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Workers' Perceptions of the Effect of Three-Tier Shift Schedules on Community Functioning

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MS, Touro University, 2011

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Shift work is commonplace in many fields that require around-the-clock employee coverage. There is ample evidence that two-tier shift work can detrimentally affect health and functioning. The purpose of this study was to understand the impact of three-tier shift schedules on physical and mental health and *community functioning*, a concept which refers to activities and behaviors performed by individuals or groups within a system. This study used a qualitative phenomenological design, and community functioning and recovery theory were central to the conceptual framework. In-depth interviews were used to explore the perceptions of three-tier shift workers on their functioning, relationships, mental health, physical health, and safety. Special attention was paid to sleep, using restoration theory, which indicates that sufficient sleep is necessary to avoid mental and physical breakdown. The data were organized into themes, and epoché and bracketing were used during the interviews and data analysis. The results of the study add to the literature on how three-tier shift schedules affect employees. Emergent themes included overwhelmingly negative perceptions of three-tier shift workers on their health and safety, difficulty adjusting to the three-tier shift schedule, negative impact on workers' personal lives, negative impact on workers' mental health, negative impact on workers' physical health, and negative impact on workers' performance and safety. These findings could lead to positive social change through policy creation on healthier shift schedules, which could result in healthier employees, stronger family units, and safer roads and worksites.

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Dedication

I would like to thank my mother, Jean McKay, for being a constant inspiration throughout my scholastic experience; my siblings, Angela, Kirsty, Heidi, Anneliese, and Megan for encouraging my competitive nature and evoking the tenacity with which to complete this arduous task; my husband, Joel, for his love and support; and my son, Patrick “Liam” William, for ensuring my achievement of completing such a remarkable activity in order to, myself, be an inspiration to others, most especially him.

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I would like to express immense gratitude for and recognize the excellent support of my dissertation committee, Dr. Schwab, Dr. Cullen, and Dr. Tschida for all of their advice and assistance in guiding me through this exciting process.

I would also like to express my appreciation to the participants, without whom this dissertation would not be possible, as well as to acknowledge the participants' dedication to their professions, which enabled them to overcome the challenges set by such a difficult schedule and continue to successfully counsel the vulnerable population in their care.

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Chapter 1: Introduction to the Study

Introduction

The modern era requires around the clock workers in several fields. Law enforcement employees, health care providers, and emergency personnel are just some of the workers faced with covering various shifts throughout each day. Previous studies have shown the detriments of night and two-tier shift schedules on an employee's mental and physical well-being, for example the development of sleep challenges (Belcher et al., 2015), but few studies have been conducted to explore the effects of three-tier shift schedules. Three-tier shift schedules include shifts of day, evening, and night shifts within a weekly schedule. Sleep challenges, for example excessive sleepiness, impact an individual's ability to function and are associated with an increase in the risk of traffic or occupational accidents (Culpepper, 2010). In this study, I sought to discover workers' perceptions of the effect of three-tier shift schedules on community functioning.

The potential social implications of this study are healthier shift schedules and policy creation relating to healthier shift schedules as well as a better understanding of how three-tier shift schedules affect employees. This knowledge will be useful for managers and organizations wishing to improve the health of their workers and positively influence the workers' lives and ability to function well within their communities. Long-term results could include safer roads with fewer accidents due to drowsiness, stronger family units, and happier employees. Healthier and happier employees might also result in safer work-sites with increased productivity.

There are several parts to this chapter. First, I will introduce the background of the study, then the problem statement, then purpose of the study, and then the research questions. These will be followed by the theoretical framework, the nature of the study, the possible types and the sources of the information or the data, the definitions, the assumptions, the limitations, the scope, the delimitations, and the significance of the study. The chapter will conclude with a summary of the basic information.

Background

Studies of shift schedules have increased in the last few years, but researchers have almost all explored two-tier shift, night shift, and rotational shift schedules. At the time of this study, there were still no specific studies of three-tier shift schedules available. Shift schedules, or shift work, are associated with sleep challenges and the development of shift work disorder (SWD), a diagnosable disorder which might affect employees who work outside of daylight hours or on rotational shift schedules (Schwartz, 2010). Challenges associated with shift work include difficulty sleeping, a negative impact on relationships and health status, and occupational and driving safety, for example, increased mistakes at work and falling asleep while driving (Baney, 2011). Though not specific to three-tier shift schedules, the following studies relate to shift work and functioning.

There are numerous studies available on sleep, sleep disturbances, and shift work. Pritchett et al. (2012) defined sleep and circadian rhythm disruption, which is directly related to shift work symptoms. Drake (2010) described the pathology and characteristics of circadian rhythm sleep disorders. Takahashi (2014) emphasized the need to assist shift

workers' overall health with sleep and circadian research. Rodenbeck (2009) investigated the difficulties of consistent sleep with regard to shift work and diminished functioning. Meyrer et al., (2009) focused on night shifts and increasing impairments and mood deterioration. Erren et al. (2010) explored the relationship between shift work and cancer and emphasized that sufficient associations were found in experimental animals; however, limited evidence existed for associations between shift work and cancer in humans. Despite limited evidence in humans, cancer might be one of the dangers of shift work.

Prior studies show an association between shift work and sleep disturbance. Swanson et al. (2011) found that longer work hours were associated with shorter sleep durations and that shorter sleep duration negatively impacted work performance. Greubel et al. (2010) compared the fatigue and risk indices to the risk of occupational accidents. According to Baney (2011), a survey of shift workers revealed that over a third of participants admitted to dozing off while driving. Karlson et al. (2009) investigated the effects of a slower backward rotating shift change compared with a faster forward rotating shift change cycle. Flo et al. (2012) studied the problem of SWD symptoms in order to determine the prevalence and find associations using a sample of 5,400 nurses. The authors suggested that just three questions could amply assess SWD (Flo et al., 2012). These three questions could simplify the process of diagnosing SWD, enabling more expedient care.

These studies showed a trend that shift work is associated with circadian rhythm disruption. Recent studies have delved into exploring the differences between types of

shift work as well as methods to more readily recognize symptoms of SWD (CITE). The gap in the knowledge of shift work was specific to three-tier shift schedules. In this study, I addressed this gap in the literature. This study was needed in order to explore how three-tier shift schedules affect employees. The results could lead to the creation of policies for safer and healthier shift schedules.

Problem Statement

Shift work is the common practice of engaging employees in *shifts* so that work is done throughout every 24-hour cycle (Boivin & Boudreau, 2014). It is commonplace in many fields that require employee coverage 24 hours a day and 7 days a week, such as law enforcement. However, shift work can detrimentally affect sleep and health (Culpepper, 2010). Sleep involves brain pathways that are highly vulnerable to disruption, and disrupted sleep leads to multiple health problems (Pritchett et al., 2012). For example, in a study of chronic kidney disease (CKD) among Japanese workers, the authors found that short sleep duration was not significantly associated with the early development of CKD, except among shift workers (Sasaki et al., 2014). According to Sasaki et al. (2014), shift workers with short sleep duration have a significantly higher risk of CKD (hazard ratio = 3.60; 95% confidence interval: 1.52 to 10.68).

Studies have shown that shift work is detrimental to functioning and mood levels and can cause increasing mood deterioration over time (Meyrer et al., 2009). Shift work is a serious concern for public health. It disrupts normal bodily functions, such as sleeping, eating, exercising, and socializing, as well as compromising a person's

performance ability, which can lead to accidents at work and on the road (Culpepper, 2010).

Although many studies have examined and described the detrimental effects of shift work, most of these referred to two-tier shift schedules, which consist of any combination of day, evening, and night schedules (i.e., alternating day and evening shifts throughout the week). Flo et al. (2012) compared shift work symptoms between daytime schedules and night schedules, but the authors did not include schedules with an overlap of day and night shifts. Karlson et al. (2009) examined rotating schedules which included all three shift types on a rotating schedule, but the shifts were separated by days off and only one type of shift was worked (day, evening, or night) before rotation. At the time of this study, there were not yet studies available focusing specifically on three-tier shift schedules, which require an employee to work every shift within each week: day, evening, and night. In this study, I addressed this gap in the research literature by examining the communal effect of working three-tier shift schedules. The communal effect reflected any common activity that was exercised by individuals in public within the community, such as driving or socializing.

Purpose of the Study

Professions that require round-the-clock coverage have struggled to create efficient shift schedules. Medical care and public safety are two fields that require personnel 24 hours a day and 7 days a week. Nurses often work 12-hour shifts (Rasmussen College, 2014). EMTs often work 24-hour shifts (Enloe Medical Center, 2015). Firefighters can also be scheduled for 24-hour shifts, but in emergency situations,

they might work for days at a time (City of Cincinnati, 2015). Day shifts, evening shifts, and night shifts are shared among facility health care workers. What happens when long hours are combined with variable shifts? How do these effect one's physical and mental well-being? Are relationships affected? The purpose of this study was to understand the impact of three-tier shift schedules on a person's ability to maintain good health and function well within the community. I was interested in discovering whether or not the effects of working three-tier shift schedules were similar or divergent to effects of working two-tier shift work.

Research Questions

RQ1: What are the perceptions of three-tier shift workers on the health and the safety effects of working a three-tier shift schedule?

RQ2: How does working a three-tier shift schedule affect the workers with regard to functioning within the community, personal relationships, mental health, physical health, and safety?

Theoretical Framework

Restoration theory indicates that sleep is necessary for proper functioning in both the brain and the body (Oswald, 1966). This theory suggests that mental and physical breakdown will occur in a person who does not experience sufficient sleep (Oswald, 1966) and will be explained further in Chapter 2. I used this theory to explore participants' perceptions with regard to their functioning level while working three-tier shift schedules. The concept of community functioning refers to activities and behaviors performed by individuals or groups within a system which have a recognized or

unrecognized effect on parts or all of the system (Geismar, 1966). According to Pavlova, Körner, and Silbereisen (2015), community functioning encompasses several overlapping concepts, including sense of community and place attachment. Per McMillan and Chavis (1986), feelings of belonging, mutual influence, fulfillment of needs, and emotional connection make up a sense of community (as cited in Pavlova et al., 2015, p.102). According to Perkins and Long (2002), place attachment is when there is emotional bonding to a particular sociophysical environment (as cited in Pavlova et al., 2015, p.102).

Nature of the Study

In this study, I used a qualitative phenomenological design. I conducted in-depth interviews with current and former mental health workers of a single organization with three-tier shift schedules to better understand their experiences of the effects of working a three-tier shift schedule. The time frame for data collection and analysis was three months. I created a questionnaire with open-ended questions to gather data from the participants. Some questions were loosely based on the Multnomah Community Ability Scale (MCAS), as the MCAS was used to assess community functioning in a previous study (Stergiopoulos et al., 2015). I created additional questions based on my findings from the literature review, and the final three questions were those used in the study by Flo et al. (2012) to assess SWD. The resulting data were organized into themes, as outlined by Creswell (2009).

Possible Types and Sources of Information or Data

This study was based on information gathered from qualitative interviews. As such the sources of information were the participants of the study. The type of data gathered was the responses from the participants, such as how working the three-tier shift schedule affects a person's ability to function within the community or how working a three-tier shift schedule affects a person's ability to attend to activities of daily living. Further types of data included how working a three-tier shift schedule effected personal relationships and how working a three-tier shift schedule effected a person's ability to maintain relationships with friends and family.

Definitions

Chronodisruption: "A breakdown of phasing internal biological systems appropriately relative to the external, i.e. environmental changes, which leads to chronobiological disorders" (Erren & Reiter, 2009, p. 246).

Community functioning: Activities and behaviors performed by individuals or groups within a system which have a recognized or unrecognized effect on parts or all of the system (Geismar, 1966)

NOC: Night shift, abbreviation of Nocte, which is Latin for at night (*Medical Dictionary for the Health Professions and Nursing*, 2012).

Otorhinolaryngology: Pertaining to the ears, nose, and throat (*Farlex Partner Medical Dictionary*, 2012).

Shift work: Work schedules that extend beyond the typical 9-to-5 workday

(Boivin & Boudreau, 2014).

Shift work disorder: A diagnosable disorder in which excessive sleepiness and insomnia caused by shift work disrupt an individual's daily ability to function (Schwartz, 2010).

Social competence: A section of the interview questions based on the MCAS to inform community functioning with regard to the capacity of the participant to engage in appropriate interpersonal relations and culturally meaningful activities (Stergiopoulos et al., 2015).

Three-tier shift schedules: A schedule in which all three shift types are worked within the same week: day, evening, and night shifts. An example of this might be: Monday's day shift is 8a.m.–6 p.m., Tuesday's evening shift is 2 p.m.–12 a.m., and Wednesday's and Thursday's night shifts are from 10 p.m.–8 a.m..

Assumptions, Limitations, Scope, and Delimitations

An assumption I held in this study was that the employees worked full time during their tenure as three-tier shift schedule workers. I assumed all workers were scheduled for three-tier shifts. I assumed that workers were unable to amend their shifts into less than three-tier shifts.

A limitation was that I had personal experienced working three-tier shift schedules. I limited the interaction with participants to only asking questions created for the study. In this way, I hoped to decrease bias.

The scope of the study was to explore employees' perceptions of the effects of three-tier shift schedules. This was done in order to better understand the phenomenon.

Recommendations could then be made based on the perceptions of the three-tier shift schedule workers.

A delimitation of the study was that no attempt was made to examine any specific exposure-disease relationship. Participants needed only to have worked a three-tier shift schedule for at least three months consecutively. There were no restrictions on the timeline outside of the three months of consecutive three-tier shift work.

Significance

There was a gap in the existing literature of symptoms relating specifically to three-tier shift schedules. These symptoms needed to be better understood in order to delineate the ability of a person working a three-tier shift schedule to function in the community with relation to other types of shift work, for example only night work. The information resulting from this study could allow the comparison of some of the effects of three-tier shift schedules with the effects of two-tier shift schedules, which were already available in the literature. My results for how three-tier shift schedule employees perceived the effects of working a three-tier shift schedule included a decrease in mental and physical functioning and provided evidence of variables that could be used in a larger quantitative study, which might inform industries which function 24 hours a day and 7 days a week of the dangers of having employees work three-tier shift schedules. This could potentially lead to the positive social change of decreasing unhealthy shift work practices.

Summary

The topic of this study was the perceptions of three-tier shift schedule workers. This included negative impacts of the three-tier shift schedule, such as sleep disturbance associated with circadian rhythm disruption. In this study, I used a qualitative, phenomenological approach based on restoration theory. The results of this study were needed in order to address a gap in the existing literature and better understand how three-tier shift schedules affected employees. The findings of the study had the potential positive social change effect of helping inform policy formation for healthier shift schedules. Prior research emphasized the detriments of night and two-tier shift schedules, but there were no studies available that focused specifically on three-tier shift schedules; this study addressed this gap in the literature. The research problem was to explore workers' perceptions of three-tier shift schedules on their ability to function in the community, such as safely drive to work and safely perform their occupational duties without accidents, and to identify possible solutions. In Chapter 2, I will examine this topic in more detail. For example, I will cite the research strategy and describe the theoretical and conceptual frameworks upon which the study is based, as well as detail previous studies on the prevalence of shift work, the prevalence of SWD, and the treatment for shift-work related sleep disorders.

Chapter 2: Literature Review

Introduction

The problem that I examined in this study was that the common practice of shift work--arranging for employees to cover shifts so that work is completed throughout a 24-hour rotation--can be detrimental to sleep and health. The complex brain pathways involved in sleep are easily disrupted and lead to various health problems (Pritchett et al., 2012). The many studies of shift work focused on two-tier shift schedules, any combination of daylight or night shift schedules, or solely night shift schedules. There was a gap in the literature reflecting the impact of three-tier shift schedules, schedules which encompass day, evening, and night shifts within the same week. The purpose of this study was to address this gap in the literature by examining the effect of three-tier shift schedules on individual health and community functioning, which is any common, public activity that affects the community, for example, driving or socializing. The results of this study could lead to the improvement of the health and safety of employees in fields which must operate 24 hours a day and 7 days a week, such as medical care and public safety fields. Variables of physical and mental well-being, relationships, and the ability to function well within the community were explored by interviewing individuals who have worked or were working three-tier shift schedules.

Current literature provided evidence that shift work can lead to traffic and occupational accidents due to the impairment of an individual to perform effectively (Culpepper, 2010). Shift work has also been associated with an increased risk of chronic kidney disease (Sasaki et al., 2014) and with altered mood levels (Meyrer et al., 2009;

Nowak, 2009). Comparative studies have shown that working night shifts might be more detrimental than working day shifts (Waage et al., 2014); however, there were few studies available that illustrated the effects of working all three shifts every week: day, evening, and night.

In Chapter 2, I will review of previous research on the topic of shift work and the effects. In the literature search strategy, I describe how the literature search was accomplished. In the theoretical foundation section, I review the existing literature on the theoretical framework.

Research Strategy

I conducted searches using the online Walden University library. Articles were accessed by topic, and I consulted both the specific and multidisciplinary databases of MEDLINE with Full Text, CINAHL Plus with Full Text, ProQuest Nursing & Allied Health Source, Health & Medical Complete, PUBMED, PsycINFO, ScienceDirect, SocINDEX, Thoreau Multi-Database Search, Academic Search Complete, and ProQuest Central. were consulted. The keyword search terms I used were *shift work, shift work disorder, tier shift, two-tier shift, circadian rhythm, prevalence, social implications, insomnia, physical health, mental health, performance, safety, social, problems, policies, procedures, safety, personal vulnerabilities cardiovascular, gastrointestinal, body weight, metabolism, cancer,* and *injuries*. Additional articles and informational websites were found through references in articles accessed via this search strategy. I found no specific articles spotlighting the effects of three-tier shift schedules within the primary

and secondary resources. In this study, I expanded the literature by adding a study focused on examining three-tier shift schedules.

Theoretical and Conceptual Frameworks

The theoretical foundation on which I based this study was restoration theory. Restoration theory signifies that sleep is important to both the brain and the body in order to function properly (Oswald, 1966). The theory suggests that without sufficient sleep, a mental and physical breakdown will transpire (Oswald, 1966). Differing types of sleep connect to differing types of functional restoration (Oswald, 1966). This theory was important to me in this study as it predicts that following a lengthy sleep deficit, excessive sleepiness will occur as well as negatively impacted mental and bodily functioning (Oswald, 1966). Prior studies indicated that symptoms of SWD include sleepiness and bodily dysfunction (Rodenbeck, 2009). I developed the RQs in this study to extend the knowledge of how three-tier shift schedules contribute to the understanding of chronodisruption.

The conceptual framework for this study was community functioning. Community functioning encompasses activities and behaviors carried out by individuals or groups within a system which affect the system, whether recognizable or not (Geismar, 1966). Employees who have worked three-tier shift schedules have an effect on their communities, and how these employees function within their communities is termed community functioning. In order to assess community functioning in their study, Stergiopoulos et al. (2015) used MCAS. Contrary to Stergiopoulos et al.'s study though, the participants in my study did not have known mental health diagnoses, and so the

questions I created based on the MCAS were altered accordingly. However, the conceptual framework of community functioning was appropriate for this study because the main objective of this study was to explore employees' perceptions of three-tier shift schedules on community functioning.

Literature Review

The modern age requires continuous, round-the-clock operation in some fields, for example, health care and law enforcement. Shift work has been the response to meet these uninterrupted responsibilities, but shift work' effects on employees have not been adequately studied in all cases. There had been research completed on the effects of one-tier, two-tier, night shift, and rotational shift schedules, but there had not yet been studies conducted that specifically focused on three-tier shift schedules. In this literature review, I will explore previous studies and findings related to all types of shift work in order to present a comprehensive background on the subject.

Prevalence of Shift Work and SWD

According to McMenamin (2007), of all work done in the United States, the prevalence of shift work has increased from about 13% in 1985 to about 30% in 1997, but the percentage of shift work done in the United States has since stayed fairly consistent. This means that 30% of all work done in the United States continued to be shift work. According to Wright, Bogan, and Wyatt (2013), the prevalence of shift work worldwide was nearly 20%. In many European countries, North America, South America, and Australasia, the number of shift workers was more than 15% (Wright et al., 2013).

