Various Occupational and Socio-Demographic Data with Frequency of Occurrence of Mental Health Symptoms (n=500).

| Variables | Rare/non-occurrence of mental health symptoms | Frequent occurrence of mental health symptoms | p-value |
|--|--|--|----------------------------------|
| <i>Shift Schedule</i> | | | |
| Morning | 59.7% | 40.3% | 0.03 |
| Evening | 46.3% | 53.7% | |
| <i>Sex</i> | | | |
| Female | 51.1% | 48.9% | 0.05 |
| Male | 66.0% | 34.0% | |
| More than 8 hours of work | 52.8% | 47.2% | |
| <i>Occupational hazards</i> | | | |
| Rare or non-exposure to occupational hazards | 68.3% | 31.7% | <0.01 |
| Frequent exposure to occupational hazards | 46.9% | 53.1% | OR = 6.85 (1.46 – 63.78; p<0.01) |
| <i>Work area</i> | | | |
| Good work area | 57.6% | 42.4% | 0.04 |
| Bad work area | 48.5% | 51.5% | OR = 0.81 (0.33 – 1.98; p=0.61) |
| <i>Verbal Harassment</i> | | | |
| Never experienced verbal harassment | 60.4% | 39.6% | <0.01 |
| Experienced verbal harassment | 39.9% | 60.1% | OR = 2.17 (0.86 – 5.50; p: 0.07) |

| <i>Exposure to chemicals at work</i> | | | |
|--|-------|-------|-----------------------------------|
| Not exposed to chemicals at work | 60.8% | 39.2% | 0.03 |
| Exposed to chemicals at work | 45.2% | 54.8% | OR = 1.96 (0.80 – 4.84; p: 0.11) |
| <i>Frequency of experiencing physical health symptoms</i> | | | |
| Never or rare occurrence of physical symptoms | 60.4% | 39.6% | <0.01 |
| Frequent occurrence of physical symptoms | 36.5% | 63.5% | OR = 1.82 (0.66-4.97; p: 0.19) |
| <i>Frequency of experiencing injuries</i> | | | |
| Never or rare occurrence of injuries | 55.2% | 44.8% | <0.01 |
| Frequent occurrence of injuries | 18.2% | 81.8% | OR = 2.53 (0.13 – 48.84; p: 0.54) |
| <i>Living with relatives</i> | | | |
| Living with relatives | 49.7% | 50.3% | 0.04 |
| Not living with relatives | 60.9% | 39.1% | |
| <i>Seminars on occupational health</i> | | | |
| Given | 58.6% | 41.4% | <0.01 |
| Not given | 43.8% | 56.2% | |
| <i>Unions</i> | | | |
| Permitted to join unions | 81.0% | 19.0% | <0.01 |
| Not permitted to join unions | 50.0% | 50.0% | |

Further statistical analysis showed that the night shift schedule and workload are associated with the occurrence of mental health symptoms. The crude odds ratio for the association between shift schedule and frequency of occurrence of mental health symptoms is 2.13 (0.77-5.81; p: 0.10). This means that without adjusting for confounders, those who work in the evening are 2.13 times more likely to have frequent occurrence of mental health symptoms as compared to those who work in the morning. See Table 2.

Table 6. Shift Schedule and Mental Health (i.e. working at night vs working at day)

| Variables | OR (C.I.) |
|----------------------------------|-------------------------|
| Shift schedule and mental health | OR = 2.13 (0.77 – 5.81) |

The test for the homogeneity of odds ratios reveals that sex may serve as effect measure modifiers in the association between shift schedule and frequency of occurrence of mental health symptoms. Specifically, among females, those who work at night are 2.97 times more likely to have frequent occurrences of mental health symptoms compared to those who work in the morning. See Table 3.

Table 7. Mantel-Haenszel Odds Ratios Adjusting for each Confounders and Results of the Test of Homogeneity of Odds Ratios.

| Confounder | Adjusted OR/stratum-specific odds ratio (in the case of effect measure modifiers) | 95% CI | p-value for odds ratio | p-value for test of homogeneity of OR |
|------------|---|-----------|------------------------|---------------------------------------|
| Sex | 2.07 | 0.85-5.02 | 0.10 | 0.03 |
| Female | 2.97 | 1.09-8.11 | 0.03 | - |
| Male | 0.00 | - | 0.16 | - |

In addition to the confounders, exposure to occupational hazards was found to confound the relationship between shift schedule and frequency of occurrence of mental health symptoms. Controlling for age, sex, educational attainment, tenure, work load, and exposure to occupational hazards, those who are working at night are 2.13 (0.79-5.71) times more likely to have frequent episodes of mental health symptoms compared to those who work in the morning. See Table 4.

