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# The Reproductive Health Experienced by Female Shift Workers in the United States

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Abstract

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## Abstract

Shift work has become a normalized part of the occupational schedule across all industries, where previous research has illustrated the detrimental effect on female reproductive health. The conceptual lens that this research used was based on shift work adaptation. Worker adaptability to shift work, through management of occupational and non-occupational demands, may be fundamental in reducing negative health outcomes associated with shift work. This descriptive qualitative study detailed the experiences of female shift workers in the United States to better understand the conditions, barriers, and perceptions of their reproductive health that lead to adaptive or maladaptive behavior amid a non-traditional work schedule. Semi-structured interviews were used to assemble a rich compilation of descriptions of female shift worker experiences and perceptions. Thematic analysis was used to draw insight and identify commonalities as they exist among participant descriptions, where final reporting defined and interpreted themes present in the data. Six themes emerged from the data: (a) time, (b) anatomical and physiological characteristics, (c) workplace accommodations, (d) reproductive health education, (e) cognizance of sexual health, and (f) sexual consequences. Participants' insights provided a voice to the contemporary female shift worker in the United States. This study brings awareness for positive social change to the conditions and barriers that participants experienced in maintaining their reproductive and sexual health.

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# Dedication

This study is dedicated to the men and women who have contributed to the scientific field over the decades, allowing for new research opportunities to better humanity. It is through a foundation of knowledge that we are able to better understand the intricacies of human nature and build upon its continual growth in innovation, safety, and longevity.

# Acknowledgments

I would like to thank my husband and two children for supporting me through my education journey. Callie and Finn, you have given me the drive to make the world a better place and have given me the reasons for pursuing higher education. Zack, it is with your love and support that I can continue seeking knowledge so that I can contribute to significant, positive social change.

I would also like to thank my two biggest mentors. Dad, you have been my life-long hero, proving to me that no amount of money or notoriety should ever dictate generosity. You have taught me to always give to the best of my ability and help others in need, with no expectation of reciprocation.

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# Chapter 1: Introduction to the Study

## Introduction

Work schedules play an important role in structuring organizations, societies, and individuals (Costa & Silva, 2019). For many Americans, the institution of 24/7 economics have necessitated nontraditional work schedules in which incompatible work and non-work domain demands can lead to work-life conflict, sleep disruption, associated negative health outcomes, relationship tension, and reduced productivity (Karhula et al., 2018). In order to address the demands of economic growth, shift work has been instituted in many industries to create working hours for periods of time that fall outside of the traditional weekday, daylight, or non-rotating schedule (Rosa & Colligan, 1997).

In the modern world, in which shift work holds great economic importance, the disruption of a natural sleep-wake cycle has a significant impact on mental and physical health, which affect the clock genes associated with hormone secretion (Khan et al., 2018). Alterations to circadian regulated "clock gene" expression commonly occurring because of shift work can impair or disrupt female reproductive health (Pan et al., 2020). The dysfunctional effect of shift work on female reproductive health has been associated with marital problems, changes in menstruation, pregnancy complications, spontaneous abortion, and increased risk of hormone disorders (Nikpour et al., 2020). Exposure to rotating work hours may cause sleep disturbances that interfere with female pituitary and ovarian hormone levels necessary to maintain healthy menstrual cycles, sexual function, and libido (Valenzula-Peters et al., 2017). The consequences of shift work schedule's

circadian disruption on female sexual dysfunction development and progression have thus far been poorly researched (Stamatiou et al., 2016).

Research findings have revealed an association between sexual function and sexual satisfaction, where reduced vaginal lubrication, inability to reach orgasm, and painful intercourse relate to lesser sexual pleasure (Zegeye et al., 2020). Sexual performance can play an important role in the mental health, quality of life, and overall satisfaction of a female, and therefore sexual dysfunction can disrupt life and impact overall well-being (Mohammadian & Dolashahi, 2019). Satisfactory sexual life is a crucial element to maintain a good health-related quality of life. Research has shown a causal relationship between shift work and a low level of sexual life satisfaction, yet the mechanisms that exacerbate sexual dysfunction warrant further research (Ji, 2017). Chapter 1 introduces the known role that shift work has on reproductive health, identifies gaps in existing research, and discusses how this study seeks to address those gaps.

## Statement of the Problem

Sleep and sex are vital to physical, mental, and emotional well-being. While the interplay between sleep and female sexuality has been identified, a lack of understanding on the relationship between sleep disruption, time of day sleep schedule, and insomnia on female sexuality calls for additional research (Abdallah et al., 2021). Despite sleep deprivation, the motivation to engage in sex can have a powerful impact on the duration and desire for rebound sleep (Beckwith et al., 2017). As shift work conditions are not universal among all industries and occupations, a broader study into the sexual quality of life without the bounds of occupation is needed to identify correlation (Khastar et al.,

2020). The complex interaction between shift work-induced sleeplessness and sexual reproductive health needs further investigation to inform approaches to alleviate and eradicate reproductive health concerns among female shift workers (Lateef & Akintubosun, 2020). The World Health Organization (WHO) introduced sexual health as a factor in reproductive health, where sexual health is a basic need for third millennium development (Nikpour et al., 2018). Investigating the lived experience of female shift workers brought a greater understanding of how time-of-day schedule interplays with sexuality. This knowledge brings awareness to the reproductive health issues faced by shift workers in the United States, as previous research has focused primarily on female shift workers in various other countries around the world.

Sex and gender, explored as variables associated with health, must be examined separately, as genetic and hormonal factors are sex specific (Samulowitz et al., 2018). Social determinates of health may vary when gender is used to define a population rather than sex, as gender roles may influence behaviors that would otherwise compromise health beyond a biophysiological condition (Phillips, 2005). The perception of what defines a “woman”, from a gender perspective may change based on socio-cultural context, whereas the influence of female biology has measurable outcomes on sexual and reproductive functions (Rahbari & Mahmudabadi, 2017). This research specifically looked at the female experience, of which biophysiological influence to circadian rhythm, sexual drive, and reproductive organ functioning were explored without social confounding variables associated with non-biological female experiences. I sought to understand if reproductive health problems among female shift workers reflect a global

population rather than isolation to one nation (Nikpour et al., 2020). Elements of sexual experience are understudied in reproductive health research, and addressing reproductive health through the exploration of sexual health will allow for a more comprehensive understanding of the experiences of shift working females (Abadian et al., 2021).

## Purpose of the Study

The purpose of this qualitative study was to provide a more robust understanding of how female shift workers describe their reproductive health. To address the gap in previous research, a descriptive method was used to explore female reproductive health through a contemporary lens that expands on how female shift workers describe their reproductive health vis-à-vis a non-traditional work schedule as well as how female shift workers describe their sexual reproductive health. As the WHO recognizes sexual health as a component of reproductive health, this study incorporated the evolving definition of reproductive health to contribute to a more complete understanding of what reproductive health looks like following the COVID-19 pandemic. Using semi-structured interviews allowed participants to provide their experiences, stories, and narratives so that diverse opinions and views more accurately described the contemporary female shift worker's reproductive health experience. This study was designed to investigate if commonalities exist among contemporary female shift worker reproductive health descriptions as seen in countries outside of the United States.

## Research Questions

RQ1: How do female shift workers in the United States describe their reproductive health in the context of a non-traditional work schedule?

RQ2: How do female shift workers in the United States describe their sexual health in the context of a non-traditional work schedule?

## Conceptual Framework

Rutenfranz et al. (1981) proposed one of the initial models that described the relationship between health and occupational shift schedule: the model of adaptation to shiftwork. This model provides a basis for understanding how alterations in sleep and waking hours caused by shift work produce stress that is directly responsible for the development of health problems. The relationship between sleep, stress, changes in schedule, and the development of illness or disease can be mediated by factors such as an individual's personality or family situation. Maladjustment to shift work schedules and socioemotional relationships may contribute to health problem development, according to this conceptual model.

Olsson et al. (1990) incorporated the conceptual model of adaptation to shift work and its relationship with health, proposed by Ruenfranz et al. (1981), adding personal factors as a variable influencing health outcomes. Olsson et al. identified that the strain caused by occupational, nonoccupational, and personal factors (e.g., lifestyle) influence disease and illness development dependent on the individual's coping and appraisal of circumstances. Shift workers are presumed under the work of Olsson et al. to possess the ability to mitigate stress through an appraisal of available cognitive and behavioral activities that can reduce strains that would induce mental or physical illness. This research links the appraisals of female shift workers' occupational stressors,

socioemotional relationships, and personal factors to reproductive health through understanding the lived experience of this population.

As shiftwork becomes increasingly more prevalent in contemporary society, the effect of occupational and nonoccupational stressors, coupled with coping and management of said stressors, have been shown to influence illness and disease development (Smith et al., 1999). Integrating the conceptual models proposed by Rutenfranz et al. (1981) and Ollson et al. (1990) into this research provided a better understanding to the reproductive health experienced by female shift workers in the United States.

## Nature of the Study

To address the research questions in this qualitative study, the specific research design included a descriptive approach, with data gathered through semi-structured interviews. The descriptive approach to qualitative research involves the investigation of a poorly understood phenomenon through informant insights regarding experiences and events (Kim et al., 2017). This descriptive approach used semi-structured interviews to help me better understand the lived experience of shift workers and how it related to female reproductive health. Semi-structured interviews use predetermined, open-ended questions to allow for controlled topic-driven conversation while also allowing for follow-up questions to help the researcher better understand the experiences described by the participant (Given, 2008). I expected to better understand the various reproductive health aspects that are faced by female shift workers in the United States. This study addressed a gap in literature to inform female shift workers and shift-working industries

of the reproductive health experiences of female shift workers within the United States labor force.

The research design of this study included primary data collected through semi-structured, qualitative interviews. Semi-structured interviews allow for the collection of in-depth experiences and opinions, with focused questioning intended to loosely direct conversation within the bounds of a topic (Given, 2008). The data included Google Meet records and transcriptions of responses provided by participants to interview questions regarding off-shift work habits and reproductive health self-assessment. All interviews were transcribed using the Google Meet Transcript extension from Google Meets.

## Definitions

*Female*: Having been biologically born with anatomical structures that produce oocytes (Schiappa, 2022).

*Gender:* A non-biological, social construct, varying in roles, values, and norms of a given era or society (Phillips, 2005).

*Physical health*: The genetically determined physical preparedness of an individual, adapted through physical development, to which a harmonious functioning of organs accompanies absence of pain and perceptions of comfort (Svalastog et al., 2017).

*Reproductive health*: Complete physical, social, and mental well-being that extends beyond simply the absence of illness, dysfunction, or disease in all reproductive functions and processes (World Health Organization, 2002).