The prevalence of shift work varies for night, rotational, two-tier, and three-tier shift schedules. Asaoka et al. (2013) completed a study of the various shift schedules and found that the prevalence of SWD was slightly higher in two-tier shift schedule workers than three-tier shift schedule workers, but the authors also noted that having children increased the risk for SWD and stated that the work-family conflict was not explored in this study. Asaoka et al. suggested that naps might counteract excessive sleepiness during night work and might decrease the occurrence of occupational errors. Di Milia et al. (2013) conducted a study to determine the prevalence of SWD in the general community by conducting a telephone survey with a random sample of 1,163 people in three Australian cities. Participants in their study had all types of work schedules, including regular schedules and shift schedules. The authors found that compared with day work, night work was significantly associated with symptoms of SWD (Di Milia et al., 2013). According to Di Milia et al., a third of night workers had symptoms of SWD and nine percent of night workers had severe symptoms of SWD.

Schwartz (2010) proposed that SWD was an underrepresented problem. Schwartz suggested that patients who work night or rotating shifts be screened for excessive sleepiness and insomnia, as these are indicative symptoms of SWD. Risk factors for SWD include shift type and pattern; shift timing in response to circadian rhythm synchronization cues, for example, bright light; job satisfaction; and individual physiological and lifestyle factors, such as age, gender, and circadian preference (Schwartz, 2010). Excessive sleepiness and insomnia are symptoms of SWD; however, "normal" and pathological responses to shift work are not clearly defined (Schwartz,

2010). Schwartz's findings related to this study in that they defined shift work symptoms but also caveated those symptoms as belonging to other sleep disorders as well, suggesting a need for further exploration into shift work schedules, which I completed in my study.

In their study, Waage et al. (2014) explored predictors of SWD. The authors surveyed participants at baseline and 2 years later with questions about excessive sleepiness and insomnia related to their work schedules. These variables are within the symptoms for SWD and were used within my study as well. The strength of using the approach of both a baseline and follow-up survey was that the authors had a comparison of SWD symptoms over time. The authors could compare baseline findings, shift schedule, and the follow-up findings, which enabled them to determine associations. Predictors of SWD included having SWD at baseline, depression, use of melatonin or bright light therapy, and number of nights worked (Waage et al., 2014). The authors found that employees who switched from night shift to day shift had a decreased risk for SWD. The authors stated that the low response rate (38%) at baseline might have been construed as a weakness, but the authors claim the high response rate of follow-up (79%) ensured a sufficient sample to represent the population.

Diagnosis of sleep disorder. Research in shift work has been documented since the 1950s (Thiis-Evensen, 1958). Studies of health problems in continuous shift work and new syndromes have been investigated over the decades, with new terminology being introduced such as, *delayed sleep phase syndrome*, which applied to a group of patients unable to fall asleep at the desired time and *shift work syndrome*, which described a

portion of participants in a study of night workers. (Annoni, 1963; Puca et al., 1996; Weitzman, 1981). SWD is a relatively recent term for the circadian rhythm sleep disorder (CRSD) specific to shift work. SWD is an extrinsic CRSD, which can be triggered in some people by an enforced change in the sleep/wake cycle contrary to the internal circadian rhythm, such as night shifts (Drake, 2010). Drake reiterated the importance of diagnosing and treating SWD, especially since vital tasks, such as law enforcement and medical care, are performed by individuals who work around the clock.

Flo et al. (2012) surveyed 5,400 nurses in order to assess SWD symptoms and proposed that asking three questions could identify patients with SWD comparatively as well as performing any of the numerous other diagnostic criteria, such as the Bergen Insomnia Scale (BIS) and the Epworth Sleepiness Scale (ESS). They suggested that positive responses from individuals regarding difficulty with sleep or excessive sleepiness, a work shift interrupting an otherwise normal sleep period, and at least a month long duration was sufficient to diagnose SWD. Regression analyses of the current diagnostic criteria showed that the highest risk for SWD symptoms was exhibited by shift workers, especially those workers whose shifts included a night shift (Flo et al., 2012). Instead of going through several scales in order to determine SWD, a doctor might simply ask three questions, enabling the patient to receive more expedient care (Flo et al., 2012).

Problems associated with shift work. Since shift work is usually work completed outside of the normal daylight hours, it goes against the normal circadian rhythm of the body (Culpepper, 2010). Insomnia or disrupted sleep might occur, which

could affect physical and mental health, the ability to perform or function, awareness of safety, and alertness to social cues (Garbarino et al., 2002). Research on sleep and circadian rhythm is necessary in order to assist shift workers' overall health, including health concerns, safety and performance concerns, and psychosocial concerns (Takahashi, 2014).

Shift work and sleep. Shift work is defined as any nonregular schedule of work. Shift work includes shift schedules which occur at night, start before 7 a.m., or rotate (Culpepper, 2010). Since shift work is usually performed outside the normal work hours and regular night time sleep is affected, many challenges with sleep are associated with shift work. Sleep is divided into two stages, nonrapid eye movement and rapid eye movement (Chokroverty, 2010). There are four major sleep complaints: excessive sleepiness, insomnia, abnormal sleep behavior, and inability to fall asleep (Chokroverty, 2010). Sleeping times incongruent to the diurnal/nocturnal cycle can cause insomnia and sleep difficulties (Rodenbeck, 2009). The sleep/wake cycle is determined by light transference and habit, as an example, circadian rhythm might be described as how the body creates melatonin to facilitate sleep for the duration the body is accustomed to perceiving darkness (Drake, 2010). The homeostatic system is the pressure to fall asleep following consecutive waking hours, which usually works together with the circadian rhythm to reinforce the sleep/wake cycle (Drake, 2010).

Physical health symptoms. Other health concerns of shift work include cardiovascular and cerebrovascular problems, metabolic disorder, excessive body weight, gastrointestinal (GI) dysfunction, and cancer (Takahashi, 2014). According to Thomas

and Power (2010), there is an association of cardiovascular disease (CVD) and shift work, specifically night and early morning work. In a cohort study of 7,839 British participants who worked anywhere between 6:00 p.m. and 7:00 a.m. or weekends, the authors found that increased frequency of shift work was associated with increased symptoms of CVD, such as high body mass index (BMI), waist circumference, triglyceride levels, and diastolic blood pressure. Controlling for socioeconomic factors, occupational factors, and health behaviors only partly explained the associations (Thomas & Power, 2010).

Mohebbi, Shateri, and Seyedmohammadzad (2012) also completed a study which included the measurements of waist circumference and adiposity. The study of 3,039 shift work drivers and 3,039 daytime drivers yielded an association between shift work and metabolic syndrome. Shift workers might have an increased risk of cardiometabolic disease, based on the circadian disruption inherent in their schedules, such as night shifts (Morris, Yang, & Scheer, 2012).

Wong, Ostry, Demers, and Davies (2012) completed a pilot study to explore the effects of shift work and job strain on ambulance paramedics and dispatchers. Salivary stress biomarkers, heart rate monitors and job specific surveys were self-administered during rest and work days. The authors found that job strain affected measurement results, as samples from work and rest days varied significantly. Dispatchers and rotating shift workers reported higher job strain than ambulance paramedics and daytime-only workers. Subjective and objective findings suggest that work stressors might lead to early signs of CVD over time (Wong et al., 2012).

Tada et al. (2014) explored BMI with regard to shift work in a participant pool of 1,179 day workers and 1,579 rotating shift workers. All of the participants were female Japanese nurses between the ages of 20 and 59 who self-administered the study's questionnaires. The results of multivariable linear regression analysis indicated that after controlling for lifestyle habits, higher BMI was significantly associated with rotating shift work. Higher intakes of sugary drinks and shorter sleep durations were also associated with higher BMI and rotating shift work. The authors suggest investigating additional shift work factors, such as inconsistent meal times and sleep (Tada et al., 2014).

Pan et al. (2011) investigated shift work with relation to Type II diabetes in a study of two cohorts: 69,269 women between the ages of 42 and 67, and 107,915 women between the ages of 25 and 42. None of these women had diabetes, CVD, or cancer at baseline. Pan et al. differentiated the women by work schedule and updated the information every two to four years during the 18 to 20 year follow-up. The authors found that factors associated with an increased risk of Type II diabetes included the duration of shift work and body weight, measured by BMI (Pan et al., 2011).

Another physical health complaint associated with shift work are GI disturbances. Saberi and Moravveji (2010) sought to distinguish the frequency of GI complaints between 27 regular day shift nurses and 133 rotating shift nurses through GI symptom questionnaires. Results of chi-square and Fisher-exact tests showed a significantly higher prevalence between shift work and GI symptoms, irregular meal times, and GI medication intake (Saberi & Moravveji, 2010).

According to the International Agency for Research on Cancer, there is sufficient evidence to find an association between shift work and cancer in animals, but there is only limited evidence to find that association in humans (Erren et al., 2010). Yet global studies support the link between shift work and cancer in humans. In a British study of 8,603 workers, shift workers were found to have a significantly higher risk of cancer than their day working counterparts (Taylor & Pocock, 1972); in an Icelandic study of 603 workers, shift workers had the highest standardized mortality rates of cancer (Rafnsson & Gunnarsdóttir, 1990) and meta analyses by Germany and the United States of a study population of around 240,000 individuals found a significantly elevated risk of breast or prostate cancer in flight personnel and shift workers (Erren et al., 2010).

Mental health symptoms. The effects of shift work on mental health were sporadically documented over the last several decades. Two studies were found from the seventies. Taylor (1973) specifically mentioned psychology in his study on the health effects of shift work, and Fawer and Lob (1979) found that the psychological difficulties of shift work included irritability as an increased association with shift work in their study of 131 shift workers.

Meyrer et al. (2009) conducted a case study on an individual with a bipolar II disorder. The subject was able to maintain a stable mood as long as the subject followed a stable work schedule, but when the subject switched to a night shift schedule, the subject developed depressive symptoms (Meyrer et al., 2009). After ceasing the night shift schedule, the subject was able to regain stability (Meyrer et al., 2009). This case exhibits how shift work can affect someone with a diagnosed mental instability.

Pritchett et al. (2012) hypothesized that sleep and circadian rhythm disruption (SCRD) and schizophrenia are associated. Sleep deprivation causes cognitive impairment. SCRD and schizophrenia are often co-morbid, and similar symptoms are found in both ailments, for example impaired cognitive performance (Pritchett et al., 2012). While the circadian rhythm is the body's adaption to an expected 24 hour cycle, sleep is regulated by the homeostatic system of increased waking hours resulting in an increased need to sleep (Pritchett et al., 2012). Thirty to eighty percent of schizophrenic patients report SCRD (Pritchett et al., 2012). Pritchett et al. tested their hypothesis with rodent models by treating the SCRD and finding that the symptoms of schizophrenia were also alleviated. Pritchett et al. recommended further testing in order to better understand and treat patients with comorbid SCRD and schizophrenia, thereby improving overall health and quality of life, which was also the ultimate goal of my study.

Vallières et al. (2014) completed an epidemiological study investigating how participants perceived insomnia to affect their physical and psychological health. All of the participants presented with symptoms of insomnia. The 418 participants were evenly divided between day workers and abnormal shift workers; 51 participants worked nights and 158 participants worked rotating shifts. Day shift workers were paired with off shift workers based on gender, age, and income. The authors found that regardless of shift type, participants with insomnia complained of psychological symptoms: anxiety, depression, and fatigue (Vallières et al., 2014). Rotating shift workers also had the highest physical complaints, such as chronic pain and otorhinolaryngology.

Performance and safety concerns. Performance and safety concerns include neurobehavioral function and work performance (Takahashi, 2014). Baney (2011) compared two studies with regard to functional impairment caused by shift work and health care recognition, including a study in which over a third of the participants admitted to dozing off while driving. Both studies included the same 260 shift workers, and the second study included 673 health care professionals to evaluate the recognition rate of shift worker symptoms in the health care field. The health care professions were not specified as shift workers. Results from the surveys showed an abundance of sleepiness, which resulted in 10% work injuries, 87.1% diminished concentration, 69% work mistakes, and 43% of participants reporting compromised care of dependents due to sleepiness. Participants reported that these sleeping difficulties caused them to seek medicinal treatment.

Belcher, Gumenyuk, and Roth (2015) also investigated impairments related to sleepiness and shift work. The authors explored how insomnia is related to occupational impairment. Night shift workers kept journals for two weeks and participated in tests overnight to explore their functioning levels. Strengths of this study included the performance of a variety of tests to explore sleepiness and insomnia, while a weakness of this study was that it partially depended on participants' self-report about instances such as occupational accidents. The authors found that insomnia was linked to cognitive and functional impairments among people with SWD.

Greubel et al. (2010) conducted a survey of 209 shift workers, of which 144 workers had night work in their schedules, with regard to occupational accidents, using

the fatigue index (FI) and the risk index (RI). There were no correlations between occupational accidents and the indices in the day shifts. In the other shifts, however, FI correlated with sleep and health complaints and appeared to be a predictor of occupational accidents (Greubel et al., 2010). A large deviance from a normal distribution was found in all index parameters, resulting in statistical difficulties, which might decrease the reliability of the analysis (Greubel et al., 2010).

In another study about occupational accidents, Horwitz and McCall (2004) used Oregon workers' compensation data to evaluate hospital employees' injuries. They found that night workers had the greatest risk for frequency and severity of occupational accidents based on the reported disability leave.

The Brief Norwegian Safety Climate Inventory (Brief NORSCI) might be used to assess how workers feel about their safety. Nielson, Hystad, and Eid (2016) used the Brief NORSCI in order to complete a cross-sectional survey of 8,066 workers of various shift types. One of the results of the study indicated that sleep problems affected climate safety (Nielson et al., 2016). The Brief NORSCI might be used to assess feelings of safety in current shift workers.

The aforementioned studies showed a strong association between sleep disturbance of shift work and ability to function and perform work safely. Dozing off while driving, increased work injuries, diminished concentration, increased work mistakes, and decreased ability to care for dependents were all associated with shift work. The FI might be able to predict occupational accidents, and the Brief NORSCI might be

able to assess workers' perceptions of job safety, however neither addresses treatments of symptoms of shift work.

***Social impacts*.** In addition to physical and mental health, shift work also impacted people's social life, how they interacted with family and friends, and their overall quality of life (Garbarino et al., 2002). Kasperczyk and Josko (2012) surveyed 286 regular daytime workers and shift workers, with roughly half of the participants in each category. Although the authors found that both types of work were associated with sleep disorders, the rate was much higher for the shift workers, and shift workers were more likely to have noticeable emotional problems, such as mood changes which impacted interpersonal relationships and led to conflicts and misunderstandings (Kaspercyzk & Josko, 2012).

Sarwar and Khalid (2015) conducted a study of 150 nurses. The nurses either worked the day shift or the night shift. The authors found that nurses who worked the day shift were more motivated than nurses who worked the night shifts, and nurses who worked the day shift had the perception that they received more social support than nurses who worked the night shift (Sarwar & Khalid, 2015).

Agosti et al. (2015) found high rates of work absence due to illness and early retirement among nurses. The authors suggested that the work-life balance was disturbed by the shift work, and that finding equilibrium between work and private life might result in improving the health and social aspects of the nurses' lives (Agosti et al., 2015). Work-life balance perceptions included reflections on life, self-care and being healthy, a meaningful and supportive work environment, shift- and part-time work, family and

support network, and a comforting home (Agosti et al., 2015). Reflections on life were seen as a resource to facilitate setting boundaries and evaluating values and goals, self-care and being healthy were necessary for recuperation and to reenergize, and a meaningful and supportive work environment contributed to personal growth and could be a resource for encouragement to promote health by providing an individual with positive meaning through helping others (Agosti et al., 2015). Shift and part-time work sometimes facilitated work-life balance by increasing the time available for private life, but if work schedules or responsibilities conflicted too heavily with private life, it was seen as detrimental (Agosti et al., 2015). Family and support networks were vital in managing troubles, with the well-being of family being critical to happiness. A comforting home, dubbed "making your home your castle" by the authors, was fundamental for respite as well as the promotion of activities of daily living (Agosti et al., 2015, p. 246).

Factors influencing shift-work related problems. There are several factors which affect the prevalence and severity of shift-work related issues. Three examples are work policies and procedures, personal vulnerabilities, and treatments. Prevention of shift-work related difficulties could influence the prevalence and severity of shift-work related issues by decreasing both the prevalence and the severity of shift-work related difficulties.

***Work policies and procedures*.** Work policies and procedures affect shift work by directing how shift work must be applied. Policies and procedures are instructed by each individual organization; barring safety measures in, for example construction fields, there

are no federal policies governing what type of schedule a company might impose on its employees. Employers do sometimes set such policies.

A large organization in the San Francisco Bay Area mandated that mental health counselors work all three shifts within a week, regardless of how managers felt that would affect their employees. Some managers felt that the imposed schedule might have had detrimental effects on their employees, but any reproach to the procedure was impeded. This exemplified how some procedures continue, despite criticism. Upper management and lower management of this organization were exempt from working irregular shifts, and at least one manager was forbidden by their superior to work night shifts, per that manager's report. This is contrary to the managers' responsibility to cover a shift if it could not be covered by extra help. To the contrary, a company in Kansas recently moved to 12 hour shift schedules, but they encouraged managers to periodically work their employees' shifts in order to foster communication and raise morale (Jusko, 2014).

Galatsch et al. (2013) investigated the effects of requested, forced, and denied changes of schedules by nurses with respect to work ability and general health. The study included 11,102 nurses from eight countries in Europe and provided a baseline questionnaire and a follow-up questionnaire a year later. Results were measured by Work Ability Index (WAI) and general health. Nurses with imposed schedules and denied schedule change requests had the lowest scores of WAI and general health, whereas nurses whose shift change requests were approved had the highest WAI and the least

impacted general health. Galatsch et al. suggested that shift schedule organization could lead to promoting WAI and improving the general health of employees.

The Australian National Transport Commission does not have policies governing rail safety regarding scheduling and avoiding fatigue (Anderson, Grunstein, & Rajaratnam, 2013). However, it is considering options. Currently the Australian National Transport Commission warns that fatigue is cumulative and 12 hour shifts double the risks for occupational accidents and injury.

Though there are no governmental policies covering shift work in the United States (U.S. Department of Labor, n.d.), there are clear warnings of the symptoms of extended or unusual hours. These symptoms include fatigue, which over time can become debilitating. Other symptoms as listed by the Occupational Safety and Health Administration are weariness, sleepiness, irritability, reduced alertness, lack of concentration and memory, lack of motivation, increased susceptibility to illness, depression, headache, giddiness, and loss of appetite and digestive problems (U.S. Department of Labor, n.d.). Susceptibility to mental and physical symptoms of shift work varies individually (Boivin and Boudreau, 2014) .

***Personal vulnerabilities*.** Personal vulnerabilities also play a part in how shift schedules affect an individual. Individuals' tolerance to shift work is associated with sleep-wake cycle disturbances, circadian misalignment, and affecting individual and internal factors (Boivin & Boudreau, 2014). According to Vogel et al. (2012), whether or not an individual can tolerate working shift schedules is dependent on various factors, including both work related characteristics, such as schedule or worksite, and individual

characteristics, including social and demographic factors. Age and weight seemed to be the most consistent factors in ability to work and susceptibility to disease, but not at a significant level (Yong et al., 2010). According to Gumenyuk, Roth, and Drake (2012), some individuals are unable to change their circadian rhythm, creating a mismatch when working at night and resulting in SWD symptoms, while other individuals are able to adjust their circadian rhythm with their changing work shifts, resulting in no or few symptoms of SWD.