Table 8. Fitting of Various Covariates

| Confounder | Adjusted OR/stratum-specific odds ratio (in the case of effect measure modifiers) | Difference between crude and adjusted OR | p-value for Likelihood ratio test |
|-------------------------------------|---|--|-----------------------------------|
| Occupational Hazards | 1.92 | 0.21 | <0.01 |
| Work load ^a | 2.03 | 0.10 | 0.91 |
| Sex ^a | 2.07 | 0.06 | 0.67 |
| Age ^a | 3.25 | 1.12 | 0.27 |
| Tenure ^a | 2.33 | 0.20 | 0.33 |
| Educational attainment ^a | 2.10 | 0.03 | 0.42 |

^aForced confounders (from literature).

Controlling for the other confounders in the model, the final model for the association between shift schedule and frequency of occurrence of mental health symptoms (Table 5) shows the following:

1. A one-year increase in age is associated with a 3% decrease in the risk of having frequent mental health symptoms.
2. Those who are frequently exposed to occupational hazards are 5.78 (1.17-28.71) times more likely to have frequent mental health symptoms as compared to those who are not. The evidence for this association is strong.
3. Those who are contractual/temporary are 2.33 times (0.35-15.62) times more likely to have frequent mental health symptoms as compared to those who are permanent.
4. Females are 32% more likely to experience mental health symptoms frequently as compared to males.
5. Those who finished vocational school or college are 1.46 (0.58-3.65) times more likely to have frequent mental health symptoms as compared to those who finished high school.

Table 5. Final Model for the Association Between Shift Schedule and Frequency of Occurrence of Mental Health Symptoms.

| Variables | Odds ratio | 95% Confidence Interval |
|----------------------------------|------------|-------------------------|
| Shift schedule | 2.13 | 0.79-5.71 |
| Age | 0.97 | 0.85-1.10 |
| Exposure to occupational hazards | 5.78 | 1.17-28.71 |
| Tenure | 2.33 | 0.35-15.62 |
| Workload | 0.99 | 0.39-2.51 |
| Sex | 0.68 | 0.15-3.19 |
| Educational Attainment | 1.46 | 0.58-3.65 |

This study provides evidence towards the claim that nightshift work is associated with the occurrence of mental health symptoms, affecting more women workers. The findings of the study is similar to the ones found by Angerer, Schmook, Elfantel, & Li (2017); Cheng & Cheng (2017); Dong et al. (2017); Moon, Lee, Lee, Lee, & Kim (2015); Øyane, Pallesen, Moen, Åkerstedt, & Bjorvatn (2013) and Lee et al., (2017) which all claimed that those working during the night are more likely to experience mental health symptoms than those during the day. Other research findings also show that night shift is strongly associated with the occurrence of other health symptoms (Beswick, 2003), such as fatigue (Dorrian, Baulk, & Dawson, 2011; Ramey et al., 2012) as well as hypertension (Rotenberg, Silva-Costa, Vasconcellos-Silva, & Griep, 2016). One study disputes this finding, and says that there is no actual relationship between night work and the occurrence of physical symptoms and fatigue (Dahlgren, Tucker, Gustavsson, & Rudman, 2016). Instead, this study claims that short durations between shifts is what is actually associated with poor sleep quality, exhaustion and occurrence of physical symptoms. There is also a current consensus that working more than 8 hours per day is associated with the occurrence of various health symptoms (Beswick, 2003), such as fatigue (Caruso, 2014; Itani et al., 2013; Yumang-Ross & Burns, 2014), and adverse cardiovascular conditions (Hata et al., 2014; Rotenberg, Silva-Costa, Vasconcellos-Silva, & Griep, 2016). On the other hand, one study claims that extended weekly work hours were not associated with occupational injury or illness (Weaver et al., 2015).