*Sexual health*: The ability to engage in a safe and satisfying sex life in that the individual is able to choose when and how often sex leads to reproduction, as well as the

ability to engage in safe and pleasurable experiences unencumbered by violence or discrimination (Centers for Disease Control and Prevention, n.d.).

*Sexuality:* The biopsychosocial level of an individual's reflection of their attitudes, values, and behaviors aligned with their gender, sex, sexual identity, desire, eroticism, intimacy, pleasure, and reproduction (Crowell et al., 2017).

*Shift work*: Non-traditional occupational hours that include fixed or rotating time in evenings, overnight, or with extra-long workdays and/or falls outside of traditionally accepted hours between 7-8am and 5-6pm, Monday through Friday (Costa, 2010; United States Department of Health and Human Services, 1997).

*Woman*: A combination of two or more categories of anatomical, biological, genetic, socially accepted gender performance, and/or identity of gender; inclusive of those who have undergone female genital mutilation, menopause, hysterectomy, and sex reassignment surgery (Meyer, 2016).

## Assumptions

One of the cornerstones of qualitative research is the use of inductive reasoning, in which the researcher seeks new information through gathered data rather than pursuing specific findings (Walters, 2001). There were several assumptions guiding this research to include honest answers from participants, generalizability of interview questions, and the motivation of female shift workers to be self-aware of their reproductive health. Primarily, the validity of this study's findings hinged on the honesty of participants. Rapport building and assurance of confidentiality were tools used to make participants feel more comfortable in providing honest, robust answers. Secondly, it was assumed that

participants would come from various cultural backgrounds. Interview questions for this study were designed to be culturally sensitive, using jargon-less phraseology and terminology appropriate for adult conversation. Finally, this study assumed that female shift workers were both aware of and motivated to monitor their own reproductive health. As participant self-assessments were used as data, it was assumed that the adult participants would have had experience in caring for or discussing with professionals their reproductive health. These assumptions were necessary to justify inclusion of participants for this study.

## Scope and Delimitations

This study explored how female shift workers in the United States described their reproductive health, educational background regarding reproductive health, challenges or barriers encountered in seeking routine reproductive health services amid a non-traditional work schedule, sexual health, and demands of occupational schedule on fulfilling sleep requirements while fulfilling reproductive health needs. Focusing on the lived experiences of female shift workers who are of legal age to make decisions regarding their reproductive health improved the likelihood that participants would have experience in monitoring and managing their reproductive and sexual health. Through the course of data collection, new insights into the experiences of the female shift worker expanded on previous literature and illuminated the understanding of how female shift workers navigate their reproductive health amid a non-traditional work schedule.

The representative population for this study was adult, female shift workers in the United States. Inclusion criteria include having been employed currently as a shift worker

for a minimum of 6 months, biological female status, 18 years of age or older, and a non-traditional work schedule. As previously defined, the non-traditional work schedule was described as shift work and fall outside of 7am to 6pm Monday through Friday (Costa, 2010; United States Department of Health and Human Services, 1997). Information disclosed in this research was transcribed and participant identity remained confidential, where any audio or video recordings of the participants were properly disposed of following completed transcription. As much of the interview content was of a sensitive nature, personal identifying information was excluded from data collected, analysis, and reporting to protect the privacy of participants, build trust, and maintain ethical standards of integrity throughout the research process (Kaiser, 2009). The decision to exclude non-biological females was made to ensure that confounding variables, such as biological implications of gender reassignment, employment opportunities, and psychosocial variables can be controlled. Additionally, females under 18 years of age were excluded from this study, as they do not have legal autonomy to consent to medical decisions without parental consent, which may inhibit their understanding or ability to independently engage in their reproductive health.

This study used a descriptive qualitative methodology to conduct semi-structured interviews for the purpose of obtaining rich data regarding the descriptions of female shift workers in respect to their reproductive health. To address the complexities of human behavior as it relates to off-shift behavior, a qualitative methodology was chosen as a more suitable option than a quantitative design. A qualitative design allows for a more in-depth understanding of the experiences of female shift workers, whereas a

quantitative design may have limited participant input with closed-ended questions that may not fully capture the subjectivity of reproductive health (Lakshman et al., 2000). This study covered the subjective description of reproductive and sexual health as expressed by participants; however, it did not investigate specific medical conditions or hormonal values. This study was limited to the self-accounting of experiences and behaviors described by selected participants.

## Limitations, Challenges, and Barriers

Communication is a vital part of data collection in a descriptive qualitative study, where communication can influence output data through misunderstanding of words that may have alternative meaning either to the researcher or participant (Sholl, 2015). This study was limited to female shift workers in the United States; the lack of universal language or dialect was understood to be a factor that may have created challenges in data collection (Leonard et al., 2020). Additionally, there may have been a barrier to accessing participants that read and speak languages other than English as a primary, limiting the population of potential participants to those that were able to read and understand the advertising flyers (Laanterä et al., 2011).

Another potential limitation to this study was participant involvement that may result in participant fatigue affecting completion of the interview, drop-out due to the nature of questions, and the reliability of self-reporting by the participant (Theofanidis & Fountouki, 2018). A challenge of recruitment was anticipated to be the inhibitions of participants to discuss sensitive, personal information (Queiros et al., 2017). Questions about sexuality, sex, and various other reproductive health topics may create discomfort

for both the researcher and participants (Herson et al., 1999). In conducting research on a sensitive topic, apprehension about openly and honestly answering questions in which the participant may perceive judgement may have inhibited responses (Noland, 2012).

To understand the complex reality of the phenomenon, careful consideration of participant eligibility was necessary to address the breadth of shift work among various industries (Queiros et al., 2017). Enlisting participants in various occupational fields, while still meeting research saturation, involved a lengthy recruitment process. As I sought to discover universalities among female shift workers, cultural influence other than educational background regarding sexual and reproductive health were not investigated. Though comparison of various groups may be beneficial to support similarities and differences, the lack of methodological guidelines for qualitative comparison groups was anticipated to be a challenge (Lindsay, 2018).

Finally, the use of social media to recruit participants may not yield sufficient involvement for generalizability (Koo & Skinner, 2005). Reliance on social media and physical fliers may have limited the number of participants willing to negotiate their already time-strained availability for involvement. Participants must have met inclusion criteria to be eligible for the study, and the recruitment practice may have attracted only those with active social media accounts or those who saw the flyers. Reliance on optics, in the context of initial interest outreach, may have created a barrier to recruitment.

## Significance

The study fills a gap in existing research on the described reproductive health problems faced by shift workers in the United States. Shift work is becoming increasingly

more common, so understanding the lived experience of these workers provides insight into the impact work schedule has on reproductive health. Understanding the complexities of female reproductive health includes highlighting the influence of sexuality on quality-of-life satisfaction, barriers associated with reproductive healthcare due to occupational schedule, and individual educational backgrounds that may influence perceptions of reproductive and sexual health. The results of this study are aimed at improving worker quality of life that can translate to increased productivity and decreased attrition.

In 1966, Julius Fast published *What You Should Know About Human Sexual Response* after identifying changes in social norms required an updated commentary and analysis of the modern female's sexual experience. Perceptions and understanding of the complexities involved in reproductive health are ever evolving, where modern court rulings dictate a change in the future of female reproductive rights. On June 24, 2022, in the case of Dobbs v. Jackson Women's Health Organization the Supreme Court ruled that the 50-year precedent grounded in Roe v. Wade and Planned Parenthood v. Casey were unconstitutional and sent abortion rights back to the states (Dobbs v. Jackson Women's Health Organization, 2022). Following the Supreme Court ruling, wide-ranging restrictions and bans of abortions and abortifacients inequitably affect the autonomy and bodily integrity of females of color, young females, those in abusive relationships, and low income or rural females (Gostin, 2022). Significant changes to abortion and family planning legislative regulations are exceedingly rare, and studies of the effects of these

restrictions have rarely analyzed the contemporary outcomes on human capital on the labor market and on females themselves (Bailey et al., 2019; Hajdu & Hajdu, 2021).

The COVID-19 pandemic has had a direct impact on occupational workload, increased stress, and quality of sleep where investigation into various occupations and personal circumstances are needed to understand shift workers' off-shift modifiable behaviors that contribute to their health (Maunder et al., 2021). Original research is needed to improve awareness on various aspects of sexual and reproductive health amid unprecedented times of the COVID-19 pandemic to minimize the negative impact that the pandemic may induce on the reproductive and sexual lives of individuals globally (Pennanen-Iire et al., 2021). This study sought to evaluate the descriptions of female shift workers' reproductive health to produce a current commentary amid the changing landscape of federal legislative changes and the COVID-19 pandemic in the United States.

## Summary

Chapter 1 provided an overview and introduction to the role that shift work plays on female reproductive health. This chapter discussed the evolving socio-political landscape as well as a public health pandemic that may be relevant to the sexual and reproductive health of shift workers as it impacts off-shift behaviors and quality of life. The human capital element of the United States economy relies on healthy workers to engage in production. Understanding the experiences and descriptions of female shift workers' reproductive and sexual health may further uncover universalities that can improve quality of life and increase adaptability to a non-traditional work schedule.

Chapter 2 provides an in-depth overview of shift work to include health risks, reproductive issues faced around the world, the role of circadian disruption, the relationship between sleep and reproductive health, hormones associated with reproductive health, and the role of sexuality on contemporary quality of life.

# Chapter 2: Literature Review

## Introduction

Chapter 2 encompasses a thorough literature review of existing research as it pertains to the known occupational conditions of shift work and relevant key concepts of reproductive health among female workers. Key concepts in this study include the known relationship between shift work and health, reproductive health issues faced around the world, circadian disruption, the relationship between sleep and reproductive health, hormones associated with reproductive health, shift work influence on reproductive hormones, and the role of sexuality as a factor of reproductive health through a contemporary perspective. This chapter also reiterates the study's problem and purpose statements, discussing the significance of the study's outcomes as it relates to filling a gap in existing research on the perceived reproductive health problems faced by female shift workers in the United States.

Working conditions, such as working time, link the basic human capacity to means of production (Kreitzman, 1999). Traditionally, working hours are accepted to be between 7-8am and 5-6pm, Monday through Friday (Costa, 2010), with the United States Department of Health and Human Services (1997) further defining shift work as any occupational hours that include fixed or rotating time in evenings, overnight, or with extra-long workdays. To meet the demands of the labor market, diversification in occupational scheduling has become a social norm and organizational standard, where shift work has become an integral part of the modern industrial economy (Brown et al., 2020).