Harvey, Gehrman, and Espie (2014) used a psycho-bio-behavioral approach to understand who might be vulnerable to insomnia, one of the primary symptoms of SWD. Although hyperarousal is known to be associated with insomnia, stress reactivity might be a better indicator of insomnia vulnerability (Harvey et al., 2014). The Ford Insomnia Response to Stress Test (FIRST) might be an effective method to predict an individual's vulnerability to insomnia. FIRST is a questionnaire designed to identify vulnerability to sleep disturbance due to high stress events; it consists of nine Likert questions (Drake et al., 2004).

Using FIRST, Kalmbach et al. (2015) performed a longitudinal study of 96 participants who had no prior history of insomnia or symptoms of SWD and who had not previously done shift work. Kalmbach et al. completed a follow up evaluation of the participants after the participants had performed a year of shift work using FIRST. The results of the study not only showed that sleep reactivity was associated with SWD, but sleep reactivity was also associated with increased levels of depression and anxiety (Kalmbach et al., 2015).

Nakajima et al. (2014) surveyed 338 participants in order to validate the FIRST (FIRST-J) in Japanese and found that FIRST-J was as effective as the original FIRST with regards to validity and internal consistency. Chen et al. (2015) also sought to validate a version of FIRST, this time in French (F-FIRST). Chen et al. completed a study of 45 participants at baseline and 3 weeks later, of which 14 participants spent one night in a laboratory in order to obtain polysomnography. The results of the study reflected high internal consistency and confirmed an association between sleep reactivity and sleep disturbances (Chen et al., 2015).

The preceding studies provided ideas as to who might more likely be vulnerable to symptoms of SWD. Characteristics associated with vulnerability to symptoms of shift work include age, weight, hyperarousal, and stress reactivity. Stress reactivity might be measured through the FIRST in English, the FIRST-J in Japanese, and the F-FIRST in French. The three surveys provide evidence that assessment of employee characteristics, prior to working shift work, might assist when scheduling employees and provide the ability to prevent SWD (Chen et al., 2015; Nakajima et al., 2014).

***Prevention of shift-work related problems*.** In order to prevent shift-work related difficulties, it was important to understand what might increase susceptibility to shift work related issues. Studies of the FIRST have identified stress reactivity to be associated with vulnerability to SWD. This information might be used in identifying individuals susceptible to symptoms of SWD before they attempt to work shift schedules. Identifying individuals vulnerable to symptoms of SWD could also be an effective measure in preventing shift work related problems. In addition to the knowledge which FIRST

measurements might provide, knowing the effects of various schedule rotations might influence whether or not symptoms of SWD might be avoided or decreased. The following studies explored the effects of differing schedule rotations and the effects of changing those schedules.

Karlson et al. (2009) investigated the effects of a slower backward rotating shift change compared with a faster forward rotating shift change cycle. The forward rotating shift was two days on each type of shift and then four days off, whereas the backward rotating shift was three days on each type of shift and then three days off. Participants were surveyed in order to ascertain quality of life characteristics, for example ability to sleep, function, and maintain relationships. The authors found that the backward rotating shift was associated with shift workers' improved ability to function (Karlson et al., 2009).

Yong et al. (2010) compared two forward rotating shifts with regular day shifts by surveying a sample population of 924 participants. They used the WAI to assess health factors in the workers. Items of the WAI include current work ability compared with the lifetime best, work ability in relation to the demands of the job, number of current diseases diagnosed by a physician, estimated work impairment due to diseases, sick leave during the past year, own prognosis of work ability 2 years from now, and mental resources. 3 x 12 shift schedules were 12 hours long and rotated continuously between day and night, with 24 hours off between shifts. 4 x 12 shift schedules also rotated continuously between day and night, but with two days off following a night shift. Yong et al. postulated that fast forward rotating shift schedules are less detrimental to sleep

than slow rotating shift schedules. Yong et al. noted that drop out of employees unable to handle the rotating shift schedule might have resulted in the appearance of a "healthy worker effect" (p. 1146) within this cross-sectional study.

Saksvik et al. (2011) explored adaption rates to changing between shifts. The participants kept sleep diaries 1 week prior to a shift schedule, 2 weeks during a shift schedule, and one week following the shift schedule change. Shift schedules included only working day shifts, only working night shifts, and one schedule which consisted of alternating weeks of working day shifts and night shifts. Based on the diaries, the changing shift (7 nights, then 7 days) was the most difficult to which to adapt with regards to sleep. A limitation of this study was that participants were relatively healthy males; therefore the results might not be as generalizable. Also, some data was missing with low observation numbers, and age was not controlled.

Eldevik et al. (2013), in their study of the 5,400 nurses, found that quick returns, or shift schedules which had 11 hours or less between the shifts, had a significant association with symptoms of SWD, in particular insomnia, excessive sleepiness, and excessive fatigue. Eldevik et al. recommended future studies which would explore the association of decreasing quick returns with decreasing complaints of SWD symptoms.

An additional method of preventing symptoms of SWD might be caffeine in order to prevent injuries and errors in shift work (Ker, 2010). Ker (2010) conducted a review study of 13 trials and found that, while caffeine might improve performance, there were no trials in which an injury could be said to have been prevented. Scheduled meals could also avoid or reduce the symptoms of SWD associated with shift work, for example risk

of obesity onset, according to the study of mice by Oike et al. (2015). This study was important since it showed a possible association between diet and ability to prevent occupational accidents during shift work.

Treatments for Shift-Work Related Sleep Disorders

The treatment of SWD symptoms differs from the prevention of SWD symptoms. The treatment of SWD symptoms focuses on the management of SWD symptoms. The prevention of SWD symptoms focuses on avoiding the onset of symptoms of SWD.

Physical activity. Increased physical activity has been endorsed as an effective treatment for shift-work related sleep disorders. Thorpy (2010) and Wright (2013) suggested a comprehensive management plan which included exercise. Pepłońska et al. (2014) explored modifying lifestyle factors with a cross-sectional study surveying 605 employees who worked night shifts. The authors found that eating more and exercising less was associated with working night shifts. Pepłońska et al. suggested that this might be the reason these shifts are associated with increased morbidity.

Oike, Sakurai, Ippoushi, and Kobori (2015) also explored obesity with regard to shift work. The authors mimicked the effects of shift work and obesity in mice (Oike et al., 2015). Mice were subjected to light/dark changes, similar to the effects of shift work, and either free fed or put on a fixed feeding schedule (Oike et al., 2015). Mice which were able to freely feed themselves gained weight, but there was no weight change in mice put on the feeding schedule (Oike et al., 2015). Oike et al. suggested a meal schedule for shift workers as a way to avoid or treat the weight challenges of shift work.

Sleep hygiene. Sleep hygiene consists of multiple practices to promote nighttime sleep and daytime alertness (National Sleep Foundation, 2016). Tips for sleep hygiene include the maintenance of a regular sleep schedule, avoiding naps, getting out of bed if still awake after five to ten minutes, not watching TV or reading in bed, appropriate caffeine use, avoiding substances which disturb sleep, regular exercise, a quiet room, not checking the clock, and a routine before bed (American Sleep Association, 2016). There are several additional tips to improve sleep recommended by the Division of Sleep Medicine at Harvard Medical School [DSMHMS] (2016). These include only going to sleep when you are actually tired, using natural sunlight in the morning to start your day, getting up at the same time daily, only napping briefly and before 5 p.m. if a nap is necessary, eating dinner well before bedtime and only having light snacks thereafter, moderating liquids throughout the day in order to prevent nighttime dehydration and avoid nighttime bathroom trips, early exercise, and dedication to your sleep hygiene routine (DSMHMS, 2016).

Thorpy (2010) also recommended improved sleep hygiene as well as napping as a treatment for symptoms of shift work related disorders. Wright et al. (2013) again agreed with Thorpy's suggestions, but he also emphasized good sleep behaviors and increased sleep duration in addition to promoting sleep through sleep hygiene and promoting wakefulness through naps and schedule design. Wright et al. suggested that in addition to the aforementioned management tools, ceasing or decreasing shift work should also be a part of comprehensive treatment.

Oral supplements. Both Thorpy (2010) and Wright et al. (2013) suggested that intake of caffeine or other stimulant, prior to the start of the shift might promote wakefulness. Wright et al. also proposed hypnotics, melatonin, prescription stimulants, and various combinations of the aforementioned management tools. Thorpy recommended further studies be done on the use of melatonin to facilitate sleep during required rest periods.

Jones (2011) studied the effects of Armodafinil on 383 shift workers who worked outside the hours of 6 a.m. to 6 p.m.. Armodafinil is a prescription medication to promote wakefulness in individuals who have narcolepsy or SWD (U.S. National Library of Medicine, 2016). Workers in the study came primarily from health care, protective services, and transportation fields. Participants were given Armodafinil or a placebo and measured at baseline, 3 weeks, and 6 weeks. Armodafinil intake was associated with decreased illness and increased functionality rates at both follow up measurements (Jones, 2011). Jones stated that Armodafanil might decrease the tripled risk rate of occupational accidents of shift workers compared to the risk rate of occupational accidents of traditional day shift workers.

Bright light therapy. Recommendations for sleep hygiene include scheduling, bright light exposure, napping, and psychoeducation (Richter et al., 2016). Thorpy (2010) and Wright et al. (2013) also recommended using bright light therapy, and Wright et al. clarified that promoting circadian adaption through light alteration would require bright lights at night. Waage et al. (2014) realized that excessive sleepiness was associated with shift work and that people use melatonin or bright light treatment to mitigate their

symptoms, but the authors also suggested future studies on these treatments. In my study, participants were asked what treatments might have helped them alleviate detrimental symptoms experienced while working the three-tier shift schedule.

Summary

Previous studies showed a trend of unhealthy and unsafe effects of shift work in one-tier, two-tier, and rotational shift schedules, for example night shifts and combination shifts. Sleep difficulty is a major factor in shift work. Insufficient sleep impacts relationships, mental health status, physical health status, and occupation and traffic safety.

Unfortunately, none of these studies specifically addressed three-tier shift work occurring within each week. The study by Karlson et al. (2009) studied three-tier shift schedules, but they had much larger rest periods between types of shift, so that only two shifts would fall within a week, effectively making a type of two-tier rotating shift schedule. In the next chapter, I will provide a thorough explanation of the methodology I used in this study.

Chapter 3: Research Method

Introduction

The purpose of this study was to understand the perceptions of three-tier shift workers with regards to community functioning, physical and mental well-being, relationships, and safety. There is a gap in the literature with regard to studies that focus on three-tier shift schedules. However, studies of rotating shifts, night shifts, and two-tier shift schedules were abundant, especially in recent years. Researchers of night shifts seemed to agree on the negative effects of night shift schedules, but the findings of studies on two-tier shift schedules and rotating shift schedules differed on whether or not results were significant with regard to negative effects. In this study, I explored how workers perceived the effects of three-tier shift schedules. The major sections of this chapter will include the research design and rationale; the researcher's role; the methodology, which includes instrumentation and procedures; the data analysis plan, issues of trustworthiness; ethical procedures; and a summary.

Research Design and Rationale

The research design I used for this study was a qualitative phenomenological approach. A qualitative study is defined as an observational study conducted in a natural setting where the researcher is the main instrument (Creswell, 2013). This study included interviews and document reviews (see Patton, 2002). Phenomenology emphasizes the exploration of human experience and how it is transformed into both individual and shared meanings of consciousness (Patton, 2002). In order to better understand the perceptions of employees who have worked three-tier shift schedules, such workers were

invited to participate in in-depth interviews with me. My goal with this study was to answer the following RQs:

RQ1: What are the perceptions of three-tier shift workers on the health and the safety effects of working a three-tier shift schedule?

RQ2: How does working a three-tier shift schedule affect these workers' functioning within the community, personal relationships, mental health, physical health status, and safety?

The concept of community functioning addresses the role an individual plays within a community. Community functioning involves activities and behaviors performed by individuals within a system, which are recognized or not recognized, that impact all or parts of the system (Geismar, 1966). In order to evaluate community functioning in a population of homeless individuals with mental health diagnoses, Stergiopoulos et al. (2015) used the MCAS as the measurement tool. The MCAS consists of 17 questions divided into four sections: interference with functioning, adjustment to living, social competence, and behavioral problems (Hendryx et al., 2001). In order to evaluate community functioning in my study population, I created open-ended questions loosely based on the MCAS. I also created open-ended questions based on the knowledge I had gained from the literature review, such as the work-life balance perceptions from the study by Agosti et al. (2015) and the three questions which could assess SWD (Flo et al., 2012).

The theoretical framework I used was based on restoration theory. Restoration theory specifies the importance of sleep; without sufficient sleep, restoration theory

proposes that the functions of the body and the brain will break down (Oswald, 1966). Restoration theory also states that in addition to negatively impacted mental and physical functioning, excessive sleepiness will occur following a lengthy sleep deficit (Oswald, 1966).

I chose this specific framework because these theories work together to inform my study's protocol. I explored how community functioning was affected by sleep, or a lack thereof. I explored how restoration theory indicated an association between the participants' responses and their functionality while working three-tier shift schedules.

Role of the Researcher

My role as the researcher in this study was to interview the participants. I used open-ended questions, which should have decreased the chance of receiving a predetermined answer from the participants (Patton, 2002). I had previous professional relationships with the participants, as I had also worked for the same nonprofit organization that mandated three-tier shift schedules. However, I had no power over the participants, as the participants were former coworkers or former supervisors of mine. There were no power relationships to be managed, as no former subordinates were interviewed. I managed my bias by adhering to the questionnaire and refraining from professional small talk before or during the interview. Other ethical issues that were not applicable to the study were: Though the study was within a former work environment of mine, I no longer worked for the same employer that mandated three-tier shift schedules, and I did not use material incentives. There was no conflict of interest or power differential between me and the participants.

Methodology

Participant Selection Logic

I invited 10 individuals to participate in the study. According to Dukes (as cited by Creswell, 2013), three to 10 subjects are recommended for phenomenology . However, if the suggested sample size had not resulted in saturation of the information, I would have recruited additional participants in the same fashion until saturation of the data was achieved. At the time of the study, participants were either currently working or had worked a mandated three-tier shift schedule for at least 3 consecutive months. Participants were invited via knowledge of employment with the organization which mandated three-tier shift schedules and were previously acquainted with me. Potential participants were advised of the study and its nature and asked whether or not they were willing to participate in an interview with me. I conducted this process was conducted through telephone and e-mail. A description of the communication can be found in Appendix A.

Instrumentation

The data collection instrument I used in the in-depth interviews of this study was a questionnaire. Interview questions included 17 questions loosely based on the MCAS, 18 questions based on the knowledge obtained through the literature review, and three additional questions specifically developed to evaluate SWD (Stergiopoulos et al., 2015; Waage et al., 2009). The MCAS was developed in 1983 by health providers in Oregon (CITE). An evaluation of the reliability and validity of the MCAS was conducted by Hendryx, Dyck, McBride, and Whitbeck in 2001. Hendryx et al. (2001) found the MCAS

to be reliable with concurrent validity in their study of 1,250 mental health outpatients. Stergiopoulos et al. (2015) used the MCAS to evaluate the community functioning in their study's population. This assessment instrument was appropriate for my study to investigate community functioning in my population. However, as my participants were not known mental health outpatients, the questions based on the MCAS followed the guideline of the original MCAS, but my interview questions were largely modified open-ended questions.

I created the 18 literature-based questions based mostly on the problem areas associated with shift work. The literature-based questions were divided into six sections: five that focused on the difficulties of shift work and one that focused on the treatment of those difficulties. The six sections included sleep, physical health, mental health, performance and safety concerns, social impacts, and treatments.

Flo et al. (2012) developed the three additional questions during a study of shift work among oil rig workers, and they were based on the International Classification of Sleep Disorders, Second Edition (ICSD-2) criteria from the American Academy of Sleep Medicine (2005;Waage et al., 2009). These questions were used by Flo et al. (2012) in a study of a sample of 5,400 randomly selected nurses in conjunction with the BIS and ESS to evaluate the questions' validity and reliability. Flo et al. found that asking the three specifically developed questions were sufficient to determine SWD symptoms. These questions were appropriate for my study as SWD is associated with functionality, and these questions evaluate SWD symptoms. The three questions designed to diagnose SWD

were not modified, but I did pose them optionally at the end of the interview in order to assess possible SWD.

The purpose of this study was to explore workers' perceptions of how three-tier shift schedules affected their functioning in the community. Participants must have worked at least 3 consecutive months of regular three-tier shift schedules in order to partake in the in-depth interviews. Since participants were known to me through the organization, which mandated the three-tier shift schedule, I was aware that the potential participants were all mental health counselors. Although some of the questions might have seemed complex, the target sample population was familiar with the jargon from the field. Open-ended questions and the SWD questions for the interviews can be found in Appendix B.

Procedures

I collected data from the participants during one-time, face-to-face interviews. The interviews lasted between 30 and 60 minutes. I wrote the data on questionnaires as the participant responded to the questions. I also recorded the interview with a dedicated audio recorder. If insufficient participants were recruited for the phenomenological approach, a narrative approach would have been substituted and a more in-depth interview with a lengthier duration would have taken place. In that case, I also might have conducted a follow-up telephone interview in order to clarify any outstanding issues. Participants exited the study following their interviews or after receiving the one optional telephone call from me to clarify any confusion which might have arisen after

completion of the interview. The following protocol was completed with regard to participant recruitment, participant participation, and data collection:

1. Participants were contacted via telephone, e-mail, or social media and asked if they were interested in participating in the study. The communication found Appendix A was presented to them.
2. Participants interested in the study were scheduled for interviews.
3. Participants were provided with a letter describing the study and were requested to sign the Consent Form (see Appendix B) before beginning the interview.
4. Participants were optionally contacted by telephone after the face-to-face in order to clarify any remaining questions.

Data Collection

The data collection technique I used for this qualitative study was in-depth interviews. Single, face-to-face interviews were conducted with each participant in order to explore workers' perceptions of three-tier shift schedules. Follow-up telephone calls were optionally made in order to answer any lingering questions. I took notes during the interviews and afterwards kept the notes in a locked cabinet to which only I had access. I also recorded the interviews on a dedicated audio recording device which was also stored in a locked cabinet to which only I had access. I transcribed the audio recordings for analysis purposes. Notes, audio recordings, and transcriptions will be destroyed 5 years after the completion of the study per the minimum requirement time of keeping raw data.

Procedural steps of the data collection technique of interviewing include RQs, interviewee identification, interview type, recording procedures, interview protocol design, location determination, interviewee consent, and interview procedures (Creswell, 2013). The interview questions are located in Appendix B. Interviewees were identified by the common phenomenon of working a three-tier shift schedule for at least 3 months. I conducted a single interview with each participant. Participants chose the location of the interview and signed the Consent Form (see Appendix B) before commencing the interview. A single follow-up telephone call was optionally made to participants to clarify any issues.

According to Creswell, 2013, possible challenges might include unexpected participant behaviors, interview process, documents and audiovisual materials, and ethical issues (Creswell, 2013). I experienced the following challenges during my data collection: distracted participants, an unexpected acquaintance interrupting one interview, loud background music at one café, and care alarms sounding in the background. The interview process was otherwise straight forward, beginning with me providing an explanation of the procedures followed by the signing of the Consent Form and the asking of the interview questions. Materials at each interview included the Communication Form (Appendix A), the Consent Form (Appendix B), the Interview Questions (Appendix B), and a dedicated audio recording device used solely for this study. Ethical issues, such as researcher bias, will be described in a later section in this chapter titled, Ethical Procedures. Types of data included community functioning, for

example activities of daily living and driving, and personal relationships, for example the ability to maintain friendships and communicate well with family.

Data Analysis Plan

In order to explore the workers' perceptions of three-tier shift schedules, I organized the data gathered into themes (see Creswell, 2009). The data analysis included personal experience descriptions, a significant statements list, significant statement groupings, textural descriptions, structural descriptions, and composite descriptions (Creswell, 2013). The data analysis techniques of *epoché* and bracketing were used to suspend judgment and analyze the data in order to better understand personal bias and assist in refining the data (Patton, 2002). I did not use a computer software program such as NVivo, based on my ability to code the data into categories and themes without the use of such a program.