One significant finding in this study is the mediating effect of occupational hazard exposures in the relationship between night shift work and mental health symptoms. The study showed that those who are frequently exposed to occupational hazards are 5.78 (1.17-28.71; *p*-

value <0.05) times more likely to have frequent mental health symptoms as compared to those who are not. The evidence for this association is strong. Although, it must be noted that the exposure to occupational hazards was collected through survey questionnaires, thereby increasing the chances of bias. This is a recognized limitation of this study. However, this method of data collection for occupational hazards exposure has been done in other studies as well (Asgedom, Bratveit, and Moen, 2019; Osinubi et al, 2017).

The new feature of contemporary work organizations places a high level of demand on women workers such as the need for overtime work and working at night shifts. Artazcoz et al. (2009) showed that workers under financial stress tend to accept poor working conditions to increase their income, despite the added physical and mental strain. This is reflected in the finding of this study that contractual or temporary workers, which were the majority of the respondents, are 2.33 times (0.35-15.62; *p-value* <0.05) more likely to have frequent mental health symptoms. Being a contractual worker in the Philippines entails that the individual is not regularized and not entitled to additional health and security benefits (DOLE, 2002). Due to this reality, contractual work is often recognized as having poor work conditions. In this study among Filipino factory workers, the workers were exposed to several occupational hazards. This may lead to decreased sleep hours and poor sleep quality which are associated with a variety of health and safety issues including occupational injuries and accidents (Salminen et al., 2010; Uehli et al., 2014), poor job performance (Bae & Fabry, 2014), fatigue (Akerstedt et al., 2014), and sickness absences (Lallukka et al., 2013). A recent systematic review also showed that long work hours are also associated with a higher risk of depression, and anxiety symptoms (Bannai & Tamakoshi, 2014). However, a comprehensive study in China found little evidence to believe that extensive work hours, per se, influence the health and lifestyle of Chinese workers if shift work is not taken into consideration (Nie et al, 2015). This emphasizes the need to further look into the association of varying work schedules to the health of an individual, as the hours themselves are not enough to illustrate the effect of work schedule and health. In fact, a study among health care workers found that those who routinely work night shifts experienced greater negative impacts to health than those with rotating shifts and regular daytime shifts, although the variations of rotation were not studied in depth (Burch et al, 2009). These are significant issues in exploring the factors influencing the mental health of female factory workers as they tend to accept any workload and schedule to remain employed. These forms of unfavorable and exploitative working conditions have been observed throughout the years and are common in the industry among Asian countries (Kabir, Maple, Usher, and Islam, 2019; Siu, 2015).

Dall'Ora et. al (2016) conducted a literature review which identified that shift work can negatively impact employees' job performance and wellbeing. This was reflected in the results of this study since 63.2%, and 49.6% of respondents reported lack of concentration leading to poor job performance and frequent tardiness or absent-mindedness, respectively. Shift work may also predispose the workers to health problems especially sleep and cardiovascular disorders (Wickwire et al., 2017; Li et al., 2016). In this study among Filipino factory workers, they reported experiencing sleep disturbances with 48.8% of respondents reporting having experienced insomnia. Aside from the physical stress, shift work is also psychologically demanding as more than half of the respondents reported excessive work (82%), physically-demanding work (66.8%), perceptually-demanding work (84.4%), visually demanding work (89%), and boring work (73.6%) as prevalent adverse work situations. Kchaou et. al (2017) demonstrated that there is a correlation between night work and the perceived stress and subjective well-being. Workers must be able to adapt to reduce the problems caused by their work. Companies should implement management

programs to help the workers address their issues on coping skills, health, and well-being. (Cruzat, 2014; Panczynk et al., 2017).

There is some literature that shows some plausible explanation on the incidence of mental health symptoms among women night shifters. Abbott et al (2017) stated that night shift work can disrupt the circadian rhythm. When disrupted, this can cause psychiatric disorders, among other illnesses. They reiterated that the disruption and dysregulation of the circadian rhythm at the molecular, cellular and systems levels such as that brought about by shift work can contribute to adverse health outcomes. When an individual is sleep deprived due to night shift, there can be a spill-over effect on mental health behavior such as anxiety. In the study of Veda et al (2016), insomnia was associated with anxiety and was likewise a precursor for anxiety ($\beta = 0.11$). The authors suggested that insomnia should be considered for predicting mental illnesses and as a possible outcome of adverse work-related conditions. In the study of Arzalier-Daret, et al (2017), they also showed that sleep deprivation is implicated with impairment of cognitive performance to manage crisis situations among subject respondents. In addition to this, sleep was shown to be instrumental in maintaining the mechanism that helps regulate an individual's mood (Sculthorpe, and Douglass, 2010).