## Background

The shift work schedule has become an instituted labor pattern, originating in meeting the demands of industries to sustain high levels of production during turn of the century war time and the boom of industrialization in the United States (Dunham, 1977). To account for the challenges of shift work, the United States government recognized that the increased impact of occupational schedules required regulation to reduce inconveniences and improve social amenities granted to their traditionally scheduled counterparts; as such the Fair Labor Standards Act of 1974 was established (Tasto & Colligan, 1977). Shift work often interferes with the worker's personal life by imposing time constraints that restrict valuable time necessary for work-rebound recovery, relationship stability, and non-work domain demands (Choi et al., 2015; Wöhrmann et al., 2020). The Fair Labor Standards Act of 1974, an amendment to the Fair Labor Standards Act of 1938, was intended to protect workers against the challenges of shift work by establishing minimum wages, establishing overtime and maximum hour requirements, defining qualified compensated "working hours," specifying meal periods, and creating benefit retention statues (Henke, 1999).

Round-the-clock industries engaging in both continuous operations and processes, such as production, law enforcement, firefighting, health care, transportation, communication, retail, hospitality, and utilities often rely on shift work to meet economic and production needs (Tasto & Colligan, 1977). The advancement of a 24-hour society lifestyle has brought attention to the negative influences on health and wellness associated with the human biological adaptation to light-dark synchronization (Ljevak et

al., 2020; Reppert & Weaver, 2002; Savic et al., 2019). In a 1981 study, Rutenfranz et al. investigated the role of shift work and its relationship to health through the lens of occupational and related nonoccupational stressors, finding that maladjustment to shift work schedules can negatively influence sleep, stress, interpersonal relationships, and development of disease or illness. Shift work may be a causative factor of strain- and time-based conflict, imposing significant stress on workers attempting to balance work and non-work domains. According to Iskra-Golec et al. (2017), time and strain conflict related to non-standard working schedules interfere with rest, nutrition, relationship satisfaction, homecare duties, personal enhancement, and enrichment. Despite the efforts of the Fair Labor Standards Act of 1974 to financially accommodate workplace demands, changes in light/dark exposure and conflicting time-based non-occupational life demands nonetheless have biological repercussions and health consequences.

Chronic circadian disruption may be an associative factor in hormonal imbalances affecting female reproductive health among shift workers (Drake & Wright, 2011; Wickwire et al., 2017). Shift work-associated reproductive health problems may include marital dilemmas, gynecological problems, conflict between pregnancy and occupational schedule, breastfeeding challenges, limitations to childbearing, and impaired sexual relationships (Attarchi et al., 2013; Bonzini et al., 2009; Lee et al., 2012; Whelan et al., 2007). While female reproductive health is fundamental to the perpetuation of humans, there exists conflicting research in regard to the causal link between reproductive health issues and occupational schedule (Nikpour et al., 2020). Reproductive health is a complex, often subjective, concept that may be difficult to define in quantitative designs

as sexuality and reproduction are sensitive topics that may require a more in-depth understanding of meaning and context (Ahmaifaraz et al., 2014). Exploring female reproductive health problems around the world is necessary to better understand the universal challenges faced by contemporary female shift workers (Nikpour et al., 2020). Therefore, this study is needed to better understand the known reproductive health problems perceived by female shift workers outside of the United States to better grasp if these problems are unique to one nation or universal. This study will help female shift workers better understand the risks of a non-traditional occupational schedule as it relates to their health, allowing for more informed time-of-day work scheduling. Additionally, the results of this research can be used by organizations to make places of work a safer environment for their employees with a greater emphasis on balancing circadian influence with health and wellness.

## Search Strategy

To investigate the previous research regarding shift work and reproductive health, the following databases were used for the purpose of this literature review: PsychINFO, EBSCO, APA PsycArticles, Health and Psychosocial Instruments (HaPI), SAGE Journals, Google Scholar, and Thoreau. Initial review of the literature provided a historical context to shift work, insight into the presence of adverse outcomes associated with occupational scheduling, and sleep disturbances among shift workers. The initial search terms included *shift work*, *work schedule*, and *health*. In review of the discussion and recommendations for further research in these studies, the repeated mention of female health problems triggered modification of the search terms to include *female*

*reproductive health*, *sexual health*, and *circadian disruption*. As the review process began, a clearer picture of the outcomes associated with shift work, circadian disruption, and female reproductive health dysfunction as an integrated response to occupational schedule emerged. Although the search was intended to find the most recent research, historical context and transitions of thought processes in association with working conditions were considered relevant to this study as a part of the conceptual framework and evolution of female perceptions of their reproductive health amid shift work hours.

## Conceptual Framework

The conceptual lens that this research used was based on shift work adaptation. Rutenfranz and Colquhoun (1979) first investigated the role of circadian rhythm on human performance and found that sleep "need" had a large negative effect on performance. This study investigated differences in occupational time of day schedule, age, personality, and sleep as they relate to one another, where circadian rhythm was found to be a fundamental element of alertness and productivity. The 1979 work of Rutenfranz and Colquhoun was conducted though meta-analysis of several studies that identified the correlation between worker productivity and circadian control, revealing that in industrial situations, there are conditions that influence performance rhythms. Situational and motivational factors influence masking behavior among workers, where financial gain and job security may motivate workers to continue to bank sleep debt associated with reduced sleep duration and alterations of rest/activity cycles. These masked motivations, while often serving their purpose in the short term, ultimately translate to quality and performance issues.

**Stress and Strain Concept**

Colquhoun and Rutenfranz (1980) described the "stress and strain" concept to explain the relationship between occupational health problems and nightwork conditions. Through this concept, nightwork conditions were described as the disruption of physiological rhythms experienced by shift workers and a slow rate of adaptation that causes stress and induces worker strain that may impact performance efficacy, physical and psychological wellness, and socioemotional relationships. The magnitude of effects in an individual is influenced by intervening variables that may work in conjunction or separately. Variables such as age, personality, preexisting rhythmic type, physiological adaptability, job type, length of shift, type of shift system, environmental conditions of the workplace, and social and domestic circumstances were factors associated with overall individual outcome measures of physical and mental health well-being. Factors influential to outcomes of physical and mental health may not necessarily be negative, as they may make adaptation easier or harder dependent on the combination of variables. Due to the complexity and variability of these factors, Colquhoun and Rutenfranz concluded that they are determinants of worker adaptability to shift work and place the onus of calculating the best fit of worker adaptability on not just the worker but on the hiring organization and community at large. As the same stress of night work may not universally pose the same risk of job-related disease development, it is necessary for us to develop a better understanding of the conditions to which the individual must adapt to be effective at shift work.

In 1982 Joseph Rutenfranz continued the investigation into the effects of shift work on disease and wellbeing, finding that the cause-and-effect relationship between job-related diseases and shift work adaptability have multifactorial origins. Rutenfranz postulated that several degrees of adaptation exist, in which patterns of behavior, innate characteristics, and pregiven daily-life conditions decrease the physical capacity to adapt, which reduces well-being and over time develops into disease. In many instances, it is not the direct action of the workplace that influences declining well-being and increased risk of disease; rather, the factors that influence adaptation to the workplace elevate risk factors of exposure. The motivation to follow a shift work schedule may not be universal, as some may take a position out of financial need while others may prefer the schedule as it best aligns with their personal organization of work/life balance. Sleep need may also be variable depending on the individual's non-occupational life demands, where the need for sleep or presence of sleep interruption may vary from person to person. Personality differences and situational differences were further expanded upon from earlier work between Colquhoun and Rutenfranz (1980). Personality differences, like extroversion or introversion, may dictate preferred time-of-day work and social interaction that may influence adaptability. Patkai (1971) found a significant relationship between introversion and work performance peak in the morning and extroversion and work performance peak in the evening, influencing personal preference to working schedule. Additionally, situational differences such as the presence or absence of a spouse/children, living conditions, levels of social support, and family acceptance of shiftwork play a significant role in adaptability.

**Previous Application of Shift Work Adaptation**

While there may be a lack of universal experience in shift work adaptability, proper scheduling of light exposure has been considered to optimize shift timing and limit risk factors associated with the non-traditional work schedule. Postnova et al. (2013) conducted a study with eight night-shift workers, where experimental conditions of light brightness and alterations of working schedule were examined against worker sleepiness. The experiment was intended to determine if variations in light control would produce positive adaptability to night work. Findings showed a positive correlation between adaptability in workers who started shifts with bright or regular light at 21:00 rather than 00:00, with reduced sleepiness. Findings also noted that people with the same chronotype (such as identical sleep times under normal conditions) may have different responses; however, those with similar homeostatic and intrinsic circadian parameters do not.

Previously, the work of Boivin and James (2002) examined the effects of a practical intervention to promote circadian adaptation to night shift work with 15 nurses. For this study, participants working ≥ 8 hour shifts at least 15 days per month on a regular night schedule were recruited. The participants were placed on a period of ≥10 days in which they worked a regular daytime schedule, and then were admitted to a laboratory for circadian phase assessment via a 36-hour constant routine. The nurses were then placed on 23-nightshifts, based on their regular schedule, as either an intervention or control worker. Intervention workers received 6 hours of intermittent bright-light exposure in the workplace followed by bright morning outdoor light shielding with tinted goggles, whereas the control group were observed in their habitual working conditions.

Throughout the experimental phase of this study, workers maintained their regular sleep/ wake schedules, and circadian markers of core body temperature and salivary melatonin cycles were assessed. Findings show that significant circadian phase delays were displayed by the control group. These results support practical intervention efficacy for promoting circadian adaptation, through occupational considerations of light exposure on night workers.

Additional studies have identified the need for social support and coping strategies to enhance shift work adaptability. Gifkins et al. (2017) conducted semi-structured interviews with new and experienced nurses performing shift work. Perceptions in the utility of shift work, coping strategies, and social support varied between experienced and inexperienced nurses. Experienced nurses indicated that support from family and friends, nursing manager support, and flexible shift arrangements made shift work advantageous, especially for those with dependents. Management and home life were found to be separate variables that collectively work together to impact worker adaptability positively or negatively. While inexperienced nurses indicated feeling socially disconnected, support from management and encouraged coping strategies were recommended for improvement in adaptation.

**Relevance of Shift Work Adaptation to the Current Study**

While the consequences of shift work are emerging, understanding the factors associated with negative outcomes may improve the quality of life experienced by shift workers. Adaptability plays a significant role in mitigating the negative effects of occupational schedule, where integrating realistic interventions into the workplace may

improve the lives of workers, improve health outcomes, increase worker productivity, and decrease attrition. Rutenfranz (1982) sought to determine the multifactorial origins that affect shift work adaptability. As shift work becomes more predominant in society, the various psycho-physiological, pathological, and social factors that influence maladaptation and/or tolerance to shift work must be considered (Costa, 2003). As Colquhoun and Rutenfranz (1980) presented the stress and strain concept to shift work adaptability, they noted that individual factors occurring outside of work must be considered to help researchers better understand the causal relationship between occupational schedule and health outcomes. Shift work policies and regulations vary widely from nation to nation, where special provisions for women and specific industries may offer varied supportive services (U.S. Congress Office of Technology Assessment, 1991). In the context of contemporary, female shift workers in the United States, exploration into their experienced reproductive health may provide insight into the various adaptive and/or maladaptive behaviors that influence wellness or disease.