Issues of Trustworthiness

In order to address credibility, or internal validity, participants were recruited and interviewed with comprehensive interaction. Interviews continued until the data were saturated. In order to address transferability, or external validity, there was dense description of the interviews, and a variety of participants with differing genders demographics sharing the phenomenon were interviewed. In order to address dependability, detailed notes were taken during the interviews with regards to participants' responses and my observations. In order to address confirmability, I was aware of reflexivity, where apparent cause and effect might be bidirectional, by being actively conscious of the personal bias of working three-tier shift schedules with

debilitating effects. There were strengths and weaknesses to this qualitative phenomenological approach. A strength of this approach was that it was a study specifically oriented to an infrequently studied population. A weakness of this approach was that there were limited data available with which to compare this specific population.

Ethical Procedures

Language was void of implication, and defined the study accurately (American Psychological Association, 2010). Awareness of labels, sexual orientation, racial and ethnic identities, disabilities, age, and historical and interpretive inaccuracies was practiced (American Psychological Association, 2010). There were no agreements to gain access to participants or data. I was personally aware of participants' work schedules through prior employment, and only I handled any data collected. The treatment of human participants was ethical (Walden IRB approval no. 06-14-16-0290801). There was no need for institutional permissions, as institutions were not required to determine the participant pool. Only individual permissions to consent were necessary to participate.

Participants chose the location of the interview. Had the participant chosen their home as the interview location, the researcher took additional precautions. First, I offered to conduct the interview in a neutral location such as a coffee shop or a meeting room at a public library. If this was declined, I ensured that my presence did not expose the participant or the participant's family to any risks, i.e. exposure to illness if I was contagious, and I requested that the interview was conducted in a room separate from the participant's family in order to ensure privacy. Finally, I included occasional check-ins throughout the interview to ascertain how the participant was doing and whether or not

they needed a break by asking the participant these questions. I also advised the participant of the halfway point of the interview to create an opportunity for the participant to stop the interview and follow up at a later time if the interview was running longer than expected.

Participants were free to leave the study at any point with no repercussions should they have wished to do so. Recruitment materials included contact from me and a copy of the communication form if desired by the potential participant. Data were collected directly from interviews with the participants and remained confidential. Recorded data were kept in a locked cabinet to which only I had access and will be destroyed 5 years after the conclusion of the study. There was no incentive for participation.

Summary

In the sections of this chapter, I described the research design and rationale, the researcher's role, the methodology, the data analysis plan, issues of trustworthiness, and ethical procedures. I conducted this study in order to better understand workers' perceptions of three-tier shift schedules. As such, a qualitative phenomenological approach was chosen. A qualitative study allowed exploration of workers' perspectives and the phenomenon shared was the performance of three-tier shift work. My role was to conduct interviews and collect and analyze data. Issues of trustworthiness and ethical procedures have been addressed. In the next chapter, I will detail the results of the study.

Chapter 4: Results

Introduction

The purpose of this study was to explore workers' perceptions of the effects of working three-tier shift schedules. Although there are many studies addressing the effects of night shift, two-tier shift, and rotational shift schedules, there was a gap in the literature regarding three-tier shift schedules. With RQ1, I addressed the perceptions of three-tier shift workers on the health and the safety effects of working a three-tier shift schedule. With RQ2, I addressed how working a three-tier shift schedule affects these workers' functioning within the community and their personal relationships, mental health, physical health status, and safety.

This chapter will be organized according to the study protocol: I will begin with a brief summary of the research design and rationale, and then continue with the setting, the sample, and the data collection methods. The results of the study will follow, including the demographics of the participants and the data collection. Lastly, I will summarize the research results.

Research Design and Rationale

This was a qualitative phenomenological study, the first of its kind with regard to three-tier shift schedules. I conducted in-depth interviews in order to better understand the perceptions of three-tier shift workers of the effects of working a three-tier shift schedule. Interview questions were developed based on the literature review and the MCAS. The MCAS was developed in 1983 to evaluate community functioning and found to be reliable in a study by Hendryx et al. (2001). The MCAS consists of 17 questions

divided into four sections: interference with functioning, adjustment to living, social competence, and behavioral problems (CITE). I also included three additional questions at the end of the interview in order to assess for SWD (Flo et al., 2012). SWD is a diagnosable disorder which might affect employees who work outside of daylight hours or on rotational shift schedules (Schwartz, 2010).

Setting

The settings of the study were varied by the preference of the participants. In order to facilitate the comfort of the participants, I conducted three of the interviews in coffee shops, one of the interviews at a park, and another at a participant's home. There were no changes in personnel as I conducted all of the interviews. No personal or organizational influence on the participant was observed during the interviews.

Sample

I recruited participants with prior knowledge from my former employment with the organization that mandated three-tier shift schedules. I contacted 10 former colleagues per the methods described in Chapter 3 and requested their participation. Three former colleagues did not respond, one former colleague expressed interest but had moved to another state, one former colleague had not worked a three-tier shift schedule for 3 months consecutively and therefore met exclusion criteria, and five former colleagues agreed to participate.

Demographics

I interviewed five participants for this study. The participant pool consisted of four females and one male. The participants' ages ranged from 29 to 63 years old. All

five participants had worked a three-tier shift schedule for at least 3 consecutive months. All of the participants reported that they no longer worked a three-tier shift schedule and had not done so for approximately two years.

Table 1

Participant Demographic Data

Characteristic	Female (n = 4)	Male (n = 1)
Age		
29	1	
30	1	
33	1	
37		1
63	1	
Children at home		
Yes	3	
No	1	1
Waking preference		
Morning	3	
Mid-morning		1
Afternoon-evening	1	
Duration of three-tier shift		
3 months	1	
2 years	1	1
5+ years	2	

Participant 1 (P1) was a 29-year-old married, Caucasian female who no longer worked a three-tier shift schedule. She had two children, ages 4 years old and 2 and a half years old. Her highest level of education was a Master's degree, her income was $50,000, and her waking preference was described as a morning person. The three-tier shift schedule that she worked varied, but usually consisted of a morning meeting on Tuesday, either 9 a.m. to 12 p.m. or 9 a.m. to 11:30 a.m., a day shift, an evening shift, and two night shifts each week. The meeting sometimes fell within her schedule and sometimes

did not. Example day shifts were from 8 a.m. to 4 p.m., evening shifts were from 3 p.m. to 12 a.m., and night shifts were from either, 11:30 p.m. to 8:30 a.m. the next day or 8:30 p.m. to 8:30 a.m. the next day. She worked a rotating three-tier shift schedule for over 5 years.

Participant 2 (P2) was a 30-year-old single, Caucasian female who no longer worked a three-tier shift schedule. She had no children. Her highest level of education was a Master's degree, she was not currently working, and her waking preference was described as a morning person. The three-tier shift schedule that she worked consisted of a meeting on Monday from 12 p.m. to 2:30 p.m., the day shift on Tuesday from 8 a.m. to 5:30 p.m., the evening shift on Wednesday from 1:30 p.m. to 11:30 p.m., the night shift on Thursday from 11:30 p.m. to Friday 8:30 a.m., and the night shift on Friday from 11:30 p.m. to Saturday 8:30 a.m.. She worked a fixed three-tier shift schedule for 3 months.

Participant 3 (P3) was a 33-year-old single, Caucasian female who no longer worked a three-tier shift schedule. She had one child, age 4 years old. Her highest level of education was a Master's degree, her income was $54,000, and her waking preference was described as an afternoon or evening person. The three-tier shift schedule that she worked consisted of a meeting on Monday from 12 p.m. to 2:30 p.m., the day shift on Tuesday from 8 a.m. to 5:30 p.m., the evening shift on Wednesday from 1:30 p.m. to 11:30 p.m., the night shift on Thursday from 11:30 p.m. to Friday 8:30 a.m., and the night shift on Friday from 11:30 p.m. to Saturday 8:30 a.m.. She worked a fixed three-tier shift schedule for about two years.

Participant 4 (P4) was a 37-year-old single, Caucasian male who no longer worked a three-tier shift schedule. He had no children. His highest level of education was a BA in Psychology, his income was $36,000, and his waking preference was described as a midmorning person. The three-tier shift schedule that he worked varied, but usually consisted of an afternoon meeting on Wednesday from 1 p.m. to 4 p.m., a day shift, an evening shift, and two night shifts each week. The meeting sometimes fell within his schedule and sometimes did not. Example day shifts were from 6:30 a.m. to 2:30 p.m. or 6:30 a.m. to 4:30 p.m., evening shifts were 1 p.m. to 12 a.m., and night shifts were either 12 a.m. to 5 a.m. or 12 a.m. to 7 a.m. He worked a rotating three-tier shift schedule for about two years.

Participant 5 (P5) was a 63-year-old married, African American female who no longer worked a three-tier shift schedule. She had one child, age 44 years old. This participant preferred not to divulge her educational background or income. Her waking preference was described as a morning person. The three-tier shift schedule that she worked varied, but usually consisted of a morning meeting on Tuesday either 9 a.m. to 12 p.m. or 9 a.m. to 11:30 a.m., a day shift, an evening shift, and two night shifts each week. The meeting sometimes fell within her schedule and sometimes did not. Example day shifts were from 8 a.m. to 4 p.m., evening shifts were from 2 p.m. to 12 a.m., and night shifts were from either 11:30 p.m. to 8:30 a.m. the next day or 8:30 p.m. to 8:30 a.m. the next day. She worked a rotating three-tier shift schedule for over five years.

Data Collection

I interviewed each of the five participants face-to-face using the interview questions in Appendix B. Consent forms were reviewed and completed by the participants at the beginning of each face-to-face interview. Interviews were recorded using a dedicated recording device, filed, and saved in a secure password protected database on my private computer. I transcribed each interview and stored the results in a locked filing cabinet in my home office. All identifying information was removed from the transcripts prior to verification procedures.

I interviewed three participants in California, either at Starbucks locations, a park, or their home. Interviews lasted between 30 minutes and 60 minutes. The data were recorded using a dedicated recording device as well as by notes I took on paper during the interviews. There was no variation in the data collection from the plan previously presented in Chapter 3. Unusual circumstances encountered during the data collection included car alarms going off in the background, loud music in the background, and people occasionally interrupting the interview. The dedicated recording device I used during the interviews had noise reduction capabilities, and the recording device was paused during interruptions.

Data Analysis

The process which I used to move inductively from coded units to larger representations was to place similar questions and responses from the interviews (see Appendix B) into categories. I then analyzed the specific categories that emerged from the data by RQs and topic. In order to better visualize the data, I created a table using different colors representing each participant to code the participants' responses. The

main research question and subquestions were used as a starting guideline, and participants' responses were sorted under each RQ. Participants' entire responses were included in the initial table. I then redacted the participants' responses to color blocks and created a more succinct color-coded table. This enabled easy reference to the initial table's pertinent information, such as quotes from the participants for the results section. I then reduced the colors to numbers in order to create Table 2.

Table 2

Participant Response Table

Question	Participants affected (n = 5)	Participants not affected (n = 5)
Community functioning		
6. Ability to manage money	2	3
7. Independent ADLs	4	1
8. Schedule acceptance	5	0
14. Medication compliance	2	3
15. Time management	4	1
16. Alcohol/drug use	1	4
17. Impulse control	2	3
18. SWD symptoms	5	0
35. Treatments	5	0
Personal relationships		
9. Social acceptability	5	0
10. Social interest	4	1
11. Social effectiveness	3	2
12. Social network	2	3
13. Meaningful activity	5	0
28. Emotional problems socially	4	1
29. Life reflections	3	2
30. Self-care and being healthy	3	2
31. Occupational support	4	1
32. Shift- and part-time work	4	1
33. Family and social network	3	2
34. Comforting home	4	1
Mental health		
2. Intellectual functioning	4	1
3. Thought Process	5	0
4. Mood abnormality	4	1
5. Stress/anxiety response	3	2
23. Moods	4	1
24. Anxiety	2	3
25. Depression	4	1
Physical health		
1. Physical health	5	0
19. General health	5	0
20. Diet	5	0
21. Fitness	5	0

(table continues)

Question	Participants affected (n = 5)	Participants not affected (n = 5)
22. Energy	4	1
Performance and safety		
26. Performance	5	0
27. Safety	4	1
Shift work disorder		
36. Sleep difficulties	5	0
37. Related to schedule	5	0
38. At least a month long	5	0

There are four parts in the first section of community functioning: adjustment to living, behavioral problems, sleep, and treatments. The section on adjustment to living pertains to how the participant functions in his/her daily life and how he/she has adapted to the three-tier shift schedule (see Questions 6–8 below). The section on behavioral problems pertains to those behaviors that make it more difficult for the participant to integrate successfully in the community or comply with his/her prescribed treatment (see Questions 14–17 below). The section on sleep explores the participants' perceptions of sleep before and after working a three-tier shift schedule (see Question 18 below). The section on treatments explores the actions taken by participants to assist in alleviating symptoms of working a three-tier shift (see question 35 below).

There are two parts in the second section of personal relationships: social competence and social impacts. The section on social competence pertains to the capacity of the client to engage in appropriate interpersonal relations and culturally meaningful activity (see Questions 9–13 below). The section on social impacts explores the participants' perceptions of social impacts before and after working a three-tier shift schedule (see Questions 28–34 below).

There are two parts in the third section of mental health: interference with functioning and mental health. The section on interference with functioning pertains to those physical and psychiatric symptoms that make life more difficult for the participant (see Questions 2–5 below). The section on mental health explores the participants' perceptions of mental health before and after working a three-tier shift schedule (see Questions 23–25 below).

There are two parts to the fourth section of physical health: interference with functioning and physical health. The section on interference with functioning pertains to those physical and psychiatric symptoms that make life more difficult for the participant (see Question 1 below). The section on physical health explores the participants' perceptions of physical health before and after working a three-tier shift schedule (see Questions 19–22 below).

There is one part to the fifth section of performance and safety. This section revolves around performance and safety concerns. The section on performance and safety concerns explores the participants' perceptions of safety before and after working a three-tier shift schedule (see Questions 26–27 below).

There is one part to the sixth and final section of Table 2: shift work disorder. This section was optional, but all participants decided to respond. The section on shift work disorder includes the three questions verbatim from the literature review which were designed to specifically assess and diagnose SWD. A positive response to all three questions correlates to a diagnosis of SWD.

By looking at the shaded table, an overview of the themes was readily visible. Themes emerged when all participants responded similarly in a specific area. The discrepant case emerged when all participants except one responded similarly in the majority of areas. In the area of community functioning, all of the participants reported difficulties with schedule acceptance and SWD symptoms; they also used some form of treatment. All participants reported that social acceptability and meaningful activities were impacted in the area of personal relationships. In the area of mental health, all participants reported an impact on thought process. All participants reported an impact in all subcategories of physical health except one participant, who denied any impact on energy level, but who admitted an impact on all other subcategories of physical health. With regard to performance and safety, all participants reported that their performance was impacted, and all but one participant expressed concerns with driving home after a night shift. Had the participants been evaluated for a diagnosis of SWD based on the research by Flo et al. (2012), all participants would have been diagnosed with SWD.

Results

Interviews

Responses to all of the interview questions were incorporated to answer RQ1: What are the perceptions of three-tier shift workers on the health and the safety effects of working a three-tier shift schedule? Perceptions of three-tier shift workers on the health and the safety effects of working a three-tier shift schedule were overwhelmingly negative. All participants had difficulty accepting the schedule, had symptoms of SWD, and attempted to alleviate these symptoms with treatments. One participant did her

utmost with regards to treatments, health aids, and positivity to avoid further difficulties, but the three-tier shift schedule still impacted her sleep and time management.

Themes

Specific themes that emerged from the data were derived from similarities and overlaps in the participants' responses. Participants' responses provided the support for the themes developed from the interviews. The discrepant case involved the participant whose responses were, for the most part, singularly different than all of the other participants' responses. This included contrary responses within the themes of effect on personal relationships, physical health, and safety.

RQ1: What are the perceptions of three-tier shift workers on the health and safety effects of working a three-tier shift schedule?

The overall perception of the three-tier shift schedule workers was exemplified by the repeating theme of how the three-tier shift schedule negatively impacted the participants' health and safety. During data collection, I noticed a theme of decreased general functioning among the participants. All participants perceived the three-tier shift schedule as interfering with their functioning in all five areas. Participants complained about the three-tier shift schedule's impact on participants' ability to function, personal lives, mental health, physical health, and performance.

Theme 1: Perceptions of three-tier shift workers on the health and safety effects of working a three-tier shift schedule are overwhelmingly negative. It appeared that some of the participants were unprepared for how working a three-tier shift schedule would affect their functioning within the community. Examples of participants'

responses with regard to the effect of working a three-tier shift schedule on workers' functioning within the community were "this is *hard*" (P1), "the body couldn't handle it" (P2), "I will never do it again" (P3), "not my preferred shift schedule at all" (P4), and "I had trouble with my sleep" (P5).

There were numerous additional comments from the participants regarding how they felt about the three-tier shift schedule. For example, It seemed like shift work and part time work weren't as challenging as a three-tier schedule. It affected sleep patterns. It was well a little more tougher to string together thoughts. I was sick with stomach problems, and the immune system wasn't functioning as good. At the end of three months I wound up incredibly sick. I had to call out sick for like three weeks. Mistakes definitely went up. (P2).

Participants reported that the three-tier shift affected participants' mental and physical well-being. It's rough. I actually was in an accident (P4). I would have a hard time giving a coherent report after I'd been up all night. I didn't like it.. I didn't care for working a three-tier shift when I started working. I didn't like that idea of work. No, I didn't like the idea of having a three-tier shift. I didn't think it was a good idea of having a three-tier shift. I just knew the effect that it'd have on most people would be negative, and it does (P5).

RQ2: How does working a three-tier shift schedule affect these workers' functioning within the community, personal relationships, mental health, physical health status, and safety?

Workers reported that every area of functioning was affected at least in part by working a three-tier shift schedule. With regard to community functioning, workers reported decreases in social interactions and decreases in the ability to participate in meaningful activities. With regard to mental health, workers reported that working a three-tier shift schedule drastically inhibited their thought process. With regard to physical health, workers reported numerous impacts, for example diet and fitness. With regard to performance and safety, all of the workers commented that performance was impacted by working a three-tier shift schedule.

Three-tier shift workers had difficulty adjusting to the three-tier shift schedule; workers found their bodies had difficulty adapting to the chronodisruption. Three-tier shift workers noticed that the three-tier shift schedule had a negative impact on their personal lives, whether it was obvious mood alterations or forced decrease of socialization. Three tier shift workers reported negative impacts on mental health, including decreased ability to process thoughts, and negative impacts on physical health, including sickness and decreased self-care, for example inability to go to the gym. Three-tier shift workers also experienced negative impacts on work performance and safety, for example increased mistakes at work and decreased ability to concentrate while driving home. Most three-tier shift workers reported that the negative impacts from the three-tier shift schedule seemed to dissipate after ceasing to work a three-tier shift schedule. One participant continued to have challenges with eczema.

Theme 2: Three-tier shift schedule workers have difficulty adjusting to the three-tier shift schedule. In Table 2, all participants reported an impact in schedule

acceptance, SWD symptoms, and treatments. Participants' expectations of a three-tier shift schedule prior to working a three-tier shift schedule and after having worked a three-tier shift schedule sometimes grossly differed. Some participants, however, had an idea of how they would feel about working a three-tier shift schedule. "I knew I would dislike it. So, I didn't do it." "I always wondered how people did it, and I avoided it before I got the job." "Three months into it, you're like okay, this is, this is *hard*." (P1).

> First week I worked it I was like, oh this is not so bad, but I was also excited, looking back on it, and super motivated to start working and to be full time and to have my name on the board. You know, three months into it, you're like okay, this is, this is ***hard***. I think, when you're a student, and you're going to school, and you're doing an internship, and you're doing all that homework that's required, you're really busy like 60-70 hours a week. So, I think at first only working 40 hours a week seemed like not a big deal, but then after the first three months where you get used to that being your life and you get used to staying up on the overnight shift again and again and again, it really does start to weigh on you. You kinda just think to yourself, like, I really wonder how much longer I can do this (P1).