On the other hand, the rotating shift duration for night shift work was seen to cause certain perceptual and motor impairment in the study of San Chang et al (2011). They found that subjects who worked two consecutive night shifts compared with those who worked four consecutive night shifts were more prone to have both perceptual and motor impairment. This study therefore recommends including perpetual capacity impairment as a possible mediating factor between night shift and mental health symptoms. In this study among Filipino women factory workers, there is evidence that occupational hazards among night shifters have a greater impact on the association between night shift and mental health symptoms. As shown in the logistic regression, those who were frequently exposed to occupational hazards were 5.78 (1.17-28.71; $p < 0.05$) times more likely to have frequent mental health symptoms as compared to those who are not. The evidence for this association is strong as observed through the p-value. The argument is further strengthened by the findings that approximately half of the respondents have experienced mental health symptoms. The most frequent mental health symptoms were lack of concentration (63.2%), sadness or depression (57.8%), boredom (52%), and irritability (50.8%). Almost all respondents have also experienced at least one occupational hazard within their workspace. Ergonomic hazards (72%), heat (66.6%), overwork (66.6), and poor ventilation (54.8%) were among the most commonly experienced hazards. The mediating effect of occupational hazard exposures during night shift and its impact on mental health should be explored further.

Conclusion

The study has shown that among women Filipino factory workers, nightshift work is associated with mental health symptoms. Furthermore, nightshift schedule, workload are associated with the occurrence of mental health symptoms. The crude odds ratio for the association between shift schedule and frequency of occurrence of mental health symptoms is 2.13 (0.77-5.81; $p: 0.10$). Mental health symptoms among night shift workers also tended to be more associated with younger age, being female, and among those with contractual work. The association between night shift work and mental health symptoms is also found in this study to be mediated by occupational hazard exposures. The statistical analyses done in this study only measure association and not causality as a descriptive study. It is recommended that future studies on night shift and

mental health also include cause-effect relationship such as the measurement of hazard and risk occurrence and then the adverse health effects as is evident in time order statistical associations. The cause-effect relationship can be augmented by more objective methods of measurement such as the use of workplace observation and industrial hygiene measurements of hazards. These methods could provide more specific mechanisms of how occupational hazards influence the occurrence of mental health symptoms among shift workers.

There is now an ongoing debate on working time schedules such as overtime, night shift, flexible work arrangements as they affect worker's health and safety. So far, the analyses of work settings show inequity principle in the workplace (Fischer, et.al., 2004), which is characterized by heavy workloads, night shift works, long work hours, poor work conditions, and deregulation of established labor laws, particularly in developing countries. The inequity faced by low-skilled workers, such as those working in the manufacturing industry, has been a consistent issue with little improvements made to address this. In fact, as companies seek to lower the costs of their operations, the employee's wages are the first to suffer and experience cuts (Nurol and Unal, 2018) without adjusting workload. Inequity is especially faced in industries involving low-skilled workers in developing countries. This is evidenced by workers in textile and clothing factories only earning a fraction of what workers in the same occupation earn in Western European countries, even though these workers supply clothing to companies from the Western European area. Due to this reality, Western European clothing suppliers have since transferred production to developing countries to save on cost (Mair, Druckman, and Jackson, 2015). This is especially concerning because work conditions in these countries are noted to be poor in quality, harmful to the worker, and unsupportive to their plight (International Trade Union Confederation, 2018). This reality calls for the application of an equity principle as a science to improve good working conditions including shift work, livable wages, and social benefits.