## Chronic Health Problems of Shift Workers

Relative to non-shift laborers, there is a higher risk of adverse health outcomes among shift workers (Brown et al., 2020). Evidence suggests that shift workers may be more susceptible to long-term health and safety consequences through elevated risk of coronary heart disease, cancer, weight gain, type 2 diabetes, immunological dysfunction, accidents, and various other chronic health problems (Kecklund & Axelsson, 2016). As 24-hour economics contribute to the need for round-the-clock labor forces, the potential pathways to negative health effects have given rise to research regarding behaviors and

occupational conditions as they relate to health outcomes. Several pathways have linked shift worker risk factors of sleep disruption, reduced physical activity level, smoking, alcohol consumption, dietary disturbances, and poor mental health to negative effects (Booker et al., 2018; Caruso,2014; Proper et al., 2021).

Misalignment of light-dark cycles on human activity-rest cycles have been considered a causative risk factor associated with shift work (Caruso, 2014). The nontraditional demands of atypical work schedules often cause irregular sleep/wake cycles, leading to worse sleep quality, daytime function impairment, and physical/mental health side effects (Brown et al., 2020). Nighttime light exposure, which is associated with these working schedules, has been linked to changes in human behavior, leading to social misalignment and the inversion of activity and rest (Moreno et al., 2019). Khan et al. (2018) outlined the disruption connected with shift work and its impact on circadian rhythm dysregulation, normal sleep behavior, metabolic process dysregulation, alterations to the nervous system, effect on cancer expression, and psychosocial relationships; finding that shiftwork induced circadian disruption has a considerable impact on cancer controlling genes, psychiatric disorder controlling genes, and metabolic disorder related genes.

Karhula et al. (2018) studied the impact of working hour and its association with work-life conflict among Finnish hospital employees in a longitudinal study; findings support a parallel between negative work-life consequences and long work hours, weekend work, and night shift. This study surveyed 2,482 individuals, 93% of whom were female, to investigate if working hour characteristics paralleled changes in work life

conflict. This study used a time-dependent fixed effects regression model, with adjustments to marital status, number of children, and generalized stressfulness of life situations, to determine if a correlation between working hours and work-life conflict exists. The results of this study concluded that corresponding work-life conflict exists between evening, night, and weekend shift work where there is a parallel in increased conflict in accord with the amount of non-traditional working hour shifts. Long work weeks and quick returns after breaks in schedule also revealed increases in work-life conflict. The parallel changes between evening shifts and work-life conflict presented insight into affected well-being, productivity, depressive symptoms, sleeplessness, and increased incidence of sickness absences of shift workers who are strained by meeting the demands of shift work schedules and non-work domains. The concluding mental health strain caused by shift work schedules proved to have a profound impact on quality of life among those surveyed in this study.

Along with disturbances to sleep, shift workers are susceptible to ailments and diseases associated with the behavioral modifications necessary to meet the demands of non-occupational life domains (Ljevak et al., 2020). Research has found that shift workers are more likely to develop gastrointestinal (GI) symptoms than their non-shift working counterparts, these variations in bowel habits may be temporary and associated with night work however evidence suggests that long-term symptoms may persist dependent on working conditions and night work (Knutsson, 2003). Common gastrointestinal symptom complaints among shift workers include changes in appetite, indigestion, heartburn, vomiting, constipation, gas, nausea, diarrhea, and abdominal pain

(Knutsson & Boggild, 2010; van Mark et al., 2010). Factors such as interrupted workers' fatigue recovery, insufficient regular exercise, alterations to eating behavior, and exacerbation of existing metabolic disorders have been shown to be behaviors associated with shift work and lead to gastrointestinal interference (Liu et al., 2018). Due to the interplay between shift work schedules, circadian disruption, hormone dysregulation, and appetite regulation; glucose metabolism and lipid homeostasis may be impaired, leading to an increased risk of obesity, diabetes, peptic ulcers, functional GI disease, gastroesophageal reflux disease, chronic inflammatory bowel diseases, and nondescript GI symptoms (Knutsson & Bøggild, 2010; Liu et al., 2018). In respect to shift work, smoking habits have been shown to be a major confounding factor for upper gastrointestinal disease, gastritis, peptic ulcers, and unspecific gastrointestinal complaints (van Mark et al., 2010). Smoking habits have been shown to be more frequently found among shift workers where workers may be drawn to nicotine use to counteract fatigue and stress linked to non-traditional work schedules (Frost et al., 2009). In addition to smoking behaviors, psycho-physical health may be affected because of working conditions, adaptation to occupational schedule, psycho-physical fitness, sleep hygiene, and the ability to combine irregular working schedules with domestic duties (Costa, 2003). Risk factors associated with shift work may be dependent on the behaviors, conditions, and adaptability of the individual worker.

The cumulative impact of shift work on cardiovascular health has been related to gastrointestinal health as it correlates to cholesterol, triglycerides, and obesity (Frost et al., 2009; Knutsson & Bøggild, 2000). Knutsson and Bøggild (2000) found that shift

work stress negatively influenced behavioral problems such as smoking, unhealthy food habits, unphysiological timing of physical activity, and disturbed circadian rhythm, that negatively impact cardiovascular health. These factors are echoed by additional researchers who have made causal links between shift work and cardiovascular health. Theorell and Akerstedt (1976) demonstrated the relative risk of developing long-term cardiovascular disease as a night shift worker through their research that showed increased serum concentrations of uric acid, potassium, cholesterol, total lipids, and glucose.

Metabolic factors are often disrupted by shift work-adaptive behaviors, affecting the nervous system and cardiovascular system (Cheng et al., 2019). In adapting to the atypical schedule linked with shift work, modification to behaviors necessitated to sustain life such as eating habits, exercise, rest/sleep, and enrichment may have a profound effect on health (Liu et al., 2018). Metabolic syndrome is characterized by central obesity, glucose intolerance, dyslipidemia, and hypertension that increase the risk of cardiovascular disease, diabetes mellitus, stroke, and cognitive decline (Canuto et al., 2013). Cheng et al. (2021) conducted a longitudinal design, expanding on previous exposure data, to observe the relative risk of developing metabolic syndrome among shift workers and found that night shift workers had elevated levels of blood pressure, high waist circumference, sleep disturbances, and changes in diurnal cortisol levels. Findings from the Cheng et al. (2021) study observed, through a logistic regression model, the influence of lifestyle characteristics such as diet, physical activity, stress management, and sleep habits on the associated risk of metabolic syndrome among night shift workers.

In addition to worker behavior, shift work may cause occupational exposure that can impact health. Exposure to artificial light, workload, carcinogens, and noise are some of the most attributed risk factors associated with shift work (El-Benhawy et al., 2021; National Toxicology Program, 2021; Virkkunen et al., 2006). While physical activity is a well-known protective factor against cardiovascular disease, Virkkunen et al. (2006) found that over-strenuous emotional and physical workload can inversely affect heart health. Coupled with occupational noise, the direct physiological stress reaction triggered by workload and continuous noise can stimulate stress hormone secretions that increase blood pressure and heart rate, potentially leading to cardiovascular disease (Morrell et al., 1997).

Exposure to artificial light is common among night shift workers, where the biological effects can disrupt circadian rhythm, reduce the body's natural timing for rest and rebound, and increase cancer risks (National Toxicology Program, 2021). Exposure to blue light waves from fluorescent light desynchronizes homeostatic and circadian processes and has been recognized by the International Agency for Research on Cancer as a probable carcinogen (Straif et al., 2007). The ability to counteract exposure to carcinogens may be limited in nightshift workers, where research has found that compared to their dayshift counterparts, nightshift workers have significantly lower levels of melatonin and total antioxidant capacity and higher serum levels of inflammatory markers and cortisol (El-Benhawy et al., 2021). As cancer researchers examine the effects of shift work on disease development and metastasis, experimental evidence has demonstrated the link between accelerated tumor growth and the

suppression of melatonin associated with night work (Bonde et al., 2012). Melatonin is an indolamine neurotransmitter produced by the penial gland, with antioxidant, anti-inflammatory, and circadian adjusting properties crucial to antitumor development and progression (Fernandez-Palanca et al., 2021). Night shift work has been associated with melatonin production suppression, which can impede the positive effects of circadian regulation necessary for the inhibition of cancer development and other diseases related to light/dark homeostasis (Reiter et al., 2007). As melatonin regulates the sleep-wake cycle, cortisol acts as a bridge between the master wake/sleep clock and the modulation of endogenous and exogenous signals that mediate biological activities in periods confined to light or dark (Minnetti et al., 2020). Melatonin expression typically occurs during periods of low cortisol secretion, where night shift work specifically has been shown to elevate cortisol levels that may impede sleep quality necessary for better control of blood pressure, metabolism, and disposition (Minnetti et al., 2020; Zisapel & Laudon, 2005).

A case-controlled Danish study reported an increased risk of developing breast cancer among women 30- to 54-years old who worked predominantly at night, with these results adjusted for age, age at birth of first child, socioeconomic class, number of children, and age at birth of last child (Hansen, 2001). Employment history was reconstructed for the 7,035 participants, dating back to 1964. Odds ratios were used to analyze time of day schedule and incidence of breast cancer among the participants. Odds ratio results found that women who worked at night, for a minimum of half a year, were at 1.5 increased incidence odds for developing breast cancer, with increasing odds correlating with

increased duration of nighttime work. This study concludes that normal nocturnal melatonin production, as supported by previous researchers, is suppressed and the lack of melatonin secretion is insufficient in the inhibition of human breast cancer cells (Blask et al., 1997; Lewy et al., 1980; McIntyre et al., 1989).

In addition to physiological effects, occupational exposure can cause significant psychosocial effects that can increase interpersonal conflict, depression, and anxiety (Booker et al., 2019). Cross-sectional studies have indicated that a positive association between poor mental health and shift work exists (Torquati et al., 2019). Lee et al. found that shift working Korean nurses were at a greater odds risk of 1.5 times to experience severe depressive symptoms than non-shift working nurses (2016). Similarly, Driesen et al. (2010) found that compared to dayshift only workers, shift workers were twice as likely to report depressed moods. These findings have been met with conflicting longitudinal studies that indicate that while there is an increased risk of anxiety and depression associated with shift work (Lin et al., 2012), differences in occupation, industry, context of work, and country in which work is performed contribute to psychological well-being (Torquati et al., 2019).