"I thought it'd be easier working a three-tiered shift and then, but it slowly changed after a few months as the body couldn't handle it." "It seemed like shift work and part time work weren't as challenging as a three-tier schedule. Hours were less so it was easier to recover from like a part time schedule" (P2).

> I mean, the idea of doing overnights didn't exactly excite me at all. I didn't really think about the three-tier shift, I don't think I really knew. Like I wasn't really, it's kind of like when you have a baby, people tell you you're not gonna get any sleep, […] and you just don't know until it actually happens. You really don't have a frame of reference. Like, you can hear it as many times, but you just don't know until you do it. I will never [work a three-tier shift] again (P3).
>
> I had never worked that kind of shift before. Working, my previous job I had worked some overnights, but they were rare, usually something like stocking or inventory or whatever. So, it was something new, and so I was apprehensive about it (P4).

"Not a fan. Not my preferred shift schedule at all. It's rough." "It's definitely something that I'm still not necessarily much of a fan of, it's not something I prefer doing" (P4).

> I didn't care for working a three-tier shift when I started working. I didn't like that idea of work. No, I didn't like the idea of having a three-tier shift. I didn't think it was a good idea of having a three-tier shift. I just knew the effect that it'd have on most people would be negative, and it does. I know [coworker H.] was having some serious issues with just her two-tier schedule. Remember she was only working 20 hours (P5).

Many of the participants reported challenges with adjusting to the three-tier shift schedule. "Definitely required some adapting, especially with the NOCs. I had to

reschedule meals, remember to shower some days: I was like oh yeah, I woke up in the middle of the day. I should probably shower now" (P4).

> Definitely on the days afterwards, a little slower to react. I kind of adapted a little to it over the years, but definitely when I first started it was, it was rough: much slower reaction time, had to think about things a little bit longer (P4).

"Not as easy to string ideas together," and "definitely, like for the hard days, concentrating was difficult, so like reading was decreased." "I definitely had to reschedule my sleep patterns, like I said earlier" (P4).

> It made it difficult to pursue certain like long term goals, just because of the way the schedule was arranged. I didn't want to necessarily, it was one of the two major factors I considered when, thinking about going back to school, the other one being having stable housing was a problem for me until of late. But yeah, just the idea of trying to do school while also having three different shifts to balance is not something that I really wanted to pursue. […] I definitely would occasionally let more chores slide more often, especially on the extra fatigued days. So, the house would get a little messier than I'd like. It got easier as the time went on. Especially with one NOC now, it's a little bit easier, but it's definitely something that required adapting to (P4).

The biggest impact the three-tier shift schedule seemed to have was on the sleep regulation of the participants. Flo et al. (2012) suggested using three questions regarding sleep difficulties, duration of sleep difficulties, and sleep difficulties with relation to work schedule, which answered positively, would diagnose SWD. Had this method been used

to diagnosis SWD, all participants would have been diagnosed with SWD. “It definitely impacted my sleep” (P1). “I would just end up going without sleep” (P1). “It made it difficult for me to go to sleep at a regular time” (P5).

> It made [sleep] impossible a lot of days. I found it very difficult because you know obviously, the day you’re working eight to four is totally normal. Your three to midnight, well I was up later than I normally would have been. The thing about sleep working three to midnight is that, well I sort of anticipated before I started working it. Like okay, so the three to midnight I thought to myself, well that’s okay. I’ll be up a little later than normal, but I mean I’ll still get home by 12:30. I’ll fall asleep. That’s really only two hours later. Well when I got home, who feels like going to sleep the second they get home. So, I ended up getting a snack, and then I ended up reading. And then I’d be wide awake. Some days I wouldn’t fall asleep until like one or two o’clock in the morning. Now for me, that’s four hours later than normal, three hours later than normal. So, it definitely impacted my sleep. And then when you’re getting ready for your overnights that starts at 11:30. I’m not a napper, so trying to force myself to go to bed at seven when it was light out, which is so impossible. It just felt so difficult and like, which means I would just end up going without sleep. So, instead of napping, I just would often just not sleep cause I wasn’t a good napper. So, I would say, you know, less sleep, definitely. I just functioned with much less sleep (P1).

“Before, it was a pretty normal sleep schedule, somewhere between six to eight hours of sleep at night.” “[Sleep] definitely went down a lot. It, some nights I didn’t sleep

at all, others I didn't sleep well. Three or four hours of sleep, broken sleep, too. I would wake up constantly." "[The three-tier shift schedule] affected sleep patterns." "It pretty much went down to, I don't know, sporadic sleeping patterns, three or four hours a night. It was all over the place." "[Energy] went down significantly. I was always tired, couldn't, I wanted to always take lots of naps" (P2).

> [Sleep was] super inconsistent, some nights I would get like, I mean, it was most consistent on the nights where I would work overnights, I would get like, because my sleep would be all broken up, and I'd get like, you know, four hours of sleep here, two hours of sleep there. On the nights, I wasn't working, I think it was just harder for me to fall asleep. I just got wired. I think I generally slept through the night, though, but I don't remember. Like I don't remember if I like woke up more frequently or if it was easy to wake up. I don't remember (P3).

"Definitely more fatigued," "much slower reaction time," "was definitely less tolerant to socialization," and had difficulties driving (P4).

> I'd have trouble sleeping before the shifts, so afterwards I was especially tired, and then it's hard for me to sleep all day, so just that. Especially when I'm working two of them, overnights, it's, some people preferred that, but I don't. It's harder, yeah. Cause it throws my whole physiological being off. So just dragging, just feeling blah, if that's a word – very clear, descriptive, but yeah, feeling like I wanted to just be lazy all day (P4).
>
> [I] definitely don't get as much sleep on my overnights, on my overnight days. Like I said, I have trouble falling asleep beforehand, so I usually just go through

> the night and then sleep afterwards. Usually average about six hours after an overnight. Just depending on how fatigued I am, sometimes I'll sleep later. I don't really like it, because then my whole day's gone, but it's rough. And then the midnight ending shifts mean that I go to sleep later than I usually do. It's more like six or seven hours [as opposed to seven or eight hours]. Yeah, but sometimes I'll sleep until like ten if I'm really tired, which that gives me less time to get things done, so. But, well, and with the days I sleep in 'til ten, I usually wake up, actually what usually happens is I'll wake up around eight and then have to go back to sleep, because I'm still tired. Yeah, like my body's like, okay it's time to get up, and I'm like no, not yet (P4).

"The only thing I would say that the three-tier shift did for my physical health was the fact is, it made it difficult for me to go to sleep at a regular time." "I had trouble with my sleep. Now, that I did struggle with." "I had to sleep more. I had to rest more." "Sometimes I had difficulty sleeping, not, I could always go to sleep. I couldn't sleep as long as I could normally sleep" (P5).

The three-tier shift schedule impacted having a regular routine.

> You'd get off work at a normal job. You'd come home and you'd like make dinner. You know what I mean, like do all that stuff. But it's like you get home from an overnight, you come home and you go to sleep. You know, like, with a three-tier shift. If you didn't have a three-tier shift you probably wouldn't come home and go to sleep, you'd come home and like, you know, you'd have your routine kind of thing. You probably would like, make yourself some food or do

> some stuff and hang out for a while. Go hang out with friends, you know what I mean. It'd be more routinized, but since it wasn't then it was like, you know (P3).
>
> I would say after a while I was working it, I was just kind of, just trying to get by, you know. Just like those people who like, like my friend I was telling you about who came over last night with his kid. Like he just seems exhausted all the time, it just seems like he's trying to get by, you know. Like just seemed like, you know, [zombified]. Just trying to make it through the day and get to the next day and do this shit again (P3).

Participants reported that exercise helped to decrease symptoms of SWD.

"I definitely try to stay or keep at least once or twice a week exercise. Of course, it's a little bit harder with the weird schedules, but I tried to get a little bit in there." "[Exercise] definitely [helped]" (P4).

> Work out. That's the stair stepper and the weights. That's the main thing to keep me going. I'd get up on my little stair stepper and I'd do most, well I'd do a lot of the cleaning, not all of it, but I'd clean quite a bit. That's all, keep active (P5).

Some participants tried over-the-counter medications. "I had to start taking melatonin to help me get to sleep" (P5). "Melatonin definitely helped" (P4).

> I think that I had tried [Melatonin], but it didn't really work, but now I use it and it totally works. So maybe it like, that has to do with it. I mean like maybe it's not gonna work if your body is so screwed up. Because you know, melatonin is what, supposed to promote like, you know what I mean, like regular routinized sleep, too. You know and like sleeping at nighttime. I did try it, and I don't think it

> worked very well. It was like, nah, I don't feel it, so I stopped taking it. But now it works for me (P3).

Not everyone used over-the-counter treatments in an attempt to reduce symptoms of SWD, but everyone seemed to attempt to improve their sleep hygiene in order to improve the quality or amount of sleep obtained. "Definitely close up all the windows and all the blinds and everything [to make the room dark to sleep during the day]" (P4). "Well, the thing I had to do is make sure the room was dark, as dark as possible" (P5). "That was what I needed to do to sleep during the day. It helped me facilitate sleep by making the room as dark as possible and wearing an eye-mask. And that gave the perception of being night" (P5). Another participant primarily focused on sleep hygiene, as she did not even drink caffeine.

> I mean I definitely did the nights that I got to sleep my regular 8 hours I really highly valued it. […] But those nights that I could get those eight hours of sleep I'd prioritize those, and I got those eight hours of sleep. So definitely being as thoughtful about my sleep hygiene as I could be, and that became more important because my sleep was harder to come by. […] I mean I think that if I hadn't got at least a few nights of working, of sleeping eight hours I think I probably wouldn't have been able to do it. I know that some people don't depend on sleep as much sleep as I do, but since my body is like that, I just actually needed those hours (P1).

The one participant who did take prescription medication found that an increase in the dosage was necessary while working the three-tier shift schedule:

> [I had a] consistent lower mood in general. That's why I started taking the meds. Just a kind of blandness, I guess. Well I did increase my med dosage after a while [of working the three-tier shift schedule]. [It] went from 20 to 30, and it did help. Yeah. I don't know if it was directly related, but it happened at a time when I was doing the three-tier shift, so it's probably related (P5).

Theme 3: Three-tier shift schedule workers' personal lives are impacted by working a three-tier shift schedule. In Table 2, all participants reported an impact in social acceptability and meaningful activities. All of the participants reported a decrease in social activities. Examples of participants' responses with regard to the effect of working a three-tier shift schedule on workers' personal relationships were "I didn't feel like being as social" (P1), "a little more snappy towards family" (P2) "my motivational level went down while I was working a three-tier" (P3), and "I was definitely less tolerant to socialization" (P4). Only P5 had no differences in personal relationships and stated: "My husband was very positive, and he always supported whatever I did." These apparent difficulties with socialization were also influenced by the effect of time restraints inherent to a three-tier shift schedule, which appeared to contribute to isolation.

> It's not just the 40 hours a week that you're working, it's the hours that you're preparing for it. Like the three hours before the overnight that you're trying to sleep or the hours afterwards that you're recovering, so, to try to get some sleep. So, you really are busy for more than 40 hours a week if you look at it that way. That was a little hard, like, because I did miss out on things, because I was too

> tired. I didn't feel like being as social at the end of my shift, at the end of my week, because I was exhausted (P1).
>
> It just cuts down on the amount of time you can spend with people. You know, I definitely remember missing like 4th of July fireworks with people, because even if I didn't have to work that shift, then I had to go to sleep early for the NOC for the overnight shift. So, you do miss out more on things (P1).

"The only thing the three-tier did is it made it difficult for me to go to some functions at times. […] But that was an effect on me, having not to go to certain functions that I wanted to attend" (P5).

The three-tier shift schedule affected social interactions and social awareness.

> Probably a little less friendly. When you're going to the grocery store after a tier shift you're a little tired, so you're probably not gonna be as smiley without realizing it or even as like talkative like in line at a grocery store cause you're tired. You're just trying to get through your day and you're trying to just get home (P1).

The three-tier shift impacted meaningful activities.

"I was pretty much out every evening. I hung out with friends. I would always go fencing, gym, and do that." "… quit doing all of that. Just didn't, I never felt up to going out as much, too tired." "[Depression] definitely went up a little bit: lack of interest in stuff. I didn't feel like engaging with people as much." "I was a little more short with people. I didn't want to carry on a conversation" (P2).

> I mean the only difference I can really think of is just maybe like my effort, you know. Especially after working, while working the three-tier shift or whatever. Like I probably didn't put as much effort into like engaging, you know what I mean, like, the extra effort to it. Like 'how's your day going?' (P3).
>
> It just made it a little harder to be casually social with people. I would turn down social outings because I was like, man I just can't do it today. Especially at work, it's not, not the best, because we're working with people. Yeah, it's hard to be sympathetic for people when you're struggling with your own stuff (P4).
>
> I get super not social. Um, I just don't wanna, even emails sometimes were too much, because I just couldn't think especially coherently some days. I would super withdraw. Day to day stuff was a bit…; I could manage it if I had to. I was definitely less tolerant to socialization. Some days were of course better than others (P4).

"Definitely on the hard days, it was uh difficult to get out. I didn't necessarily want to drive anywhere. Hard days would be the days where I felt especially fatigued, antisocial, or not as social, especially days after NOCs."

The odd hours were also a challenge.

"Occasionally difficulty to get in touch with people, just because of the weird hours sometimes. So [I] definitely had to make adjustments there" (P4).

> I have more than once texted my cousin at three o'clock in the morning without thinking about it, which no one appreciates. So, you can't be as social as you'd

like to be, because you're up and awake when other people aren't awake. So, you can't really reach out you would normally, or the way you'd want to (P1).

I think that sleep deprivation never helps somebody be less sensitive. But I think that, you know, just being a little sensitive, I do remember a few times where I'd go over to my cousin's to pick something up after an overnight, and I would be really, really tired, and she was trying to tell me something, and she was used to me being the person she could talk to about anything, and being like so spaced out that I could tell that I wasn't giving her the amount of attention that I normally did, and her being like you're so tired (P1).

I don't know if it was this way all the time, but I definitely remember a specific time where I had a friend over for dinner, and I think it was pretty evident that I was like kind of zombified. And I wasn't super aware of it in the moment until after the fact. Cause she was like, and she kept saying like, we don't have to, you know what I mean like, I could leave, or like, you know what I mean. Like she could tell how tired that I was, I think, and how just like, just not with it. You know, I was just kind of like, I think that goes along with the whole thought process thing you were saying, too. That I was, like, not with it. I don't think that it was like that in every social interaction, but it was definitely more like that than I was aware of. You know, just kind of like dumbed me down, and like zombified me a little. I was just not as alert and sharp. I was just getting by, just skating by (P3).

> You know, like I don't think we ended up hanging out after that, really. I mean, we had talked about it, but it never did happen. So maybe, I don't know if it had something to do with that or […]. Yeah, because we didn't really, but then maybe it could have been my fault, because I'm not the best about keeping in touch with people either. So, that could be partially my fault (P3).
>
> I think it made it a little bit harder for me to reach out. I definitely, after a while, made it clear that it was, or tried to make it clear that it was just that my work made me tired. So, people didn't get offended that I kept turning them down (P4).
>
> It was getting to the point where I was only seeing [my spouse] like one or two days a week, maybe two days a week, which definitely makes it difficult. I think the reason why it took me so long to get pregnant with my daughter, it took me almost a year to get pregnant with her, is because you have to see your husband if you want to have a baby (P1).

Theme 4: Three-tier shift schedule workers' mental health is impacted by working a three-tier shift schedule. In Table 2, all participants reported an impact in thought process and all but one reported an impact on intellectual functioning, and mood abnormality (moods and depression). Examples of participants' responses to the effect of working a three-tier shift schedule on workers' thought processes were "I would start to do something on my shifts and then forget what I was doing" (P1), "I remember leaving keys in the refrigerator" (P2), "more forgetfulness" (P3), and "not as easy to string ideas together" (P4), and "after an overnight shift I would have a hard time giving a coherent report after I'd been up all night" (P5).

Participants' mental health was affected in various ways, including moderation of emotions and variance in anxiety and depression. Examples of participants' responses to the effect of working a three-tier shift schedule on workers' emotions were "lack of interest in stuff" (P2), "a little more snappy towards family" (P2), and "I felt more stressed" (P3).

> I think I'm used to functioning under a lot of stress, like with school and stuff, so again, I think it just all goes back to being super tired. Like, three-tier schedule made me super tired, which meant that when I would get stressed out about something, I don't think I functioned as well (P1).

"I definitely was less cautious about my spending, especially at the end of a three-tiered work week" (P1). "I've definitely done more than one shopping spree on the overnights" (P1).

> Probably like interacting with my kid, I guess. You know, like getting more frustrated with him, more easily frustrated, like having a lower tolerance to like be patient, I feel like, I mean it would affect functioning in the sense that I would feel like more tired and I didn't want to do as much, maybe (P3).
>
> I always dreaded the start of my three-tier shift, and it did make me very emotional, especially when I was pregnant. I would cry, like every night before my overnights. Because I was just dreading, […] the anticipation of how tired I was going to be. I would get so nauseous, even pregnancy or not, I would get super nauseous, like 5 o'clock in the morning, I would get so nauseous in the morning whenever I worked my overnights, and I would just get, I would get so

> emotional before those overnights that I would dread that feeling. Cause I hate being nauseous more than anything. I would just dread the anticipation of that. You know, you just feeling that jittery nauseous feeling. And it made me tearful (P1).
>
> Whereas before [working a three-tier shift] I could function just probably the same, or at least I felt like the same, when I was stressed, after a three-tier schedule or in the middle of a three-tier schedule, being so tired, it, I didn't have the tolerance for the stress. So, like, again, I'd probably be more tearful, um, feeling physically drained by the stress, feeling extra anxious (P1).

"My feelings were more raw during the three-tier," and "it's just a matter of your ability to tolerate long periods of feeling stressed starts to wear at the end of the three-tier" (P1).

"[My] head was a little foggy," "after [her intellectual functioning] got a little worse. I like started forgetting stuff, misplacing keys, and stuff like that; basic stuff" "After it was, well, a little more tougher to string together thoughts." "Definitely more depressed while I was working it after a while, some anxiety. I just didn't feel like doing anything" (P2).

"I feel like maybe I was maybe a little more emotional probably from lack of sleep too, just not getting very good sleep, kind of like high stress, like higher cortisone levels or something." "I mean, like I said there was probably more forgetfulness, like maybe I would forget things like midsentence. Like oh, I forgot what I was talking

about." "It was probably definitely more irritable, because I was under a lot of stress" (P4).

> When I'm stressed out, it's like much lower [frustration tolerance], and more frequent. I don't know if I was like as happy presenting as I usually do. I'm wondering if my affect was more blunted, sort of, you know, like, I'm more, a more minimal expressive affect (P4).
>
> I had definitely more stress and anxiety. I definitely remember, like I was saying, like the heart palpitations or like racing, like, heartbeat, and just like difficulties breathing. I remember like being like, I couldn't breathe very well or something. And I think that was because I was under a lot of stress. I remember feeling that way especially in class. Like I felt more stressed and like anxious in class while I was on the [three-tier shift] schedule. And I don't really remember experiencing that before (P4).
>
> When I get anxious or when I'm thinking or whatever I do pick at myself. I mean I do that as well as forget things, [...] but I feel like it must be more mild, because I'm not as aware of it. [While working the three-tier shift schedule] I just think that it made the things I already do worse. You know what I mean, like more picking, probably, more severe, sort of, like bleeding when I would pick at myself kind of thing (P4).
>
> I think [my health] was okay, but I definitely had some concerns. Like I was worried about my heart, kind of, I think. Like I had a lot of heart palpitations, sort of. Like, you know, but I was pretty sure that it was like stress (P4).