References

- Akerstedt, T., Axelsson, M., Lekander, N., Orsini, G., & Kecklund, G. (2014). Do sleep, stress, and illness explain daily variations in fatigue? A prospective study. *Journal of Psychosomatic Research*, 76, 280-285.
- Angerer, P., Schmook, R., Elfantel, I., & Li, J. (2017). Night Work and the Risk of Depression. *Deutsches Ärzteblatt International*, 114(24), 404–411. <https://doi.org/10.3238/arztebl.2017.0404>
- Asgedom, A. A., Bråtveit, M., & Moen, B. E. (2019). Knowledge, attitude and practice related to chemical hazards and personal protective equipment among particleboard workers in ethiopia: A cross-sectional study. *BMC Public Health*, 19 doi: <http://dx.doi.org/10.1186/s12889-019-6807-0>
- Bae, S. & Fabry, D. (2014). Assessing the relationships between nurse work hours/overtime and nurse and patient outcomes: Systematic literature review. *Nursing Outlook*, 62(2), 138-156.
- Bannai, A. & Tamakoshi A. (2014). The association between long working hours and health: A systematic review of epidemiological evidence. *Journal of Work, Environment, and Health*, 40(1), 5-18.
- Berthelsen, M., Pallesen, S., Bjorvatn, B., & Knardahl, S. (2015). Shift schedules, work factors, and mental health among onshore and offshore workers in the Norwegian petroleum industry. *Industrial Health*, 53(3), 280–292. <https://doi.org/10.2486/indhealth.2014-0186>
- Beswick, J. (2003). Working Long Hours HSL/2003/02. Retrieved from <http://www.si-whp.eu/resources/working-long-hours.pdf>.
- Burch, J. B., Tom, J., Zhai, Y., Criswell, L., Leo, E., & Ogooussan, K. (2009). Shiftwork impacts and adaptation among health care workers. *Occupational Medicine*, 59(3), 159-166
- Caruso, C. C. (2014). Negative impacts of shiftwork and long work hours. *Rehabilitation Nursing: The Official Journal of the Association of Rehabilitation Nurses*, 39(1), 16–25. <https://doi.org/10.1002/rmj.107>
- Cheng, W.-J., & Cheng, Y. (2017). Night shift and rotating shift in association with sleep problems, burnout and minor mental disorder in male and female employees. *Occup Environ Med*, 74(7), 483–488. <https://doi.org/10.1136/oemed-2016-103898>
- Cruzat, M.R.A. (2014). Health, Well-Being and Coping mechanism of BPO Shift Workers: Basis of a Proposed Development Plan. *Asia Pacific Journal of Multidisciplinary Research*, 2(2), 49-57.
- Dahlgren, A., Tucker, P., Gustavsson, P., & Rudman, A. (2016). Quick returns and night work as predictors of sleep quality, fatigue, work-family balance and satisfaction with work hours. *Chronobiology International*, 33(6), 759–767. <https://doi.org/10.3109/07420528.2016.1167725>
- Dall’Ora, C., Ball, J., Recio-Saucedo, A., & Griffiths, P. (2016). Characteristics of shift work and their impact on employee performance and wellbeing: A literature review. *International Journal of Nursing*, 57, 12-27.
- Dong, H., Zhang, Q., Sun, Z., Sang, F., & Xu, Y. (2017). Sleep disturbances among Chinese clinical nurses in general hospitals and its influencing factors. *BMC Psychiatry*, 17, 241. <https://doi.org/10.1186/s12888-017-1402-3>
- Department of Labor and Employment. (2002). Department Order no. 18-02: Rules Implementing Articles 106 to 109 of the Labor Code, as Amended. Retrieved from: http://www.ble.dole.gov.ph/downloads/issuances/DO_18-02_s02.pdf.