## Circadian Disruption

Sleep is an essential biological process, vital to mental and physical health (Cho & Duffy, 2019). Shift work often disrupts the normal sleep-wake cycle, as schedule demands of both work and non-work life domains may lead to shortened sleep and excessive fatigue (Kecklund & Axelsson, 2016). Adaptation to shift work has shown that the development of sleep disturbances is influenced by higher subjective workload,

workload-induced social and domestic disruption, and decreased flexibility of sleep behaviors (Smith et al., 1999). Sleep deprivation, due to the pressure associated with meeting basic socio-economic demands, has been shown to adversely affect human evolution, as the ability to build mechanistic adaptations to compensate for sleep debt accumulation has not been found (Lateef & Akintubosun, 2020). Sleep deprivation is defined as partial or near absence of sleep, producing various detrimental health challenges among organisms (Kushida, 2005). Light is the main synchronizer of the endogenic circadian pacemaker of the anterior hypothalamus suprachiasmatic nucleus (SCN), where control of dark and light exposure creates alignment between the sleep/wake cycle and circadian pacemaker (Boivin & James, 2002; James et al., 2004). Circadian rhythm, mediated by the SCN, is essential for good health in humans as it mediates hormone expression essential to life functions (Jehan et al., 2017).

Sleep is regulated by homeostatic and circadian processes, with evidence suggesting the direct influence of circadian clock on the mechanisms of homeostatic sleep that influence sleepiness or alertness (Deboer, 2018). Sleep generally consists of two states, rapid eye movement (REM) and non-REM, characterized in clinical settings by electroencephalographic (EEG) waveforms, muscle tone (via electromyogram), and eye movement (via electrooculogram). Non-REM sleep has four stages (N1-N4), with N3 and N4 characterized as the deepest sleep stage, N2 characterized as the most abundant sleep phase, and N1 as the transitional stage between sleep and wakefulness, whereas REM sleep is characterized by dream sleep (Cho & Duffy, 2019). Studies have indicated that sleep loss often occurs in N2, where night shift work may cause the termination of

sleep episodes after only 4-6 hours as the body attempts to realign itself with circadian rhythm (Akerstedt & Wright, 2009). Sleep is an essential function in creating pathways of learned information for remembering, enhancing problem-solving skills, controlling emotions and behavior, and allowing the body to heal and repair daily (Carskadon & Dement, 2011). Shift workers, compared to non-shift workers, often have a higher prevalence of sleep disturbance due to alterations in circadian rhythm as attributed to atypical work hours, reduced physical activity, occupational stress, domestic stress, long working hours, chronic pain, improper sleep hygiene, over-commitment of work and non-work domains, irregular light exposure, and melatonin suppression (Jehan et al., 2017).

The mechanisms responsible for sleep-wake regulation involve a series of brain circuits and expression of neurotransmitters that activate the thalamus and cerebral cortex through a network that comes together in the pons and the hypothalamus (Saper et al., 2005). During the day, metabolic and homeostatic physiological processes are carried out by the endogenous synchronizing of circadian rhythm within the ventral hypothalamus (Valenzuela-Peters et al., 2017). Light exposure provides the primary cue for the central clock located in the suprachiasmatic nuclei (SCN) of the hypothalamus and suppresses synthesis of melatonin in the penial gland, which can be disrupted by artificial light exposure experienced through shift work (Potter et al., 2016). Melatonin delivers photoperiodic communication to the pituitary *pars tuberalis*, which is a key node in regulating seasonal rhythms of physiological adaptations to seasonal body mass and reproductive changes, where artificial light may interrupt the suppression of the

melatonin feedback system that communicates with the body's master clock (de Miera et al., 2014; Johnston et al., 2006).

Circadian rhythm controls many biological variables, and shift work has been associated with the exacerbation of many disorders that involve these variables (Knutsson, 2003). Intrinsic rhythmicity of metabolic and electrical activity is controlled by the circadian pacemaker of the SCN, where expression of circadian clock genes is associated with tissue function (James et al., 2007). Expression of clock genes associated with tissue function influences cellular immune defense (Liu et al., 2006) and regulated expression of cell-cycle progression (Granda et al., 2005). Biological tasks such as cell proliferation, cell differentiation, energy storage, and immune regulation are adaptively confined to specific periods of light or darkness that signal the expression of circadian mediated genes (Minnetti et al., 2020). Circadian clock genes found in the suprachiasmatic nucleus control feeding, behavior, and reproduction through hormone and neurotransmitter activation (Pan et al., 2020). In mammals, the rhythmic expression of clock genes is found in an array of organs (to include the heart, lungs, liver, and kidneys) with a distinct rhythm aside the suprachiasmatic nucleus (SCN) (Pan et al., 2020). Moreno et al. (2019) found that hormone release, immune function, and catabolic functions can be disrupted when there is misalignment with the suprachiasmatic nucleus (SCN) clock, supporting the evidence that physiological and behavioral patterns among shift workers can contribute to or exacerbate existing conditions that increase inflammation, oxidative stress, or alter temporal patterns of hormones due to time-restrictions imposed by work schedule.

One of the negative consequences of shift work is the development of shift work sleep disorder (SWSD), which increases the risk of consequences and comorbidities associated with sleeplessness (Schwartz & Roth, 2006). Shift work disorder (SWD) is typified by the recurrence of sleep disturbance, including excessive sleepiness and/or insomnia, occurring as a byproduct of overlapping work schedule and conventional sleep times (Brown et al., 2020). Difficulty in initiating or maintaining sleep, as in the case of SWSD, and the associated impairment of daytime function can have profound effects on physiological, psychological, and social interactions (Peter et al., 2019). As shift work disrupts natural rhythms of wakefulness, sleep, eating, and cognition, disruption to circadian rhythms and homeostatic sleep regulation can pose profound health repercussions (Vanttola et al., 2019). Shift work and circadian desynchrony have been shown to increase reproductive risk among women where risk is compounded by occupational exposures such as artificial light, radiation, toxic chemicals, intense heat, job stress, excessive noise, and physically demanding work (Park et al., 2020).

## Relationship Between Shift Work and Reproductive Health

According to the WHO, reproductive health is defined as the "state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and to its functions and processes" (World Health Organization, n.d.). Gamble et al. (2013) identified known circadian regulated processes that are disrupted due to shift work schedules and their impact on reproductive health, finding that clock gene expression in the body's central clock, daily variation in peripheral-clock, daily variations in hypothalamic-pituitary axis,

and daily variations in parturition can have profound implications on menstrual cycles, pregnancy, and postnatal health. The dysregulation of clock gene expression in the body's central clock affects GnRH (gonadotropin-releasing hormone) neurons, dopamine-ir cells in the arcuate nucleus, and paraventricular neurons which disrupt pre-ovulation and cause irregular menstrual cycles, endometriosis, dysmenorrhea, and subfertility. Ovulation can be disrupted by daily variations in the peripheral-clock regulation of luteinizing hormone, follicle stimulating hormone, estradiol, and progesterone that can cause a misalignment of estrogen, cortisol, and melatonin. Spontaneous abortion may be the byproduct of daily variations in the hypothalamic-pituitary axis in which ACTH (adrenocorticotropic hormone) and cortisol expression is misaligned. Finally, Gamble et al. (2013) identified that circadian regulated processes of parturition, disrupted by shift work, may be affected by spontaneous membrane rupture, labor onset, and birth time that may cause preterm birth, low birth weight, and reduced breastfeeding success.

**Pregnancy Complications**

Recent studies have evaluated the relationship between shift work and/or long working hours and adverse pregnancy outcomes. Pan et al. (2020) found chronic exposure to artificial light experienced by female night-shift workers disrupts circadian homeostasis and increases negative pregnancy outcomes due to melatonin, estrogen, and cortisol dysregulation. Cai et al. (2019) conducted a meta-analysis of primary studies regarding the health outcomes of pregnant women who engage in paid work. The literature search identified 62 observational studies, 19 case-controlled studies, and 27

cross-sectional studies across 33 countries regarding occupational schedule and pregnancy outcomes. Findings of this meta-analysis concluded that compared to fixed day shift workers, pregnant women who work rotating shifts are at a 13% increased odds risk of preterm delivery, 18% increased odds risk of having a child born small for gestational age, a 75% increased odds risk of developing preeclampsia, and 19% increased odds risk of developing gestational hypertension. Fixed night shift workers were found to be at a 21% increased odds risk of preterm delivery and a 23% increased odds risk of miscarriage. Long working hours were associated with increased risk of miscarriage, infants with low birth weight, and infants born small for gestational age. The meta-analysis provided insight into the risk of negative pregnancy outcomes among shift workers, however due to the self-reporting nature of many of the studies, the potential for recall bias does not allow for a firm conclusion on work patterns and pregnancy outcomes among shift workers.

In examination of the biological implications of occupationally associated pregnancy outcomes, Banerjee (2009) conducted a meta-analysis and found that mental and physical factors, such as repetitive work, fatigue, heavy lifting, prolonged standing, heat stress, excessive sweating, and shift work were associated with negative pregnancy outcomes. Bonzini et al. (2007) investigated further the mechanisms of shift work that lead to preterm labor, low birth weight, and pre-eclampsia through a meta-analysis of 53 reports, finding that workplace exposure to heavy lifting, circadian disruption, prolonged standing, and arduous physical labor were among the most common factors identified. As pregnancy requires a high demand of uterine and placental blood flow, long working

hours, prolonged standing, and heavy lifting may limit reserve capacity for vigorous activities that may further limit cardiac output and venous return, raising norepinephrine levels and increasing the risk of preterm labor through increased uterine contractility (Mozurkewick et al., 2000). Davari et al. (2018) studied 429 pregnant women and observed that shift work induced circadian rhythm alterations to hormone levels, versus day-shift workers, increased frequency of miscarriage, intrauterine depth, pre-eclampsia, and premature rupture of amniotic membrane. Though significant differences were noted by Davari et al. (2018) between day and shift workers in regard to pregnancy outcomes, adjustment to occupation showed that shift work could only be attributed statistically to premature labor.

Rahman and Matiana (2019) studied the correlation between maternal education, work shift, work-place dust, and work-place vibration on maternal health among female workers in Indonesia and found that a correlation exists between shift workers and pregnancy disorders, disruption of ovulatory cycles, and reduction in libido. This observational cross-sectional study sampled 500 female workers, of which 388 completed the study, to determine if a correlation existed between maternal and neonate health and maternal education, work shift, dust, and vibration. Chi-square analysis concluded that all variables played a role in maternal and neonate health, with night work shifts increasing the risk of fetal miscarriage during the first 20 weeks of pregnancy and doubling when required to work back-to-back night shifts. The study found that a relationship between maternal education level correlated with the knowledge of preventative measures, nutrition, and antenatal care that mildly reduced negative pregnancy outcomes. Working

conditions such as vibration and dust pose additional risks to pregnancy health, with increased risk associated with low maternal education and night shift work.