The discrepant case involved the participant who, though congruent with the overall result of sleeping difficulty, was able to overcome the majority of challenging symptoms through diet, exercise, and positivity. The only issue this participant had besides difficulties with sleep, as everyone had, was time management, as there were only 24 hours in the day, and this participant needed more rest.

> I wouldn't give a three-tier shift or any other kind of shift that hold on me, because as you can see, I'm all, I'm totally, I have a whole range of stuff I do to make sure I'm healthy. […] I decided not to allow my job to take over my life to the point where I couldn't have a good life. And that's a choice I made, because I made a choice not to be unhealthy. And not being unhealthy gives you more benefits. I made a choice to watch my weight, not to get too overweight. So, I made, it was a choice. I made a choice not to allow the three-tier shift to affect my overall health (P5).

Theme 5: Three-tier shift schedule workers' physical health status is impacted by working a three-tier shift schedule. In Table 2, all participants reported an impact physical health, general health, diet, and fitness. Examples of participants' responses to the effect of working a three-tier shift schedule on workers' physical health were "exhausted" (P1), "physically bone tired, more tired than you can ever imagine, you could be" (P1), "headaches" (P3, P4),"weight gain" (P1), "stomach problems," (P2) "the immune system wasn't functioning as good" (P2), "heart palpitations" (P3), "difficulties breathing" (P3) "eczema" (P3), and "fatigue" (P4).

One participant "wound up sick more often than usual, colds and stuff" and "at the end of three months I wound up incredibly sick. I had to call out sick for like three weeks" (P2). "[The three-tier shift schedule] definitely impacted [my general health]. I was sick with stomach problems, and the immune system wasn't functioning as good" (P2).

> After working it for a little while, like I started to get like, I found out later it was eczema, but I didn't know what it was. And it was like on my feet, where it started specifically, and you know I went to the doctor and they thought it was different things. Then I finally found out, you know, like I was looking stuff up on online, and I was like, oh maybe it's eczema and then I just treated it with hydrocortisone cream or whatever and then it went away. But, you know, I didn't start getting that, and you know it's apparently stress-related, so I'm pretty sure it had to do with that because I'd never had it before that I was aware of. It was just never an issue. And now I still get it. I get it on my hands now, but it does seem to be around stressful situations, but that is when, like, my body kind of freaked out, I feel like. I kinda feel like I experienced hair loss, but I don't know if that was completely because of [the three-tier shift schedule] or hormonal, from after being pregnant. I'm trying to think of other things, oh, headaches. I probably did get more headaches. […] I don't really get any headaches now either, like, I'm not prone to getting those. I just felt crappy all the time. Like, I didn't feel well. I felt like, it felt like my body was all stressed or something (P3).

One participant reported “headaches, for sure,” and responded that he was “not especially” prone to headaches before beginning the three-tier shift (P4). “I think it had to do with the fatigue and lack of sleep stuff” (P4). “I had a mild history of indigestion. I definitely feel more of that when I had to stay up overnight” (P4). Another participant also had gastrointestinal and otorhinolaryngological issues: “I may have had more constipation for sure. I got sick a lot more. But I don’t know if that’s because of having a kid, too. Cause I definitely got sick a lot more, him and I both did” (P3).

Participants’ also reported a negative impact on their activities of daily living (ADLs), including taking care of themselves physically.

> I never thought I’d go to work in yoga pants, but I think you just really don’t care. So, I think that maybe, as far as dressing appropriately was a little bit affected by working a three-tier shift schedule. […] I definitely, I hate to ask for help. I’m not a person that asks for help, but you know when you’re so tired, I remember asking my husband to do a lot more of the housework and that sort of thing. You know, I’m sure my legs got shaved a lot less when I was working overnights as far as personal hygiene goes. I think a lot of stuff just kinda falls to the wayside, though. […] I ended up dedicating virtually all of my vacation time just to being able to sleep and have a normal pattern, or as normal pattern as possible, which means I didn’t really take a vacation for 5 years. Or not very long one, you know (P1).
>
> I can tell you that I did not go to the gym much, which did not help my 15-pound weight gain. What you don’t want to do is an exercise class at like 7 o’clock in the morning if you didn’t, if you’ve been awake for the last day or two (P1).

"I was definitely less physically fit because I wasn't working out at the gym" and "it drastically affected my energy. I remember feeling tired like all the time, often, most days" (P1). Another participant also noticed the decrease in her gym attendance while working a three-tier shift schedule: "I was physically fit. I worked out 6 days a week for 30 minutes to an hour. It went down quite a bit. I went only probably like once or twice a week to the gym" (P2). "Definitely more difficult to get exercise" (P4). "I was not able to attend gym as much as I wanted to" (P5) "I wasn't able to work out as much. That would be the big thing" (P5).

> It was only because I was working overnights, I didn't put much care into how I looked as much, but I don't think it was cause, you know, I was like getting into a depressive state and not caring or something, but more so just like going into the overnight and nobody cares anyways, you know what I mean? But if I was going out somewhere then I would dress okay and would dress, would still put effort in (P3).

With regard to diet, all of the participants either had to make adjustments to the timing of their meals, and most participants either skipped meals or the nutrition level of the meals decreased. Participants shared specific examples of how their diets were affected.

> How it affected my diet? Like I mentioned earlier, I think one of the ways that I stayed up was eating. You know, I would make sure I would bring really good food. […] I felt like I needed a reward for staying up late, so I needed something to look forward to, so whether that was soda, whether that was um candy, I would

> bring, you know, my leftovers from like take-outs, so a huge burrito. Definitely stuff no one should be eating at 3 o'clock in the morning was kinda the thing that I did that kept me going (P1).

"It was all over the place; a bunch of junk food. Lots of stuff you can just grab and eat. You never really ever felt like cooking; all the worst" (P2). "Definitely tend to be a little bit more lazy about cooking for myself, so I'd eat out a little bit more: fast food" (P4). "Nutrition went down quite a bit. Skipped meals and there was well forgetting to eat" (P2).

> I think I skipped more meals, and like even, I didn't eat as consistently while I was working a three-tier schedule. Because I would get hungry, like obviously at like three in the morning or something, or like wouldn't be hungry at certain times (P4).
>
> Definitely affected it. Definitely I don't get three whole meals on days after a NOC shift. It's like two meals: when I wake up and dinner. Sometimes I skipped lunch on days that I go in in the afternoon, just because I wake up so late. So, I have my breakfast and then I snack a little bit at work, and then I have dinner. The morning shifts are a little bit easier, because you have breakfast and then lunch and then go home and have dinner (P4).

Participants also used oral supplements to assist in surviving the three-tier shift schedule. "Caffeine, lots of it. At first it certainly helped, but after a while nothing really helped. I was just always tired" (P2). "I would drink caffeine. I tried those 5-hour energy drinks. I think it did [work], I just didn't really like 'em, so, yeah, coffee" (P3).

"Definitely drinking more coffee than I used to." "I would rather not drink as much coffee as I do." "I'm a strict coffee guy, no energy drinks" (P4).

> Not only were you sleep deprived and tired, but, you know, you were pumping yourself full of sugar. I saw people that I worked with take energy drinks, do all that stuff. I was always scared of that, cause of, for my health. But I'm not sure how much better chocolate and sugar really is, but it seemed better at the time (P1).

> I did a lot of things to keep myself awake, one of which was eat. So, the only way that I could guarantee that I wouldn't fall asleep on my overnight shifts was if I ate. And it usually was crap, so, soda, chocolate. The immediate health side effect of working three tiers was I'm sure I gained at least 15 pounds (P1).

Despite also needing to adjust the timing of her meals, the discrepant case did manage her diet well. "You adjusted your meals according to the schedule." "My diet never changed. I eat healthy all the time, and I continue to strive to eat even healthier: as natural as possible." "I may have had more miracle bread and stuff. I did so much stuff [vitamins]" "And then, like I said, sometimes I take some really healthy snacks" (P5).

> [My diet regime is] over the top, I've been told. You know I'm extremely healthy. I'm the same before as I was; the only thing I might have did is if I found different nutrition, which I'm always on the hunt for, anyway. Because I just incorporated a whole lot of 'yami' capsules to my dietary supplement. I found that to be really great. […] Sometimes Benadryl, because I have allergies, also. Very helpful for sleep and rest, and feeling restful. Oh Sleepytime Tea also. Yes,

> Sleepytime Tea. That's for before going on the, you know, night shift. I'd have that Sleepytime Tea and everything before I went to bed to sleep, and I'd get up and then I'd have the powerful stuff. […] the Miracle Reds and Miracle Greens, the aloe vera juice, the different vitamins, and the, I would always drink a bottle or two of tea, and then I'd have, sometimes I'd have coffee, I'd take coffee with me along too. 50/50, 50% caffeine and 50% decaff is what I'd use in my coffee so I don't have a full bolt of it. […] I'm usually so juiced up by the time I go I take so much stuff before I go I usually just take a green tea tablet at night (P5).

Theme 6: Three-tier shift schedule workers' performance and safety is impacted by working a three-tier shift schedule. In Table 2, all participants reported an impact on performance and all but one participant reported an impact on safety. "Mistakes definitely went up, forgetting stuff" (P2). One aspect of safety was how participants felt the three-tier shift schedule affected them personally, for example with regards to the participants' ability to react to situations and keep themselves safe. "I remember leaving keys in the refrigerator. Forget to lock the door when I leave, stuff like that" (P2).

> You're in your 39th hour of work for the week, and you're almost done for the week. It happens to also be 7 o'clock in the morning. You're tired. Maybe you're quite pregnant. And, you know, you're supposed to be helping people through a psychiatric crisis. And, number one, you can barely keep your eyes open, and number two, you have little patience, little patience. Far little than you would have, you know, at an eight to four [job], or if you were always working the

> overnights. You're tired. So, when you don't have as much emotionally left, it's hard to give anything to anyone else. So, it definitely affects your ability to deal with a crisis. And I always felt safe, like I was safe to do my work, but I didn't feel personally comfortable doing it at the end of my three-tier schedule as I did at the beginning (P1).
>
> I really thought on my decisions more, like especially on the overnights, because I didn't trust myself as much. I never felt like I was putting anyone in danger, and I never felt like I was unsafe to be there. I never ever felt like that, but I was always more cautious and more really think things through more, because I just wanted to make sure that I was thinking as clearly as I could be, cause I knew that I wasn't like rapidly and like firing as fast (P1).

Another aspect of safety was how safe the participants felt they were as they drove home after work. Examples of participants' responses to the effect of working a three-tier shift schedule on workers' safety were "I didn't trust myself as much" (P1), "sleep's all over the place" (P1), "my sleep would be all broken up, and I'd get like, you know, four hours of sleep here, two hours of sleep there" (P3), "I definitely felt unsafe driving after my NOCs" (P4), "I turned down a road at one point and didn't realize it, because I kind of like, spaced out and nodded off, and woke up on a completely different road that I wasn't supposed to be on" (P4), and "I actually was in an accident actually while I was on the three-tier after a NOC" (P4).

> I definitely felt unsafe driving after my NOCs. I think I told you the story of when I turned down a road at one point and didn't realize it, because I kind of like,

> spaced out and nodded off, and woke up on a completely different road that I wasn't supposed to be on. Yeah, especially the long drives back from Napa. I actually was in an accident actually while I was on the three-tier after a NOC. I ran into a median and wound up wrecking my tire (P4).

Occupational safety included feelings of safety and occupational support. Participants' reports were mixed with regards to workplace safety, varying from increased mistakes to feeling "safe to do my work" (P1). One participant reported that the three-tier shift schedule "definitely impacted" safety (P4).

> I can remember feeling, like in the mornings after the end of my three-tier schedule that would be the mornings after one of my NOC shifts, feeling like my brain was so slow. Like simple tasks, I had to really give that extra attention to them. And I think it's just from being so tired. It's from not being on a regular pattern. Your rhythm, your body wouldn't adapt (P1).

> [The three-tier shift schedule] definitely had an impact [on my performance]. I think I was still able to do the job. I don't think I had any problem completing tasks, but of course, especially on the overnights, it was definitely difficult to focus on things. As an example, last night I had a weekly due, did not do the weekly, was not able to focus. It's going to be late a little bit, but it'll be okay (P4).

> After an overnight shift, I would have a hard time giving a coherent report after I'd been up all night. […] And I had trouble focusing after being up all night. Of course, once I went to bed and got up, I was fine (P5).

In addition, it seemed all the participants had strong opinions on occupational support. The participants who worked in the same county seemed to have the same perception of occupational support provided by the organization. The only participant working in a different county had a much different perception of his occupational support. Per the participants' observations, it appeared that the management in the two counties had differing experiences and views. The theme of workplace safety included the repeating pattern of negative impacts to occupational support associated with the three-tier shift schedule.

> I definitely still felt like everyone appreciated me and appreciated the work that I did, but our particular supervisors were not, I didn't feel like they were particularly open to our reflection of the three-tier shift schedule. We had to rotate through our schedules. We weren't given […] the ability to pick our own schedules. And we weren't, like I think that as adults we should have been able to go into a room, and we should have all been able to decide what works best for us and worked it out. And we weren't given any of that autonomy or any of that freedom. Our schedules were picked for us, that was that. There was no discussion or anything. I don't think you feel supported when like your voice isn't being heard. I think that I would have done better in working a three-tier shift schedule if it was a three-tier shift schedule that I could pick. Even if it wasn't my favorite, you know when you make your own decisions, you feel better about it. But when you're told this is that, too bad, even though your coworker wants your

> schedule and you want hers, you can't switch because that's the way it goes. I think that that's unfortunate (P1).
>
> Not the greatest boss. Definitely put you to work and didn't really care. Especially on night shifts, didn't really considered health, how it affected you, especially to the point where she started giving tons and tons of work" (P2).
>
> "There was definitely no support around changing the schedule" (P3).

"Occupational support. That means people that are supportive, right? I didn't have any" (P5).

> I didn't have support at work for a long time. I just need to say that. Okay? I didn't have, I didn't feel supported at all for a long time at work. I didn't have any support. […] I just didn't feel like the people that was in charge of the program at the time were supportive. They just didn't appear to be supportive to me. I didn't feel any support, nuh uh. I felt like an outsider, as a matter of fact (P5).

The only participant who felt occupational support was the male who worked in a different county than his female counterparts.

> I think I've been pretty lucky in that both my coworkers and directors have been supportive and understanding of how that effects, especially since [program director] used to work three-tier shifts, so I think she has some sympathy there for it. That was one of the reason that she started out with the really short shifts, which you pointed out, did not actually work. So, based on our feedback between the relief staff and full time staff we decided that it was kind of rough going home

at 5 o'clock in the morning, and it's also harder for us to get up at 5 o'clock in the morning, so the 7 o'clock was a little bit easier (P4).

Theme 7: The negative effects of working three-tier shift schedules appear to subside after discontinuing working the three-tier shift schedule. Although not a specific question during the interview, many participants articulated how they were better off now than when they were working the three-tier shift schedule. "I don't know about long-term, but I know for certain that in the short-term, it definitely effects your functioning." "Again, now that I'm not in a three-tier schedule I think that everything has leveled out" (P1). "Now I still get [eczema]." "I don't really get any headaches now." "I take care of myself decently now." "I think that I had tried, but [melatonin] didn't really work [while working the three-tier shift schedule], but now I use it and it totally works" (P3). "With one NOC now, it's a little bit easier" (P4).

Evidence of Trustworthiness

Credibility strategies were implemented as stated in Chapter 3 in order to address credibility, or internal validity. Participants were recruited and interviewed with comprehensive interaction, and interviews continued until the data was saturated. Interviewees were identified by the common phenomenon of working a three-tier shift schedule for at least 3 months. Participants were enrolled via knowledge of employment with the organization which mandated three-tier shift schedules and were previously acquainted with the researcher. I was given former colleagues' contact information either directly by former colleagues or via a friend request on Facebook. It took approximately 3 hours to compile a potential participant list from my contact list in my private phone

and Facebook profile. I compiled the contact list at my home. I obtained the contact information from the researcher's private phone and via e-mail or Facebook. Interviewees were invited to participate in the study via telephone or e-mail as outlined in Appendix A, which took approximately 5 hours. The participants chose the location of the interview and signed the Consent Form in Appendix B before commencing the interview. A single interview was conducted per participant as outlined in Appendix B. Face-to-face interviews lasted 30–60 minutes, and the overall workers' perception of the effects of three-tier shift schedules appeared to be sleep difficulties with ensuing effects.

Transferability strategies were implemented as stated in Chapter 3 in order to address transferability, or external validity. There was dense description of the interviews, and a variety of participants sharing the phenomenon were interviewed. Interviews were recorded on a dedicated recording device with each participant's permission and transcribed for analytical purposes. Male and female participants were included, and participants' ages ranged from 29 years old to 63 years old. The dedicated recording device was kept in a locked cabinet, and the transcriptions were kept on a password-protected computer.

Consistency strategies were implemented as stated in Chapter 3 in order to address dependability and confirmability. Detailed notes were taken during the interviews with regards to participants' responses and my observations, and the interviews were recorded and transcribed for more detailed data analysis. I was constantly aware of reflexivity, where apparent cause and effect might be bidirectional, by being actively conscious of the personal bias of working three-tier shift schedules with debilitating

effects. One strength of this qualitative phenomenological approach is that it enabled me to conduct a study specifically oriented to an infrequently studied population. One weakness of this approach is that limited data were available with which to compare this specific population.

Summary

The findings of this study were that perceptions of three-tier shift workers on the effects of working a three-tier shift schedule were overwhelmingly negative. In order to analyze the data effectively, themes were derived from comparing the participants' responses. Themes which came from the comparison of the participants' responses included: negative impact on community functioning, impact on personal relationships, impact on mental health, impact on physical health, impact on performance and safety, and decrease of negative effects of working three-tier shift schedules after discontinuation of working a three-tier shift schedule.

These issues appeared to stem from the chronodisruption caused by the nature of a three-tier shift schedule. Participants repeatedly complained about the three-tier shift schedule's impact on participants' ability to regulate sleep, with an effecting increase in SWD symptoms, issues with mental and physical functioning, and difficulties adjusting to the three-tier shift schedule. These symptoms relate back to restoration theory, which indicates that insufficient sleep results in a mental and physical breakdown. In the next chapter, I will provide my interpretations and conclusions of the results.

Chapter 5: Interpretations and Conclusion

Introduction

The purpose of this study was to explore workers' perceptions of the effect of three-tier shift schedules on their community functioning. I conducted this study in order to address the gap in the literature on the effects of shift work, as no prior study had been found which had specifically focused on the effects of three-tier shift schedules reoccurring each week. One study was found where the researcher looked at three-tier shift schedules, but there were rest periods between types of shifts so that only two types of shifts occurred within the same week (Karlson et al. 2009). This effectively made the shift work schedule into a type of two-tier rotating shift schedule instead of a three-tier shift schedule.

Recent studies of shift work schedules have focused on two-tier shift, night shift, and rotational shift schedules. They clearly show a trend of unhealthy and unsafe effects of shift work in night shift schedules and combination shift schedules, which include two-tier and rotational shift schedules (Culpepper, 2010). In this qualitative study of three-tier shift schedules, I examined all the known effects of two-tier shift schedules, with a particular focus on two concepts – sleep and community functioning.

I based my examination into the concept of sleep on the restoration theory, which proposes that sleep is important to both the brain and the body in order to function properly; without sufficient sleep, a mental and physical breakdown occurs (Oswald, 1966). The interview questions I asked participants about sleep were partly derived from Flo et al. (2012) to ascertain the potential for participants to be diagnosed with SWD.

Community functioning includes the activities of individuals or groups within a system which in any way affects the system (Geismar, 1966). Examples of community functioning with regards to employees who work three-tier shift schedules includes driving to and from work, interactions with others while shopping for groceries, and personal relationships.