- Dorrian, J., Baulk, S. D., & Dawson, D. (2011). Work hours, workload, sleep and fatigue in Australian Rail Industry employees. *Applied Ergonomics*, 42(2), 202–209. <https://doi.org/10.1016/j.apergo.2010.06.009>
- Elser, H., Falconi, A. M., Bass, M., & Cullen, M. R. (2018). Blue-collar work and women's health: A systematic review of the evidence from 1990 to 2015. *SSM-Population Health*, 6, 195-244
- Ferri, P., Guadi, M., Marcheselli, L., Balduzzi, S., Magnani, D., & Lorenzo, R. D. (2016). The impact of shift work on the psychological and physical health of nurses in a general hospital: A comparison between rotating night shifts and day shifts. *Risk Management and Healthcare Policy*, 9, 203-211. doi: <http://dx.doi.org/10.2147/RMHP.S11532>
- Greenland, S., Mansournia, M. A., & Altman, D. G. (2016). Sparse data bias: a problem hiding in plain sight. *BMJ*, i1981. <https://doi.org/10.1136/bmj.i1981>
- Hata, K., Nakagawa, T., Hasegawa, M., Kitamura, H., Hayashi, T., & Ogami, A. (2014). Relationship between overtime work hours and cardio-ankle vascular index (CAVI): a cross-sectional study in Japan. *Journal of Occupational Health*, 56(4), 271–278.
- International Labour Office (ILO). (2016). *Women at work: Trends 2016*. Geneva: ILO
- International Labour Office (ILO). (2019). *Decent Work Indicators*. Retrieved from: https://www.ilo.org/integration/themes/mdw/WCMS_189392/lang-en/index.htm.
- International Trade Union Confederation. (2018). *2018 ITUC Global Rights Index: The World's Worst Countries for Workers*. ITUC CSI IGB: Brussels, Belgium.
- Itani, O., Kaneita, Y., Ikeda, M., Kondo, S., Murata, A., & Ohida, T. (2013). Associations of work hours and actual availability of weekly rest days with cardiovascular risk factors. *Journal of Occupational Health*, 55(1), 11–20. *Journal of Sleep Research*, 23(5), 545-553.
- Kabir, H., Maple, M., & Kim Usher, S. I. (2019). Health vulnerabilities of readymade garment (RMG) workers: A systematic review. *BMC Public Health*, 19 doi: <http://dx.doi.org/10.1186/s12889-019-6388-y>
- Kang, M. Y., Kwon, H. J., Choi, K. H., Kang, C. W., & Kim, H. (2017). The relationship between shift work and mental health among electronics workers in South Korea: A cross-sectional study. *PloS one*, 12(11), e0188019
- Kchaou, A., Hajjaji, M., Masmoudi, R., Sellami, I., Masmoudi, M.L., Masmoudi, J., & Jmal, H. (2017). Psychological effects of working night shifts on mental health. *European Psychiatry*, 41, 609.
- Kim, W., Kim, T. H., Lee, T. H., Choi, J. W., & Park, E. C. (2016). The impact of shift and night work on health related quality of life of working women: findings from the Korea Health Panel. *Health and quality of life outcomes*, 14(1), 162
- Lallukka, T., Haaramo, P., Rahkonen, O., & Sivertsen, B. (2013). Joint associations of sleep duration and insomnia symptoms with subsequent sickness absence: the Helsinki Health Study. *Journal of Public Health*, 41, 516-523.
- Lee, A., Myung, S.-K., Cho, J. J., Jung, Y.-J., Yoon, J. L., & Kim, M. Y. (2017). Night Shift Work and Risk of Depression: Meta-analysis of Observational Studies. *Journal of Korean Medical Science*, 32(7), 1091–1096. <https://doi.org/10.3346/jkms.2017.32.7.1091>
- Li, M., Huang, J., Tan, Y., Yang, B., & Tang, Z. (2016) Shift work and risk of stroke: A meta-analysis. *International Journal of Cardiology*, 214, 370-373.
- Moon, H. J., Lee, S. H., Lee, H. S., Lee, K.-J., & Kim, J. J. (2015). The association between shift work and depression in hotel workers. *Annals of Occupational and Environmental Medicine*, 27. <https://doi.org/10.1186/s40557-015-0081-0>