**Menstrual Changes**

According to Gamble et al., (2013) the accepted normal cyclical event of the menstrual cycle in female mammals is an approximately 28-day cyclical flux of hormones controlling follicular maturation and ovulation during a menstrual cycle, in which the hypothalamic-pituitary-gonadal axis coordinates the central nervous system (CNS) to peripheral organs. As different hormone systems rely on circadian dependent secretory patterns, disruption to the biological mechanisms responsible for menstrual regularity have been shown to cause asynchrony among night and rotating shift workers (Baker & Driver, 2007)). Jiang et al. (2019) found one indicator of female reproductive health is the regularity of menstrual cycles, such that menstrual dysfunction negatively affects healthcare utilization among women, reduces work productivity, and negatively impacts quality of life to which there is a significant impact of night shift and/or rotating shift on the occurrence of menstrual disorders.

A cross-sectional web-based self-administered questionnaire was given to 1,249 Japanese women who are employed under shift work schedules to evaluate the relationship between frequency of night shifts worked and irregular menstrual cycles (Mayama et al., 2020). The findings support previous research assertions of menstrual irregularities among night and rotating shift workers, with a prevalence of 20.8% among non-night shift workers, 37.4% among those whose shift rotates two times, and 35.9% among those whose shift rotates three or more times. Dysmenorrhea or premenstrual

symptoms affected the work of 62.9% of non-night shift workers, 68.2% and 67.7% of two and three rotating shifts respectively, with a prevalence of 29.3%, 30.6%, and 34.2% in change of menstrual cycle duration among shift workers who worked 1-3, 4-5, or 6+ night shift per month respectively. Amenorrhea was observed to be more frequent among workers in correlation with the number of night shifts worked per month. The results were consistent with previous research that indicates shift work and irregular menstruation have a causal association dependent on the frequency of night shifts worked within a month (Lawson et al., 2011; Mayama et al., 2020).

**Infertility**

Infertility affects about 6% of married women in the United States aged 15 to 44 years old, and 12% of women in the same age group have difficulty conceiving or carrying pregnancy to full term (Centers for Disease Control and Prevention, 2021). As shift work may interfere with the lives and reproductive health of women, fixed night shift and rotating schedules have been shown to have a great impact on fertility (Fernandez et al., 2016). Quantity and quality of sleep that is deficient has been associated with hormonal dysregulation that interferes with fertility and most notably among rotating and night shift workers (Baker & Driver, 2007). Fernandez et al. (2020) conducted a retrospective data linkage study of 128,852 primiparous women, from the state perinatal registry for South Australia (1986-202), utilizing a job-exposure matrix to determine if an association between fertility and shift work exists. Findings show that women $\leq$ 35-year-old, who work nights were more likely to need fertility treatment, with no statistical significance across ethnicity, socioeconomic status, or smoking habits.

Additionally, the study postulated that poor tolerance to night work or lack of schedule control may reflect vulnerability among young women working shift work schedules.

**Sexual Dysfunction**

Several studies have identified aspects of sexual dysfunction that are faced by shift workers. Valenzuela-Peters et al. (2017) studied the type of work schedule that female healthcare workers have and their reported sexual function and found that night shift healthcare workers suffered sleep disturbances, increased stress, hormonal disorders, disturbances to immune and endocrine systems, mental disorders, malnutrition, and sexual dysfunction that were most notably highest among healthcare service assistants. Ji et al. (2017) focused on workplace factors that impact female reproductive health among Chinese nurses and found shift work was significantly associated with lower sexual life satisfaction related to abnormal sex hormone concentration due to circadian disruption and prevalence of depression-related sexual dysfunction.

**Preventative Care**

In the United States, reproductive justice is an extension beyond reproductive rights that implies the legal right to reproductive health care services (Luna & Luker, 2013). In the current reproductive health climate, such as in the case of *Burwell v. Hobby Lobby Stores, Inc.*, organizations are protected under the Religious Freedom Restoration Act of 1993 from being required to grant insurance coverage of contraception or abortive care (Burwell v. Hobby Lobby Stores, Inc., 2014). Contraceptives are not only intended for family planning; rather many are used to regulate dysfunctions in reproductive hormones that cause dysmenorrhea, excessive or irregular bleeding, excessive hair

growth, acne, and pain associated with endometriosis (Dayal & Barnhart, 2001). The ability to assume control over one's body, to include reproductive choices, is a necessary condition for the ability to fully engage in the labor market and reduces the likelihood of financial precarity (Pillai & Wang, 1999). While reproductive health services extend beyond contraceptives and abortion rights, there are additional barriers to healthcare access impacting reproductive health.

Female shift workers may find it difficult to balance work, sleep, and nonoccupational needs with finding time for medical examination. Kim et al. (2012) investigated the health services sought by female migrant workers in Ha Noi, Viet Nam, finding that many shift workers reported having no time for medical examinations amid their working schedule and nonoccupational demands. In addition to lack of time associated with shift work, the COVID-19 pandemic reduced access to many aspects of preventative reproductive health care (Weigel et al., 2020). Despite the increase in telehealth utilization, as of May 2020 more than half of surveyed women reported having skipped or delayed medical care due to the coronavirus outbreak, such as STI and cancer screening, vaccinations, infertility care, and contraception (Kaiser Family Foundation, 2020).

### Interaction of Shift Work Sleep Debt With Reproductive Hormones

Circadian disruption can have profound effects of reproductive health. Circadian physiology differs between women and men, where evidence suggests that women typically have a shorter intrinsic circadian period than men such that habitual sleep timing affects many biological processes (Boivin et al., 2016; Duffy et al., 2011;

Roenneberg et al., 2007). Lateef and Akintubosun (2020) found that biological processes such as testosterone level, sperm motility, and Leydig cell apoptosis among males and spontaneous abortion, failed embryo implantation, amenorrhea, and anovulation among females are affected by deregulated sleep timing. Sex-specific alterations of biological processes associated with sleeplessness or sleep disruption may interrupt natural reproductive processes. In females, the reproductive process is regulated via internal clock to determine estrus cycle, ovulation, expression of luteinizing hormone (LH), fertilization, and embryo implantation necessary for procreation (Gray et al., 1978). Located in the hypothalamus, the SCN is linked to optic cues that establish endogenous rhythms in mammals and influence circadian timing of individual cells where a series of feedback loops found in the SCN are responsible for reproductive control associated with light cues and day length (Pan et al., 2020). Circadian desynchrony among female shift workers can suppress melatonin production, as well as excessively activate the Hypothalamus-Pituitary Adrenal (HPA) axis, resulting in early pregnancy loss, amenorrhea, anovulation, and failed embryo implantation (Lateef & Akintubosun, 2020).

Valenzuela-Peters et al. (2017) found that night shift workers are at increased risk of stress, fatigue, sleep disturbances, hormonal disorders, and disturbances of the immune and endocrine system dependent on duration of night shift work. Sex steroid hormones are generally considered to be synchronous with circadian rhythm, where gonadotropin and prolactin secretions are found to be sleep dependent, and partial sleep deprivation has been linked to increased concentrations of luteinizing hormone and estradiol (Touzet et

al., 2002). During typical menstrual cycles, the interplay between hormone release and inhibition are fundamental to reproductive health (Kolstad et al., 1999).

Gamble et al. (2013) describes a healthy menstrual cycle as a cascading event of hormone release and inhibition, to which gonadotropin-releasing hormone (GnRH) is the primary reproductive hormone that signals to the CNS, secreted on average once every 90 minutes, to promote follicle stimulating hormone (FSH) and luteinizing hormone (LH) via the anterior pituitary. Produced by developing follicles in the ovary, estradiol coordinates feedback between the hypothalamus, anterior pituitary, and ovaries to stimulate uterine endometrium proliferation and negatively regulates GnRH and FSH. Upon peak estradiol concentration, a surge release of GnRH into the hypophyseal portal blood system is triggered which then triggers a surge of LH. The surge of LH induces ovulation, causing the follicle to release an ovum upon rupture; at this point luteinization begins. The secretory phase of this cycle, lasting 10-16 days, triggers large amounts of estradiol and progesterone to be secreted from the corpus luteum that thickens the endometrium in preparation for fertilized ovum implantation. Estrogen and progesterone negatively feed back to the anterior pituitary gland and maintain low concentration levels of LH and FSH. Typically, on the $12^{th}$ day of the cycle, involution of the corpus luteum occurs if no ovum has been fertilized and implanted. Cessation of the anterior pituitary, when pregnancy has not occurred, renews the ovarian cycle with the release of FSH and LH. Reduction of estradiol and progesterone secretion then breaks down the endometrial lining and begins menstruation. The mechanisms by which individual reproductive

hormones are affected by shift work may reveal the ways in which occupational schedule impacts reproductive health and disease susceptibility (Mahoney, 2010).

**Luteinizing Hormone (LH)**

Luteinizing Hormone (LH) is responsible for steroid release stimulation from the ovaries, ovulation, and post-ovulation release of progesterone by the corpus luteum (El Sayed et al., 2017). Bahougne et al. (2020) investigated shifted light/dark cycles on estrous cycle robustness and timing of preovulatory LH surge in female mice, in simulation of shift work conditions. The study revealed that when the mice were subjected to a single 10-hour phase advance or delay, timing and occurrence of the LH surge and estrous cycle took 3 estrous cycles to rebound to previously established baseline levels. When mice were chronically exposed to shifts (in successive rotations of 10-hour phases advanced for 3 days followed by 4 days of 10-hour phase delay) severe reproductive activity impairment was exhibited. At the start of chronic shifts, the mice did not have preovulatory LH surges. Post-chronic shift gestational success was reduced 2 times lower than the control group, concluding that chronic disruption of light/dark cycles considerably impacts preovulatory LH surges, leading to subfertility.

**Follicle Stimulating Hormone (FSH)**

Follicle Stimulating Hormone (FSH) is an important regulator of reproductive function that stimulates ovarian follicle growth, and sleep deterioration increases FSH levels in the early follicular phase of menstruation that influences reproductive potential through reduced ovarian reserve (Iliodromiti & Nelson, 2013). Touzet et al. (2002) investigated the relationship between sleep duration in normally cycling women and

gonadotropin and ovarian hormone levels. This study reviewed the hormone levels of 160 women, aged 19 to 44, through up to four menstrual cycles. The central findings of this study found a significant association between sleep duration and FSH levels, where long-time sleepers had 20% higher levels than those whose sleep time was shortened. As FSH stimulates granulosa cells in the ovarian follicle to synthesize aromatase, aromatase then converts androgens into estradiol, playing a significant role in follicular development and menstruation cycle (Orlowski & Sarao, 2021).