The key findings of this study were in how three-tier shift schedule workers perceived working a three-tier shift schedule and its effects on their health and safety, which were almost entirely negative. All participants had difficulty accepting the schedule, had symptoms of SWD, and attempted to alleviate these symptoms with treatments. Workers' personal relationships were also affected; all participants had issues with social acceptability and ability to participate in meaningful activities. Their mental health was affected in that all participants' thought processes were impacted.

Their physical health was affected in that all participants perceived the three-tier shift schedule as interfering with their functioning in all five areas of physical health (Table 2). There was one exception, a participant who denied any impact on her physical energy level because she went out of her way to treat any possible symptoms through vitamins, a healthy diet, and exercise. Both Thorpy (2010) and Wright et al. (2013) have previously reported that increased physical activity is an effective treatment for shift-work-related sleep disorders.

Worker safety problems were also reported by all participants except the one who went out of her way to treat any possible symptoms through vitamins, a healthy diet, and exercise. One participant fell asleep while driving home on multiple occasions, whereas

others felt unsafe driving due to their fatigue and inability to focus. Another participant reported making more mistakes while at work, such as misplacing her keys and forgetting to lock the facility door. These workers responded positively to all three quantitative questions created by Flo et al. (2012).

I collected demographics in my interviews with participants; however, the demographics only showed diversity and not who was more impacted by the three-tier shift schedule. Although the oldest participant seemed the least affected by the three-tier shift schedule, the oldest participant was also the only participant who did not allow the three-tier shift schedule to change her attitude, habits, and exercise regime. The management of the organization might take steps to decrease the negative effects on health and safety felt by employees by decreasing or eliminating three-tier shift schedules. Another step might be to evaluate employees for susceptibility to the negative effects of three-tier shift schedules and accommodate employees accordingly.

Interpretations of Results

Perceptions of three-tier shift workers on the health and safety effects of working a three-tier shift schedule are overwhelmingly negative.

Participants found working a three-tier shift schedule challenging to participants' functioning, including safety and health effects. Rodenbeck (2009) investigated the difficulties of consistent sleep with regard to shift work and diminished functioning and found that symptoms of SWD included sleepiness and bodily dysfunction. Without exception, participants found it difficult to achieve consistent sleep while working a three-tier shift schedule. This proved problematic for the participants and corroborated

Pritchett et al. (2012) in that shift work disrupted sleep and was associated with various health problems.

Participants reported an increase in sick days and an increase in mistakes. Reports of decreased occupational support and disagreement with the enforced schedule with apparently no recourse were also rampant among responses. Participants reported feeling repercussions of working a three-tier shift schedule within months, despite expressing their apprehension of working such a schedule. Participants reported inability to think cohesively or put together a shift report following a NOC shift. One participant fell ill for almost three weeks. None of the participants expressed preference for working a three-tier shift.

As I previously discussed in Chapter 2, research on sleep and circadian rhythm is necessary in order to assist shift workers' overall health, including health concerns, safety and performance concerns, and psychosocial concerns (Takahashi, 2014). This research should also include effects from three-tier shift schedules, as participants repeatedly reported inconsistent sleep. Though there were no studies specific to three-tier shift schedules, there were many similarities between previously studied shift work of other types and three-tier shift schedule work. Parallel to the findings of Agosti et al. (2015) with regard to high rates of work absence due to illness, three-tier shift schedule workers reported calling in sick to work more often than when working other types of schedules. They also reported an increase in the frequency of work mistakes and diminished concentration, which corroborated the survey findings of Baney (2011). Three-tier shift schedule workers reported feelings of decreased occupational support, which was similar

to night shift nurses with regard to their perceptions of receiving less social support than day shift nurses (Sarwar & Khalid, 2015). Three-tier shift schedule workers were specifically disgruntled with the lack of support around the enforced three-tier shift schedule and the inability to provide their input. As with the participants in the study by Galatsch et al. (2013), the forced schedule might have impacted the three-tier shift schedule workers' health.

Three-tier shift schedule workers have difficulty adjusting to the three-tier shift schedule.

Participants appeared unprepared for the adjustment of working a three-tier shift schedule as evidenced by their responses to the various questions; many of the responses which were congruent with symptoms of SWD. SWD is a diagnosable disorder which might affect employees who work outside of daylight hours or on rotational shift schedules (Schwartz, 2010), which by definition was a part of the enforced three-tier shift schedule. Some of the participants did not expect such negative effects from working a three-tier shift schedule, whereas other participants did express an idea going into the schedule that it might cause harm.

Three-tier shift schedule workers reported obtaining fewer hours of sleep or going without sleep on some days. The restoration theory stresses that sleep is important to both the brain and the body in order to function properly (Oswald, 1966). Without sufficient sleep, a mental and physical breakdown will transpire (Oswald, 1966). According to Chokrovery (2010), there are four major sleep complaints: excessive sleepiness, insomnia, abnormal sleep behavior, and inability to fall asleep. The greatest impact of the

three-tier shift schedule was on the participants' sleep regularity. Participants did not have the ability to regulate their sleep due to the three-tier shift schedule covering every hour of a 24 hour day in each week. There was no possibility of sleep regulation, only sleep recovery. Even the participants who attempted to sleep before their shift had difficulty doing so. Sleep was sporadic, inconsistent, and shortened, and some participants reported just going without sleep. As a result, participants reported feeling more fatigued, having a decreased reaction time, experiencing decreased tolerance to socialization, and having difficulties driving.

Shift schedules are associated with sleep challenges and the development of SWD. With regard to the diagnosis of SWD, three questions were posed at the end of face-to-face interviews, reflective of the study by Flo et al. (2012). These three quantitative questions were suggested to identify patients with SWD comparatively as well as performing any of the numerous other diagnostic criteria, for example, BIS and ESS (Flo et al., 2012). Positive responses to all three questions, including difficulty with sleep or excessive sleepiness, a work shift interrupting an otherwise normal sleep period, and at least a month-long duration, would mean a diagnosis of SWD. Had the participants been diagnosed through the process described by Flo et al. that I presented in Chapter 2, all participants would have been diagnosed with SWD. According to Di Milia et al. (2013), night work was significantly associated with symptoms of SWD compared with day work. Similarly to night work, three-tier shift schedules seem to be highly associated with symptoms of SWD.

Not only did participants have difficulty accepting and adjusting to a three-tier shift schedule, participants tried in various ways to adapt to the three-tier shift schedule. All participants had difficulty with this process to some degree. In addition to how the schedule impacted participants mentally and physically, it seemed that every aspect of living was affected by the three-tier shift schedule, from adjusting meal times to reexamining work ability. Most participants felt constantly fatigued, were more often sick, and attempted to use over-the-counter medication to assist in alleviating symptoms brought on by working the three-tier shift schedule. As previously stated, three-tier shift schedules seemed to be associated with increased sick days, as with the shift study by Agosti et al. (2015). Drake (2010) proposed that following consecutive waking hours, the homeostatic system pressures sleep, but this usually works with the circadian rhythm, which seemed upset by the three-tier shift schedule. The three-tier shift schedule has workers awake both night and day during each week, and the sleep/wake cycle is determined by light transference and habit to facilitate sleep for the duration the body is accustomed to perceiving darkness. This process is clearly upset by the three-tier shift schedule, as the body cannot form a habit based on light transference.

Participants attempted to alleviate the effects of working the three-tier shift schedule in various ways. Some practiced increased sleep hygiene, such as darkening a room to sleep during the day; not using electronics before sleeping; or napping before working a night shift. I explicitly reviewed sleep hygiene in Chapter 2, including a more extensive definition and additional tips for the improvement of sleep hygiene. According to Rodenbeck (2009), sleeping times incongruent to the diurnal/nocturnal cycle can cause

insomnia and sleep difficulties. This appeared to be at least part of the case with three-tier shift schedule workers. Sleep hygiene seemed to be at least a temporary solution for three-tier shift schedule workers.

Other participants increased their caffeine intake and tried melatonin. Participants who reported using increased amounts of caffeine also reported that there was never enough to counteract the effects of sleepiness while working, while for most participants, melatonin seemed to help at least a little. Ker (2010) suggested that caffeine might reduce the number of mistakes and accidents at work, but the study found that while caffeine might improve performance, there were no trials in which an injury could be said to have been prevented.

One participant was taking prescription mood stabilizers and found that an increased dosage was necessary while working the three-tier shift schedule. This correlates to the study I reviewed in Chapter 2 about a participant who was able to maintain mood stability as long as the working schedule was a stable daytime schedule. The depressive symptoms increased for the participant described in Chapter 2 while working a night schedule (Meyrer et al., 2009).

The one participant who was able to keep up and even increase her exercise was able to mitigate most of the effects of working a three-tier shift schedule. As I discussed in Chapter 2, increased physical activity has been endorsed as an effective treatment for shift-work related sleep disorders (Thorpy, 2010; Wright et al., 2013). Pepłońska et al. (2014) found that eating more and exercising less was associated with working night

shifts, which is congruent with the perceptions of most three-tier shift schedule workers in this study.

Management utilizing three-tier shift schedules might want to implement preparation trainings for employees. Management could also offer an orientation on the difficulties of working three-tier shift schedules and provide mentors to new employees. Management might also offer rest periods during the night shift and suggest the best times to eat or exercise during the various shifts. These tactics have been associated with some success for other types of shift work.

Three-tier shift schedule workers' personal lives are impacted by working a three-tier shift schedule.

The findings of this study corroborate those of Garbarino et al. (2002), in that shift work impacts peoples' social life, in how they interact with family and friends, and in their overall quality of life (Garbarino et al., 2002). By the nature of a three-tier shift schedule, for example working odd hours at least half of the week and needing time to sleep or recover while the majority of the world is awake, such as during daylight hours, some degree of isolation might be expected.

However, all participants noticed a decrease in meaningful activities and ability to reach out to or socialize with friends and family. Participants also noticed that how they felt about socialization changed while working the three-tier shift schedule. Some participants became snappy and irritable with family members, other participants were not as casually social as they were prior to working the three-tier shift schedule. Social tolerance was decreased, as were social awareness and motivational levels. Participants

reported lack of interest and decrease in general socializing. Some participants noted it might have been due to increased depression and sensitivity. I noted in Chapter 2 that shift work was not only more highly associated with sleep disorders than regular daytime work, but that shift workers were more likely to have noticeable emotional problems socially, for example mood changes which impacted interpersonal relationships and led to conflicts and misunderstandings (Kaspercyzk & Josko, 2012). Three-tier shift schedule workers also reported being affected by changes in mood and emotional stability.

Although all participants stated that the three-tier shift schedule impacted their social lives, one participant specifically stated that she remembered a time where a friend was visiting, and the participant only realized later that the three-tier shift schedule had so impacted her that she completely misread her friend, and for whatever reason, the friend never came over again. An additional social impact, which the three-tier shift schedule enforced, was either the inability for participants to participate in social functions because of timing or because they were simply too tired. All participants felt that the three-tier shift schedule interfered with social events. Three-tier shift schedules seem to also disrupt work-life balance as described by Agosti et al. (2015) in Chapter 2.

Three-tier shift schedule workers' mental health is impacted by working a three-tier shift schedule.

Participants reported multiple noticeable mental side effects of working a three-tier shift schedule. Participants complained of decreased ability to process thoughts coherently, increased forgetfulness, and increased stress. Participants especially complained of these symptoms due to sleep deprivation. According to Pritchett et al.

(2012), the brain pathways involved in sleep are highly vulnerable to disruption, and disrupted sleep leads to multiple health problems. As previously stated in Chapter 2, perceived insomnia affects physical and psychological health regardless of shift type, however rotating shift workers had the highest physical complaints (Vallières, Azaiez, Moreau, LeBlanc, & Morin, 2014). The perceptions of the three-tier shift schedule workers substantiated these impressions. Psychological symptoms associated with insomnia included anxiety, depression, and fatigue and physical complaints included chronic pain and otorhinolaryngology (Vallières et al., 2014). Three-tier shift workers also complained of these mental and physical symptoms.

In addition to impact on mental functioning, mood also seemed to be influenced by the effects of working a three-tier shift schedule. In previous studies, psychological difficulties of shift work included irritability (Fawer & Lob, 1979) and mood deterioration (Meyrer et al., 2009). These findings described in Chapter 2 seemed to also correlate to the results in my study, as three-tier shift schedule workers also reported mood alterations. Participants reported a negative impact to their ability to moderate their emotions, including depressive symptoms, increased irritability, increased frustration, decreased patience, increased anxiety, and increased stress. One participant described how working a three-tier shift schedule would heighten her emotions and sensitivity levels, culminating in crying bouts before work. Another participant would actually pick at her skin until she bled. Management could offer wellness checkups and counseling sessions in order to monitor negative effects of three-tier shift schedules on workers.

Three-tier shift schedule workers' physical health status is impacted by working a three-tier shift schedule.

Participants also reported several physical side effects of working a three-tier shift schedule. Participants expressed concern with decreased immune system functioning, headaches, weight gain, stomach problems, constipation, heart palpitations, difficulties breathing, eczema, hair loss, and fatigue. The participant with a previous history of indigestion also noticed that the condition worsened. At least two of the participants in my study had gastrointestinal complaints while working the three-tier shift schedule. According to Takahashi (2014), gastrointestinal dysfunction was among the additional physical health concerns, as were cardiovascular and cerebrovascular problems, metabolic disorder, excessive body weight, and cancer. Saberi and Moravveji (2010) found a significantly higher prevalence between shift work and GI symptoms, irregular meal times, and GI medication intake (Saberi & Moravveji, 2010). Three-tier shift work appears to share these difficulties with other shift work.

It seemed every aspect of living was upset by the three-tier shift schedule. This included ADLs, including diet, exercise, energy, self-care, recovery, and work-life balance. Participants reported that they were less cautious about finances, their personal hygiene and attention to their appearance decreased, they were not as fastidious housekeepers as prior to working a three-tier shift schedule, they required additional assistance with daily chores, and they were unable to make it to the gym, partly due to decreased energy levels and partly due to lack of interest. The effect that not going to the

gym had on one of the participants in particular, was that she was unable to counteract her increased and unhealthy eating habits, gaining at least 15 pounds.

As stated in Chapter 2, health concerns of shift work include excessive body weight (Takahashi, 2014). One study explicitly investigated CVD and shift work, specifically night and early morning work, and the authors found that increased frequency of shift work was associated with increased symptoms of CVD, such as changes in BMI, waist circumference, triglyceride levels, and diastolic blood pressure (Thomas & Power, 2010). Mohebbi, Shateri, and Seyedmohammadzad (2012) also completed a study which included the measurements of waist circumference and adiposity and found an association between shift work and metabolic syndrome. Three-tier shift work shares these difficulties.

Participants made adjustments to the timing of their meals, skipped meals, and the nutrition level of the meals decreased. Participants reported cooking less and eating out more, for example purchasing from fast food chains. One participant admitted that she ate to stay awake and would bring food, not necessarily healthy, to which she could look forward to eating. Oike et al. (2015) explored obesity with regard to shift work, subjecting mice to light/dark changes and either allowing them to free-feed or putting the mice on a fixed feeding schedule. Mice which were able to freely feed themselves gained weight, but there was no weight change in mice put on the feeding schedule (Oike et al., 2015). A future study could involve setting meal times for three-tier shift schedule workers in order to evaluate the effectiveness of maintaining weight when meals are scheduled.

Consistent with the study by Pepłońska et al. (2014), which was a study of night shift workers, participants in my study also experienced diet challenges and difficulty exercising. At least one participant complained of weight gain, similar to the results in the study by Tada et al. (2014), which explored BMI with regard to shift work. As with the study by Tada et al., my participants reported higher intakes of sugary drinks and shorter sleep durations. This was also consistent with the results found by Saberi and Moravveji (2010), which showed an association of shift work with a significantly higher prevalence of GI symptoms, irregular meal times, and GI medication intake. One of the participants reported that she was very sick and had to take off work for 3 weeks. This is similar to the results of the study by Agosti et al. (2015) in which high rates of work absence due to illness and early retirement among nurses were found. Management could offer wellness check-ups and/or information on methods to prevent or alleviate negative effects of working three-tier shift schedules, such as eating a healthier diet or exercising regularly.

Three-tier shift schedule workers' performance and safety is impacted by working a three-tier shift schedule.

According to Culpepper (2010), shift work is associated with performance impairment and can lead to traffic and occupational accidents. While none of the participants in this study related any occupational accidents, one participant described traffic accidents on two separate occasions. Additional findings of this study support the work of Takahashi (2014) that performance and safety concerns include neurobehavioral function and work performance. One of the participants mentioned more than once how she would have to take extra care and energy in order to avoid mistakes while working

during the three-tier shift schedule. One participant reported dozing off while driving home after work. This is related to the study conducted by Baney (2011), in which over a third of the participants admitted to dozing off while driving. Another participant repeated that although she felt safe at work, she didn't feel personally comfortable doing her work due to sleep deprivation. As described in Chapter 2, the Brief NORSCI might be used to assess how workers feel about their safety. Nielson et al. (2016) used the Brief NORSCI to obtain results which indicated that sleep problems affected climate safety. Management needs to empower employees in order to improve climate safety, perhaps by allowing employees to switch shifts or control days off to ensure adequate rest and improved safety at work and at home. A study by Galatsch et al. (2013) provides evidence that suggests that shift schedule organization could lead to promoting WAI and improving the general health of employees.

The negative effects of working three-tier shift schedules appear to subside after discontinuing working the three-tier shift schedule.

Waage et al. (2014) explored predictors of SWD and found that employees who switched from night shift to day shift had a decreased risk for SWD. Some longitudinal perceptions were reported by participants in my study who no longer worked the three-tier shift schedule, and for the most part, the effects of working a three-tier shift schedule diminished or ceased after the participants returned to a more regular schedule. However, one participant mentioned that the eczema which began while working during the three-tier shift schedule actually persisted, especially when she was stressed. This particular participant had a slightly different three-tier shift schedule than the other participants, as

her three-tier shift schedule never changed during the 2 years she worked the schedule. Most of the other participants shifted to a different three-tier shift schedule every 6 months. This participant also stated that while on the fixed three-tier shift schedule she had tried melatonin, but in contrast to the other participants, it did not work for her. Now that this participant is working a regular day shift schedule, she reported that melatonin works well for her. She also stated that she takes better care of herself than she was able to while working the three-tier shift schedule.

Theory and Framework

The responses of the participants in my study correlate to the findings of previous studies on shift schedules. This expands the knowledge of how three-tier shift schedules are similar to other shift schedules. My findings confirm that three-tier shift schedules also disrupt sleep and are associated with chronodisruption. Participants complained of decreased levels of functioning, decreased safety, increased physical ailments, and severely impacted sleep. According to restoration theory, sufficient sleep is necessary in order to avoid mental and physical breakdown. This study provides evidence that insufficient sleep is associated with a decrease in mental and physical functioning. The conceptual framework of this study, community functioning, includes activities and behaviors of individuals or groups within a system which affect the system (Geismar, 1966). For example, one participant I interviewed had an accident and crashed into a sign in a median.

Limitations

Limitations in this study which effected the interpretation of the research's results included constraints to generalizability, practice applications, and how the internal and external validity were established. Researcher limitations included access, potential bias, and longitudinal effects. The employees' perceptions of the effects of three-tier shift schedules were explored, and a better understanding of the phenomenon was gained. Although I have had personal experience working three-tier shift schedules, my interaction with the participants was limited to asking the questions created for the study. There was no attempt made to examine any specific exposure-disease relationship. One participant reported a preexisting condition, which did appear to be affected by working a three-tier shift schedule. The results of this study might only be generalizable to organizations which use three-tier shift schedules.

In order to address internal validity, credibility strategies were implemented as stated in chapter three. Interviews with comprehensive interaction continued until the data was saturated. In order to address external validity, transferability strategies were implemented as stated in chapter three. Dense description of the interviews with a variety of participants sharing the phenomenon was performed. In order to address dependability and confirmability, consistency strategies were implemented as stated in chapter three. During interviews, detailed notes were taken, and the interviews were recorded and transcribed for more detailed data analysis. I remained constantly aware of reflexivity by being actively conscious of the researcher's personal bias of working a three-tier shift schedule with incapacitating effects. Methodological limitations included sample size,

lack of prior research studies on the specific topic, data collection measures, and self-reported data.