- Nie, P., Otterbach, S., & Sousa-Poza, A. (2015). Long work hours and health in China. *China Economic Review*, 33, 212-229.
- Nurol, B., & Unal, B. (2018). Voices from a hidden people: Precarious lives and discrimination in Turkish sugar industry. *Geoforum*, 92, 58-67
- Osinubi, M. O., Rotimi, B. F., Popoola, G. O., Ikusemoro, O. T., & Osemwenkha, I. G. (2017). Hazards awareness and practice of safety measures among pottery workers in ilorin, kwara. *International Journal of Medicine and Biomedical Research*, 6(3), 101-124. Retrieved from <https://search.proquest.com/docview/2202781223?accountid=47253>.
- Øyane, N. M. F., Pallesen, S., Moen, B. E., Åkerstedt, T., & Bjorvatn, B. (2013). Associations Between Night Work and Anxiety, Depression, Insomnia, Sleepiness and Fatigue in a Sample of Norwegian Nurses. *PLoS ONE*, 8(8). <https://doi.org/10.1371/journal.pone.0070228>
- Panczyk, M., Woynarowska-Soldan, M., Zmuda-Trzebiatowska, H., & Gotlib, J. (2017). Health-enhancing behaviours of nurses in Poland and their association with shift work and age. *Collegian*.
- Ramey, S. L., Perkhounkova, Y., Moon, M., Budde, L., Tseng, H.-C., & Clark, M. K. (2012). The Effect of Work Shift and Sleep Duration on Various Aspects of Police Officers' Health. *Workplace Health & Safety*, 60(5), 215-222. <https://doi.org/10.1177/216507991206000505>
- Rotenberg, L., Silva-Costa, A., Vasconcellos-Silva, P. R., & Griep, R. H. (2016). Work schedule and self-reported hypertension - the potential beneficial role of on-shift naps for night workers. *Chronobiology International*, 33(6), 697-705. <https://doi.org/10.3109/07420528.2016.1167721>
- Rotenberg, L., Silva-Costa, A., Vasconcellos-Silva, P. R., & Griep, R. H. (2016). Work schedule and self-reported hypertension - the potential beneficial role of on-shift naps for night workers. *Chronobiology International*, 33(6), 697-705. <https://doi.org/10.3109/07420528.2016.1167721>
- Salgado-Delgado, R., Tapia Osorio, A., Saderi, N., & Escobar, C. (2011). Disruption of Circadian Rhythms: A Crucial Factor in the Etiology of Depression. *Depression Research and Treatment*, 2011. <https://doi.org/10.1155/2011/839743>
- Salminen, S., Oksanen, T., Vahtera, J., Sallinen, M., Harma, M., Salo, P., & Kivimaki, M. (2010). Sleep disturbances as a predictor of occupational injuries among public sector workers. *Journal of Sleep Research*, 19(1), 207-213.
- Sculthorpe, L. D., PhD., & Douglass, A. B., M.D. (2010). Sleep pathologies in depression and the clinical utility of polysomnography. *Canadian Journal of Psychiatry*, 55(7), 413-21. Retrieved from <https://search.proquest.com/docview/744088396?accountid=47253>.
- Siu, K. (2015). Continuity and change in the everyday lives of chinese migrant factory workers. *The China Journal*, (74), 43-65,245. doi: <http://dx.doi.org/10.1086/681813>
- Tahghighi, M., Rees, C. S., Brown, J. A., Breen, L. J., & Hegney, D. (2017). What is the impact of shift work on the psychological functioning and resilience of nurses? An integrative review. *Journal of Advanced Nursing*, 73(9), 2065-2083. <https://doi.org/10.1111/jan.13283>
- Uehli, K., Miedinger, D., Bingisser, R., Durr, S., Holsboer-Trachsler, E., Maier, S., & Leuppi, J.D. (2014). Sleep quality and the risk of work injury: a Swiss case-control study.
- Weaver, M. D., Patterson, P. D., Fabio, A., Moore, C. G., Freiberg, M. S., & Songer, T. J. (2015). The association between weekly work hours, crew familiarity, and occupational

- injury and illness in emergency medical services workers. *American Journal of Industrial Medicine*, 58(12), 1270–1277. <https://doi.org/10.1002/ajim.22510>
- Ghebreyesus, T.A. (2017). Health is a Fundamental Human Right. Retrieved from: <https://www.who.int/mediacentre/news/statements/fundamental-human-right/en/>.
- Wickwire, E.M, Geiger-Brown, J., Scharf, S.M., & Drake, C.L. (2017). Shift Work and Shift Work Sleep Disorder: Clinical and Organizational Perspectives. *Chest*, 151(5), 1156-1172.
- Yumang-Ross, D. J., & Burns, C. (2014). Shift work and employee fatigue: implications for occupational health nursing. *Workplace Health & Safety*, 62(6), 256–261; quiz 262. <https://doi.org/10.1177/216507991406200606>