**Estradiol**

Secreted by granulosa cells of the ovarian follicles, Estradiol is responsible for development and maintenance of female sex characteristics (Martini et al., 2001). Estradiol is the primary estrogen through reproductive years that regulates FSH and LH activities, playing an important role in ovarian follicle growth and ovulation (Speroff & Fritz, 2005). Increased levels of estradiol have been reported among sleep deprived women who are of reproductive age (Baumgartner et al., 1993). The Endogenous Hormones and Breast Cancer Collaborative Group have provided clear evidence that plasma sex hormone levels, particularly estradiol, can predict breast cancer risk in postmenopausal women by gathering participant data contributed from 7 prospective studies regarding sex hormone and sex hormone-binding globulin concentrations (2013). Key et al. (2002) analyzed data from 2,428 women in nine prospective studies regarding sex hormone concentration and breast cancer development. Of the 2,428 women, 1,765 developed breast cancer in correlation to elevated hormone concentrations. Finding from this study concluded that relative risk for breast cancer was associated with elevated

estradiol by 1.42 times, the magnitude of risk increasing with serum concentration levels of other estrogens and androgens similarly.

Szkiela et al. (2020) furthered the research on breast cancer risk as it relates to shift work, acknowledging that elevated levels of estrogens increase breast cancer risk through a case-controlled study. This Polish study examined 494 women diagnosed with breast cancer and 515 healthy women, exploring working hours, BMI, smoking habits, early menstruation, pregnancy history, place of living, education, age, and menopause status; finding that the odds of developing breast cancer was twice as likely among those who work shift schedules.

**Melatonin**

The secretion of melatonin is fundamental in the enhancement of reproductive function, through the synchronization of sexual behaviors to seasons appropriate for mating and conception (Lateef & Akintubosun, 2020). Melatonin is found in high levels in human ovarian follicular fluid, where its primary function is to protect oocytes from oxidative stress (Goldstein & Smith, 2016). Reduced levels of follicular melatonin have been seen in women who report sleep deprivation, which can expose follicles to oxidative stress and reduced oocyte quality (Tanura et al., 2008).

In 1989 the Nurses' Health Study (NHS) II began, recruiting 116,434 female nurses for a mailed questionnaire about their medical history, overall health, and lifestyle. Razavi et al. (2019) examined 130 of those nurses who were actively working for a follow-up study. The follow-up study intended to clarify evidence regarding modulating effects of chronotype on melatonin, through spontaneous collection of urine over 3 days.

The results showed that rotating, night shift workers had more light exposure and lower urinary melatonin levels, with smaller and later peak onset of melatonin rhythms. Day shift workers showed greater mean melatonin levels, with larger and earlier peaks compared to night-shift workers. These results clarified previous research, indicating that melatonin levels were disrupted and decreased among nightshift and rotating-shift workers. As the dysregulation of melatonin prevalence is found primarily among night and rotating shift workers, the increased risk of breast cancer, menstrual dysfunction, sleeplessness, fatigue, and prevalence of accidents reduces shift work adaptability (Burch et al., 2005)

**Progesterone**

Progesterone is essential to implantation and maintenance of pregnancy by regulating the process of the uterine lining (Lateef & Akintubosun, 2020). Inadequate progesterone secretion from the corpus luteum can have a significant effect on pregnancy outcomes (Arredondo & Noble, 2006). As progesterone is a key hormone, opposing estrogen-driven growth in the endometrium, insufficient levels result in unopposed estrogen action, which can lead to endometrial hyperplasia and adenocarcinoma development (Kim & Champman-Davis, 2010). Viswanathan et al. (2007) utilized data collected through the Nurses' Health Study that began in 1976 with biennial mailed questionnaires, utilizing the responses of 121,701 women to determine if night work increased the risk of endometrial cancer. Of the 121,701 women, 53,487 indicated having worked on rotating night shift between 1988 and 2004. A total of 515 women developed medically recorded endometrial cancer. A Cox regression model was used to calculate

multivariate relative risk (MVRR) and results indicated that rotating night shift workers who worked 20+ years were at a MVRR of 1.47 for developing endometrial cancer. A significant attribution of hormonal and circadian disruption with a positive correlation with lower progesterone levels was made in respect to disease development.

**Thyroid Stimulating Hormone (TSH*)***

Acute sleep deprivation can significantly increase Thyroid Stimulating Hormone (TSH), and high levels of TSH have been shown to cause irregularities in menstruation, anovulation, recurrent miscarriages, and amenorrhea (Speroff & Fritz, 2005). High levels of TSH can stimulate secretion of prolactin, which has been associated with infertility among women when both high levels of TSH and prolactin induce ovulatory dysfunction due to hyperprolactinemia (Olooto et al., 2012). In 2016, Moon et al. published a study that investigated the relationship between night shift work and thyroid disease. This study utilized medical records of 967 female workers from 2011-2015 who work at the Incheon, Korean university hospital. TSH levels were analyzed through a general linear model and evaluated through generalized estimating equation (GEE) to evaluate 5-year period repeated measures. GEE analysis showed that night shift workers from 2011-2015 had TSH levels 0.303IU/L higher than non-night shift working counterparts, adjusting for age and department. Additionally, night shift workers had 1.399 times higher risk of developing subclinical hypothyroidism than their daytime working counterparts. Subclinical hypothyroidism is a form of mild thyroid failure that can increase cardiovascular risk (Fatourechi, 2009). The results of the study conducted by Moon et al. (2016) indicate that night shift workers were at higher risk of thyroid disease and found

that night shift workers indicated having reproductive and menstrual cycle changes. Participants also indicated increased prevalence of autoimmune disease associated with altered immune function, which the authors attributed to increased levels of TSH.

**Prolactin**

Prolactin, a hormone secreted by the pituitary gland, plays a role in reproduction and stimulates milk production (Martini et al., 2001). Sleep deprivation has been associated with hyperprolactinemia, in which transient waking inhibits prolactin secretion and becomes suppressed by sleep deprivation; this has been associated with endometriosis, anovulation, and polycystic ovary syndrome (Radwanska et al., 1987). While prolactin levels commonly influence lactational capabilities, where low levels can reduce milk production and inhibit GnRH causing infertility, excessive levels of prolactin may cause a loss of dopamine inhibition when influenced by antipsychotic drugs (Al-Chalabi et al., 2021).

Bukowska et al. (2014) investigated the relationship between prolactin levels and shift work through examination of the Registry of the Chamber of Nurses and Midwives database in Lodz, Poland. Participants were provided the International Questionnaire on Physical Activity and Pittsburgh Sleep Quality Questionnaire before beginning blood sampling to elicit information regarding cigarette smoking, alcohol consumption, and steroid medication use. Participant menstrual cycle determined date of blood draw, to measure prolactin levels, where a total of 657 of the original 708 women were selected as eligible participants. Analysis of night shift exposure, both in current occupation and lifetime exposure, was compared against sleep and blood serum levels. Results indicated

an inverse association between cigarette smoking and prolactin levels, declining prolactin levels in correlation with age, and the positive association of nulliparity with premenopausal prolactin levels. No significant inference was made of a relationship between prolactin levels and current or lifetime history of rotating night shift work. This study reveals that conflicting research has connected prolactin levels with shift work; however, this calls into question the effect of stress on prolactin levels.

Chang et al. (2014) investigated circadian disruption and its effects on mood, cognitive performance, and sleep-related hormones. This study examined 23 off-duty nurses, 20 nurses working two consecutive night shifts, and 16 nurses working four consecutive night shifts. Participants completed the State-Trait Anxiety Inventory, Maintenance of Wakefulness Test, Wisconsin Card Sorting Test, modified Multiple Sleep Latency Test, and Stanford Sleepiness Scale, along with hormone level measurement four times a day at 2-hour intervals. Participants who worked two shifts at night showed higher levels of anxiety, lack of learning, poor performance, and higher levels of prolactin than day and four-night working nurses. This study concluded that rotating night shifts too frequently impacted daytime prolactin levels in correlation with elevated anxiety and decreased performance.

## Importance of Investigating Sexuality Through a Modern Lens

Several studies have identified shift work as a causative factor to reproductive health issues in many modern, industrialized countries around the world. The development of a psychometric evaluation method to evaluate five dimensions of Iranian female reproductive health originated from a study conducted by Nikpor et al. (2019). The

psychometric evaluation found shift work had a negative effect on prenatal health, mental health, sexual satisfaction, menstrual regularity, and delivery outcomes as indicated by self-reported responses to the Women Shift Workers' Reproductive Health Questionnaire. Nikpor et al. (2020) continued research into the reproductive health problems faced by female shift workers in Iran and found the most significant issue of reproductive health among female shift workers was sexual problems due to time-limited opportunity to achieve satisfactory sexual relationships, physical/emotional fatigue inducing impotence, deliberate delay of childbearing, menstrual disturbance, genitourinary issues, and inattentiveness to reproductive health needs.

A significant part of sexual and reproductive health quality of life is determined by sexuality (Valenzuela-Peters et al., 2017). A sexual life is defined as sexual activity and behavior throughout a lifetime, where psychological, physical, social, economic, cultural, and religious factors may be effectors (Abadian et al., 2021). Starting and maintaining a sexual life is a way in which couples can exchange thoughts, feelings, and physical intimacy necessary to achieve life satisfaction (Sudani et al., 2012). Employment schedule is a factor causing sexual health challenges among working women, where working different hours than a spouse can create significant challenge to sexual engagement (Abadian et al., 2021).

Relationship satisfaction is generally accepted as having affection, low negativity, and a reasonable sex life (Schoenfeld et al., 2017). Barati and Bagheri (2020) studied the effect work had on martial satisfaction and found that reducing work-family conflict improved work and sex life, which in turn led to more relationship satisfaction. Job

fatigue and job stress can reduce sexual desire and satisfaction; an essential need for sexual relationships is to create a balance between occupational and sexual life (Abadian et al., 2021). Sexuality is integrated into the normal flow of spousal satisfaction, with interpersonal behaviors and sexual satisfaction having more relationship significance than frequency of sexual intercourse (Schoenfeld et al., 2017).

Stamatiou et al. (2016) investigated the severity and prevalence of female sexual disfunction among women working in two Greek hospitals. This study sampled women, aged 20 to 65, and used a descriptive method to provide a structured Greek questionnaire, sexual function screen, and scale-rated quality of life sectors questionnaire. Eighty-eight participants completed the questionnaires to reveal how patterns of work and occupational environment contribute to female sexual disfunction. Findings concluded that occupational environment and work schedule patterns play a role is female sexual dysfunction when age, sleep quality/quantity, use of NSAIDs, and specific occupation are considered. Age was found to have a direct correlation in desire to engage in sexual activity, declining with increasing age. NSAID use did not provide a definitive causative correlation; however, findings did suggest that NSAID use may mask or treat underlying conditions. Shift Work Sleep Disorder was also found to influence female sexual dysfunction as it increased irritability, influenced quality of interactions between spouses, and effected circadian controlled sex hormones. Finally, the specific occupation may dictate the labor and duration of a specific work environment to which negative experiences within a work domain may be translated to non-work domains.