Though sample size is less significant in a qualitative study than a quantitative study, the sample size in my study was relatively small: only five participants. Perhaps a similar study could be conducted with a larger sample size in order to correlate the results of this study, as this study was the first of its kind to specifically target the perceptions of three-tier shift workers. However, after comparing the responses from all five participants, data seemed congruent, and it seemed that selective memory, telescoping, attribution, and exaggeration were not present.

Another limitation was the limited number of participants in the pool. My access to participants was somewhat limited to the employees with whom I was already familiar. Additional participants could have been invited, had the organization given approval to do so. However, in order to reduce potential conflict over the questionable schedule, the organization was not asked to provide contact information for additional employees. It was also discovered through the participants that at least some of the sites had since changed the policy of mandating a three-tier shift schedule, and employees worked two-tier shift schedules instead. With regards to a longitudinal study, this was not performed due to time constraints of conducting a dissertation study. A future study could conduct a lengthier research study in order to ascertain if chronic symptoms arose from working a three-tier shift schedule.

One limitation of this qualitative phenomenological approach is that limited data were collected with which to compare this specific population. However numerous

studies on two-tier shift schedules and rotational shift schedules were available. One of the potential strengths in qualitative research is the ability of the researcher to redirect questions during the interviews in order to gain additional insight. However, this was not done in this study in order to decrease potential researcher bias, as I knew the participants personally and did not want to impact the study with the possibility of influencing the participants with my opinions. Therefore, I only posed the specific questions outlined in Appendix B.

A strength of this qualitative phenomenological approach is that it enabled the researcher to examine this issue in detail and in depth. The data collected in this study was based on human experience, which is a powerful adjunct in the exploration of minutiae. Subtleties and complexities about the research subjects and the topic could be discovered and evaluated. Although data were collected from only a few participants, and cannot be generalized to a bigger population, the results will serve as a guide to the study of three-tier shift schedules in similar organizations, and quantitative studies of larger populations.

Recommendations to Reduce the Effects of Three-Tier Schedules

Previous studies have made numerous recommendations to decrease SWD symptoms while performing shift work. These include taking naps to counteract excessive sleepiness (Asaoka et al., 2013), caffeine in order to prevent injuries and errors in shift work (Ker, 2010), and scheduled meals to avoid or reduce the symptoms of SWD associated with shift work, for example risk of obesity onset, according to the study of mice by Oike et al. (2015). Future studies as suggested by Tada et al. (2014) could also

be performed on the effects of inconsistent meal times and sleep with regard to all types of shift work, including three-tier shift work. The findings of this study suggest additional recommendations: decrease or abolish three-tier shift schedules, screen employees prior to mandating potentially debilitating schedules, and educate employers and employees around the challenges of three-tier shift schedules.

Decrease or Abolish Three-Tier Shift Schedules

According to the participants in my study, negative effects of working a three-tier shift schedule seemed to abate once workers no longer worked such a schedule. However, as around the clock work is mandated in some fields, another solution must be found to replace three-tier shift schedules. Karlson et al. (2009) found that slower backward rotating shifts improved shift workers ability to function, which somewhat correlates to the findings of Saksvik et al. (2011) in which participants reported that forward rotating shifts were the most difficult to which to adapt with regards to sleep. In contrast, Yong et al. (2010) postulated that fast forward rotating shift schedules were less detrimental to sleep than slow rotating shift schedules. Eldevik et al. (2013) found that quick returns had a significant association with symptoms of SWD, in particular insomnia, excessive sleepiness, and excessive fatigue. Future studies could also explore which shift is safer and less detrimental to shift workers between the aforementioned shift types.

Screen Employees Prior to Mandating Potentially Debilitating Schedules

Previous studies have also addressed how to predict vulnerability to SWD symptoms. Some individuals cannot change their circadian rhythm and are more

susceptible to SWD symptoms, while other individuals are able to adjust their circadian rhythm with their changing work shifts, resulting in no or few symptoms of SWD (Gumenyuk et al., 2012). One participant in my study mentioned how important sleep was for her, and that might have impacted how she was affected by the three-tier shift schedule. Characteristics associated with vulnerability to symptoms of shift work include age, weight, hyperarousal, and stress reactivity. In addition to stress reactivity being associated with SWD, sleep reactivity was shown to also be associated with increased levels of depression and anxiety (Kalmbach et al., 2015). According to Harvey, Gehrman, and Espie (2014), who used a psycho-bio-behavioral approach to understand who might be vulnerable to insomnia, one of the primary symptoms of SWD, stress reactivity would be a better indicator of insomnia vulnerability than hyperarousal. FI correlated with sleep and health complaints in shifts other than day shifts and appeared to be a predictor of occupational accidents (Greubel et al., 2010).

The FIRST might also be an effective method to predict an individual's vulnerability to insomnia as it is a questionnaire designed to identify vulnerability to sleep disturbance due to high stress events (Drake et al., 2004). Versions of FIRST in Japanese and French were created. Nakajima et al. (2014) validated the FIRST-J and Chen et al. (2015) validated the F-FIRST. Per Nielson et al. (2016), the Brief NORSCI might be used to assess feelings of safety in current shift workers. Future studies could conduct research on comparing the effectiveness of these predictive systems.

Educate Employers and Employees Around the Challenges of Three-Tier Shift Schedules

Employers should realize the detrimental effects they are forcing upon their employees. Not only do three-tier shift schedules negatively impact the health and safety of employees, but it also decreases the employees' performance and efficiency at work. Therefore, it would be in the best interest of the employer to decrease the effects of three-tier shift schedules, either by abolishing or decreasing the frequency of three-tier shift schedules, or at the very least by learning and decreasing the challenges associated with three-tier shift schedules. Both employers and employees could learn about the challenges surrounding three-tier shift schedules and make the decision to mandate or accept such schedules of employment.

Better schedules could be a viable option. Employers could also investigate how varying shift schedules affect employees and encourage open communication with employees on what might work best for them. Chapter 2 included many previous studies with regard to which schedules might be more beneficial than others. Karlson et al. (2009) proposed that ability to sleep, function, and maintain relationships was better served through a backward rotating shift, whereas Yong et al. (2010) suggested that faster rotating shift schedules were less detrimental to sleep than slow rotating shift schedules. This might lend support to the one participant who had a fixed schedule still having lingering effects of working a three-tier shift schedule as opposed to the other participants who stated that their work shift symptoms had alleviated.

Conclusion

Many studies describe the detrimental effects of shift work, but most of them refer to two-tier or night shift schedules. Three-tier shift schedules appear to also lead to traffic

and occupational accidents due to the impairment of an individual to perform effectively (Culpepper, 2010), and also appear to be associated with altered mood levels (Meyrer et al., 2009). Previous studies have shown that working night shifts might be more detrimental than working day shifts. The effects of working a three-tier shift schedule were not available for comparison with the other shift schedules at the time of this study. Based on the perceptions of the participants and my own experience working a three-tier shift schedule, I hypothesize that a three-tier shift schedule is actually the worst type of shift work enforced on an individual.

According to the findings in this study, three-tier shift schedules appear to be more detrimental than straight night shift schedules. Participants' physical and mental well-being was negatively impacted by the three-tier shift schedule, and their relationships were challenged. Participants reported decreased motivation to interact in society and decreased mental and physical health. These effects are more similar to two-tier shift, night shift, and rotational shift schedules than to regular daytime hour shift schedules.

Three-tier shift schedules are detrimental to health and functioning, and should be greatly decreased or eliminated altogether. Management should be mindful of the impairments associated with three-tier shift schedules and explore alternative methods for covering around-the-clock duties. Three-tier shift workers suffer impacts to mental and physical functioning, social functioning, and safety. It is especially important to recognize the detrimental effects of a three-tier shift schedule on the health and safety of not only the employees who work these schedules, but also to the community as these

employees interact with their surroundings. Decreased casual conversations in supermarkets might be dismissible as a side effect of working a three-tier shift schedule, but traffic accidents have a larger impact on the community and could result in destruction or loss of property, or worse, life.

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Appendix A: Communication with Potential Participants

Date:

Dear (Name),

My name is Jillian Wallace, and I am a doctoral candidate at Walden University. I am conducting dissertation research on the effects of three-tier shift schedules on health and community functioning. There are numerous studies with regard to the detriments of night shifts, and there are conflicting studies as to the effect of two-tier shift schedules, but there are no specific studies as to how three-tier shift schedules affect workers' functioning. This research will explore perceptions of workers with regard to their functionality while working three-tier shift schedules.

Participants are free to choose whether or not to participate and can discontinue participation at any time. Declining to participate or withdrawing from the study will in no way negatively impact the participant's relationship with the researcher. Information provided by the participants will be kept strictly confidential.

I welcome a telephone call from you to discuss any questions you may have concerning this study and your role as a research participant. I can be reached at XXXXXXXX or e-mailed at XXXXXXXX.

Sincerely,

Jillian Wallace
Doctoral Candidate
Walden University

Appendix B: Interview Protocol

Date:_____

Location:_____

Name of
Interviewer:_____

Name of
Interviewee:_____

Shift Schedule (e.g., frequency of rotation [if any], duration of shifts – including meetings, etc.):

Part I - MCAS-Based Questions for the Evaluation of Community Functioning

Section 1 – Interference with Functioning: This section pertains to those physical and psychiatric symptoms that make life more difficult for the participant.

1. Physical Health:
(a) Please describe any chronic health problems prior to beginning a three-tier shift schedule, including frequency and severity of acute illnesses. Please offer an example.
(b) How do you feel working a three-tier shift schedule has affected your physical health? Please offer an example.

2. Intellectual Functioning:
(a) Please describe your intellectual functioning prior to beginning a three-tier shift schedule, including verbal skills, memory, and response time to general questions, e.g. what you had for dinner last night. Please offer examples.
(b) How do you feel working a three-tier shift may have impacted your intellectual functioning? Please offer an example.

3. Thought Process:
(a) Please describe your thought process, or method of thinking, prior to beginning a three-tier shift schedule, (e.g., thought coherency, logical and clear presentation of ideas, loose associations, tangential or circumstantial thinking [the opposite of succinct], racing thoughts, and thought blocking [stopping speech mid-sentence]. Please offer an example.

(b) How do you feel your thought process has been affected by working a three-tier shift schedule? Please offer an example.

4. Mood Abnormality:
(a) Please describe your typical range and level of moods during a typical day prior to beginning a three-tier shift schedule, e.g. were you usually calm, did you oscillate frequently between happy and sad, etc. Please offer an example.
(b) How do you feel your mood has been affected by working a three-tier shift schedule? Please offer an example.
(c) In what ways might your mood after a three-tier shift be inappropriate for a situation? Please offer an example.

5. Response to Stress and Anxiety:
(a) Please describe how you would respond to stress or anxiety prior to beginning a three-tier shift schedule, including extreme responses or no response to events that should be of concern, as well as difficulty in handling anxiety as evidenced by agitation, perseveration, inability to problem-solve, etc. Please offer an example.
(b) How do you feel working a three-tier shift schedule may have affected your responses to stress and anxiety? Please offer an example.

Section 2 - Adjustment to Living: This section pertains to how the participant functions in his/her daily life and how he/she has adapted to the three-tier shift schedule.

6. Ability to Manage Money:
(a) Please describe how you managed your money and controlled expenditures prior to beginning a three-tier shift schedule. Please offer an example.
(b) How do you feel working a three-tier shift schedule has affected your ability to manage your money and control expenditures? Please offer an example.

7. Independence in Daily Life:
(a) Please describe your activities of daily living, including personal hygiene, dressing appropriately, obtaining regular nutrition, and housekeeping. Please offer examples.
(b) How do you feel working a three-tier shift schedule has affected your activities of daily living? Please offer an example.

8. Acceptance of three-tier shift schedule:
(a) How did you feel about working a three-tier shift schedule before you began to work such a shift? Please offer an example.
(b)How did you feel about working a three-tier shift after having worked such a shift for at least three months consecutively? Please offer an example.

Section 3 – Social Competence: This section pertains to the capacity of the client to engage in appropriate interpersonal relations and culturally meaningful activity.

9. Social Acceptability:
(a) Please describe relationships with significant others, family, friends, and strangers prior to beginning a three-tier shift schedule, e.g. satisfactory daily contact, greetings to passersby, etc. Please offer an example.
(b) How do you feel working a three-tier shift schedule has affected your relationships and how other people react to you? Please offer an example.

10. Social Interest:
(a) Please describe your interest in social interaction prior to beginning a three-tier shift schedule, including frequency of initiating social contact or response to others' initiation of social contact outside of work. Please offer an example.
(b) How do you feel working a three-tier shift schedule impacted your social interests? Please offer an example.

11. Social Effectiveness:
(a) Please describe your interactions with others outside of work (strangers) prior to beginning a three-tier shift schedule, including how well you minimized interpersonal friction, met personal needs, achieved personal goals in a socially appropriate manner, etc. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected how you interacted with others outside of work (strangers)? Please offer an example.

12. Social Network:
(a) Please describe your personal social network prior to beginning a three-tier shift schedule, including interested family, friends, acquaintances, professionals, coworkers, socialization programs, etc. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your personal social support network? Please offer an example.

13. Meaningful Activity:
(a) Please describe your meaningful activities that are satisfying outside of work prior to beginning a three-tier shift schedule, including arts and crafts, reading, going to a movie, etc. Please offer an example.
(b) How do you feel working a three-tier shift schedule impacted your meaningful activities? Please offer an example.

Section 4 – Behavioral Problems: This section pertains to those behaviors that make it more difficult for the participant to integrate successfully in the community or comply with his/her prescribed treatment.

14. Medication Compliance:

(a) Please describe your dietary supplement regime, including vitamins, prior to beginning a three-tier shift schedule. Please offer an example.
(b) How do you feel working a three-tier shift schedule has affected your supplement regime? Please offer an example.

15. Time management:
(a) Please describe your time management skills prior to beginning a three-tier shift schedule, including keeping appointments and following through on reasonable requests. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your time management skills? Please offer an example.

16. Alcohol/Drug Abuse:
(a) Please describe your alcohol and/or pharmaceutical intake prior to beginning a three-tier shift schedule, including (ab)use to the extent that it interfered with functioning. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your use of drugs and/or alcohol? Please offer an example.

17. Impulse Control:
(a) Please describe how you navigated your wishes/impulses prior to working a three-tier shift schedule, including maintaining a stable mood, frequency of temper outbursts, spending sprees, aggressive actions, suicidal gestures, inappropriate sexual acts, etc.. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your impulse control? Please offer an example.

Part II - Literature-Based Questions to Explore Various Aspects of Functioning

Section 1 – Sleep: This section explores the participants' perceptions of sleep before and after working a three-tier shift schedule.

18. Symptoms of SWD:
(a) Please describe your sleep patterns prior to beginning a three-tier shift schedule, including duration, consistency, excessive sleepiness, insomnia, abnormal sleep behavior, and inability to fall asleep. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your sleep? Please offer an example.

Section 2 – Physical Health: This section explores the participants' perceptions of physical health before and after working a three-tier shift schedule.

19. General Health:

(a) Please describe your perception of your general health prior to beginning a three-tier shift schedule, including frequency and duration of illness and dental perceptions. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your perception of your general health? Please offer an example.

20. Diet:
(a) Please describe your diet prior to beginning a three-tier shift schedule, including amount and frequency of meals and liquids. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your diet? Please offer an example.

21. Fitness:
(a) Please describe your physical fitness prior to beginning a three-tier shift schedule, including any prior diagnoses, any organ problems, waistline circumference, gastrointestinal complaints, chronic pain, and otorhinolaryngology. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your physical fitness? Please offer an example.

22. Energy:
(a) Please describe your energy level prior to beginning a three-tier shift schedule, including fatigue. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your energy level? Please offer an example.

Section 3 – Mental Health: This section explores the participants' perceptions of mental health before and after working a three-tier shift schedule.

23. Moods:
(a) Please describe your mood patterns prior to beginning a three-tier shift schedule, including range and irritability levels. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your moods? Please offer an example.

24. Anxiety:
(a) Please describe your level of anxiety prior to beginning a three-tier shift schedule, including test anxiety, panic attacks, frequency, and duration. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your anxiety? Please offer an example.

25. Depression:

(a) Please describe any symptoms of depression you felt prior to beginning a three-tier shift schedule, including sadness, apathy, excessive crying, duration, and consistency. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected any depression you may have felt beforehand? Please offer an example.

Section 4 – Performance and Safety Concerns: This section explores the participants' perceptions of safety before and after working a three-tier shift schedule.

26. Performance:
(a) Please describe your work performance prior to beginning a three-tier shift schedule, including concentration level, mistakes, and ability to care for dependents. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your work performance? Please offer an example.

27. Safety:
(a) Please describe your sleep patterns prior to beginning a three-tier shift schedule, including duration and consistency. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your sleep? Please offer an example.

Section 5 – Social Impacts: This section explores the participants' perceptions of social impacts before and after working a three-tier shift schedule.

28. Emotional Problems Socially:
(a) Please describe any emotional difficulties you experienced prior to beginning a three-tier shift schedule, including mood changes which may have led to conflicts and misunderstandings in your social network. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected any emotional interactions on a social level? Please offer an example.

29. Life Reflections:
(a) Please describe how you reflected on life prior to beginning a three-tier shift schedule, including setting boundaries and evaluating values and goals. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your reflections on life? Please offer an example.

30. Self-Care and Being Healthy:
(a) Please describe your satisfaction level with your self-care and being healthy prior to beginning a three-tier shift schedule, including your ability to recuperate and reenergize. Please offer an example.

(b) How do you feel working a three-tier shift schedule affected your self-care and ability to remain healthy? Please offer an example.

31. Occupational Support:
(a) Please describe your perception of occupational support prior to beginning a three-tier shift schedule, including encouragement, meaningful activities, and perceptions for personal growth. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your perception of occupational support? Please offer an example.

32. Shift and Part-Time Work:
(a) Please describe your perception of shift- and part-time work prior to beginning a three-tier shift schedule, including work-life balance. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your perception of shift- and part-time work? Please offer an example.

33. Family and Support Network:
(a) Please describe your perception of your immediate family and support networks prior to beginning a three-tier shift schedule, including resources for positive/negative feelings and ability to manage difficulties. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your perception of your immediate family and support networks? Please offer an example.

34. Comforting Home:
(a) Please describe your perception of a comforting home prior to beginning a three-tier shift schedule, including feelings of respite and promotion of activities of daily living. Please offer an example.
(b) How do you feel working a three-tier shift schedule affected your perception of a comforting home? Please offer an example.

Section 6 – Treatments: This section explores the actions taken by participants' to assist in alleviating symptoms of working a three-tier shift.

35. Treatments:
(a) Please describe any actions taken in order to facilitate working a three-tier shift schedule, including physical activity, sleep hygiene, oral supplements, and bright light therapy. Please offer an example.
(b) How do you feel these treatments have assisted you while working a three-tier shift schedule? Please offer an example.

Part III – Optional Questions

Section 1 – Assessing SWD: This section includes the three questions verbatim from the literature review which were designed to specifically assess and diagnose SWD. This section is optional. A positive response to all three questions correlates to a diagnosis of SWD.

36. Do you experience difficulties with sleeping or excessive sleepiness? (yes/no)

37. Is the sleep or sleepiness problem related to a work schedule where you have to work when you would normally sleep? (yes/no)

38. Has this sleep or sleepiness problem related to your work schedule persisted for at least one month? (yes/no)

Section 2 – Demographics: This section includes optional demographic questions which may have had an impact on symptoms of SWD according to the literature review.

Age: _____

Gender: _____

Ethnicity: _____

Number and Age of Children: _____

Highest Level of Education: _____

Income: _____

Waking preference (e.g., morning person or night owl):
_____