Khastar et al. (2020) further investigated the effect of poor sleep quality of Iranian shift working nurses on sexual quality of life. The study employed a parallel randomized controlled trial, with 120 female nurses across two hospitals. Participants completed the Pittsburgh Sleep Quality Index, Sexual Self-Efficacy Questionnaire, and a survey of participants' sexual quality of life. A sleep intervention to promote better quality and longer duration of sleep of 90–120-minutes once a week for three weeks was used. Compared to the control group, individuals who underwent sleep intervention showed increased sleep quality, increases in sexual self-efficacy, and increased sexual quality of life. The study concludes that improving sleep can positively impact sexual quality of life and that this then improves overall quality of life in female shift workers.

Investigating the long-term effects of shift work and reproductive outcomes, Lateef and Akintubosun explored circadian disruption and fertility through meta-analysis of previous research (2020). Findings show that sleep disturbances may disrupt the production, synthesis, secretion, and metabolism of reproductive sex steroids and hormones. Fluctuations in hormone and steroid levels, such as FSH, progesterone, TSH, LH, prolactin, and estradiol, have been shown to be functionally affected by sleep loss related to shift work and significantly impact menstruation and reproductive viability. As shift work has been attributed to sleep loss and sleep disruption, the implications of sleep deprivation can have far reaching impacts. Not only is fertility potentially impacted by sleep deprivation, but Lateef and Akintubosun conclude that the consequences of parental sleep deprivation can be passed on to descendants where reduced sexual motivation has been observed in offspring of pregnant women who experience sleeplessness (2020).

## Summary

As individual responses to shift work have provided varied results, tolerance to shift work may explain why some are able to adapt to the non-traditional occupational schedule and others experience adverse health effects (Saksvik et al., 2011). Working conditions, support, mental health, and flexibility to meet occupational and non-occupational demands are critical areas in which adaptability to shift work provides relief from the burden of circadian disruption and potential consequences of occupational schedule (Torquati et al., 2019). Asynchrony of the circadian process may adversely alter female reproductive health, where pregnancy outcomes, menstrual changes, infertility, sexual dysfunction, and preventative medical care may be jeopardized (Fernandez et al., 2020). While documentation of the hazards of shift work has provided insight into the potential interaction between circadian desynchrony and reproductive health, attention to behaviors conducted off-shift that produce the least amount of circadian misalignment (and affected reproductive hormones) may lead to potential solutions to shift work-induced reproductive outcomes (Gamble et al., 2013).

Though shift work has become more common across multiple industries, the COVID-19 pandemic has significantly changed routine health and lifestyle characteristics in shift workers around the world, bringing with it the need to find strategies that best organize routine of work and non-work demands to mitigate interferences with day-to-day performance (Coelho et al., 2022). According to Abadian et al. (2021), a common concern among married, Iranian female shift workers is the need for better management of occupational and married sex life, shift work often complicates the balance of sex and

occupational schedule, where a fulfilling sex life is a significant factor in quality of life. Gaining a better understanding of the behaviors and provisions of support that influence how couples manage a satisfactory sex life, through in-depth research, may provide a fuller picture of the interpersonal and behavioral landscape that leads to successful quality of life satisfaction (Schoenfeld et al., 2017). As previous studies have focused primarily on married couples, understanding that the modern world is inclusive of a variety of relationship structures can provide a more comprehensive understanding of the factors, conditions, and behaviors needed to achieve sexual satisfaction (Zegeye et al., 2020). Furthermore, as sleeplessness in women during pregnancy has been shown to reduce sexual motivation in their progeny, gaining functional insight into the ways in which female shift workers manage occupational schedule against life demands can potentially reduce the detrimental effects of reproductive outcomes associated with shift work (Lateef & Akintubosun, 2020). The subjective nature of sexual and reproductive health may be too complex to fully explain through quantitative design only, so a qualitative study is needed to further explore the conditions and outcomes associated with reproductive and sexual health among female shift workers in the United States to determine if universal commonality exists (Nikpour et al., 2020).

# Chapter 3: Research Method

## Introduction

As shift work becomes more prevalent in modern industry, the non-traditional work schedule has brought awareness to the concerns of reproductive health among female workers. The purpose of this qualitative descriptive study was to examine the described reproductive health of female shift workers in the United States, to include the exploration of perceived reproductive health, as well as routine health and lifestyle experiences influenced by the non-traditional work schedule. Understanding the conditions and behaviors related to reproductive and sexual health of female shift workers is needed to inform future research on the strategies, conducted off-shift, that produce the least amount of circadian disruption to potentially reduce shift work-associated reproductive health outcomes (Gamble et al., 2013). This chapter will address the research design and rationale, role of the researcher, and methodology, and address issues of trustworthiness.

## Research Design and Rationale

This qualitative descriptive study provides a more robust understanding of how female shift workers in the United States describe their reproductive health. The guiding research questions for this study were:

*RQ1*: How do female shift workers in the United States describe their reproductive health in the context of a non-traditional work schedule?

*RQ2:* How do female shift workers in the United States describe their sexual health in the context of a non-traditional work schedule?

Much of what Chapter 2 iterates are the detriments to reproductive and sexual health that shift work imposes. This study filled gaps in existing research to identify themes in descriptions of reproductive health among female shift workers. Additionally, addressing and investigating sexual health can further our understanding of why and how sexual activity can influence quality of life. In Chapter 2, previous research such as that of Prasad et al. (2014) discussed the hormonal fluctuations associated with shift work; however, it did not present an in-depth understanding of the behaviors that may also play a role in reproductive health. I sought to establish qualitative data that further examines how sexual activity influences the perception of sexual health as well as establish a more in-depth understanding of the perceptions of reproductive health through a contemporary lens. Investigating ways in which positive impact, directly linked to an individual's reproductive health homeostasis and overall quality of life, fill the gap in our understanding of both perceptions of existing sexual and reproductive health and the associated behaviors.

While there may seem to be redundancy between Research Questions 1 and 2, a distinction should be made between reproductive health and sexual health. In 1975 the WHO published a technical report that defined sexual health and stated that sexual ignorance and misconceptions can influence quality of life. In the United States, the Centers for Disease Control and Prevention cites the WHO as the organization defining sexual health (CDC, 2019). The evolving consensus regarding sexual health, reported by the WHO, is that access to comprehensive information about sex and sexuality, knowledge of risks regarding sexual activity, access to sexual health care, and living

environments that promote sexual health are fundamental elements to overall health and wellbeing of individuals (World Health Organization, n.d.). Gaining participants' insight of sexual health as it differentiates from reproductive health facilitates a better understanding and eliminates misconceptions or unfamiliarity.

Qualitative descriptive research was chosen as the best method to explore these research questions after careful consideration of alternative research designs. Due to the complex, subjective nature of what one may perceive reproductive and sexual health as, descriptive research provides a straightforward account of experiences and perceptions that allow for exploration into important questions that may have implications and impact on practices that can improve or change the quality of a specific experience (Chafe, 2017). According to Willis et al. (2016), qualitative descriptive findings provide an in-depth description of experiences of individuals that can be used to inform and encourage the development of policies and interventions that not only promote health but increase quality of life. The purpose of this study was to investigate the descriptions of the participants regarding their reproductive health, to further explore if commonalities exist among contemporary female shift workers. Per Chapter 2, many in this population discussed the reproductive health issues associated with circadian disruption, bright light exposure, and conflicting life/work demands. Few qualitative studies explored the ways in which sleep habits and sexual motivation affected quality of life and perceived reproductive health through a present-day lens that explores the changes in access to routine healthcare, lifestyle accommodations, and working conditions impacted by the

COVID-19 pandemic. As this study aimed to investigate perceptions and experiences of female shift workers in the United States, the descriptive approach was most appropriate.

Alternative qualitative design approaches such as phenomenological, ethnographic, case study, and grounded theory were also considered but ultimately ruled as ineffective at garnering significant insight into the perceptions and experiences of female shift workers across multiple industries, relationship type, sexual orientation, and occupation. The phenomenological approach was initially considered as a viable research design, as phenomenological studies describe the perception of a lived experience and examine the experience as a subjective lived event, acting as a tool that can inform how an experience is understood (Laverty, 2003). This research design, however, would not have been appropriate in examining the multiple aspects, conditions, and characteristics that understanding described reproductive and sexual health among female shift workers in the United States entail.

The ethnographic research design was considered as data is collected by observation and/or interview of individuals in their real-life environment and results are often used to draw conclusions on the functioning of society and individuals (Reeves et al., 2008). While ethnographic research would provide an immersive experience, with in-depth documentation of shift workers, the variety of work environments for this study would have been too varied to ensure access to the diverse locations and may further interrupt off-shift behaviors. Case study design was also considered for its ability to research a sample of participants and test whether adaptability to non-traditional occupational schedules applies to the phenomena of shift work-induced reproductive and

sexual health. Case study design, however, relies on a small number of cases which may offer little basis for generalization of findings or establishing reliability of results in a wider population base (Cousin, 2005). As I sought to find universalities across several occupations, focusing primarily on the schedule more than the occupation itself, ethnographic and case study research would have investigated participants through a limited lens that may not convey the broader picture of experiences.

Finally, grounded theory was considered, as its purpose is to begin with an abstract concept and generate theory through the explanation of collected data, which would be beneficial in theorizing the behaviors that would promote the least disruption of circadian rhythm, reproductive health, and sexual health (Khan, 2014). While grounded theory may be beneficial for future research on this subject matter, it may have been difficult to achieve saturation and sufficient insight for a theory grounded in data until the relevant properties of conditions and behaviors associated with adjustment to shift work were uncovered. In reference to the conceptual framework outlined in Chapter 2, adaptation to the stress and strain of shift work are based on the factors of job type, workplace conditions, social, and domestic facilitation (Rutenfranz & Colquhoun, 1980). Before a grounded theory can be created, the factors that lead to adjustment to shift work and are perceived as useful in improving reproductive health must first be identified. Ultimately, descriptive research was chosen to bring value to the study, on the premise that the results can help improve practices and solve problems of reproductive and sexual health among female shift workers in the United States through an in-depth

understanding of the behaviors and conditions that prevent reproductive health complications (Koh & Owen, 2000).

## Role of the Researcher

The role of the researcher for qualitative studies is to act as an instrument for data collection, analysis, and data management, where in health investigation the researcher learns from the participants and uses the garnered knowledge to influence interventions (Sullivan-Bolyai et al., 2005). Qualitative researchers are charged with methodology development, facilitation of interviews, maintaining of data, synthesizing of results, and reporting of findings where the distillation of participants' stories is presented as findings of research rather than results (Sutton, 2015). Bias in data collection, analysis, interpretation, and publication can lead to false conclusions or irresponsible reporting of information gained through the research process; as such an important role of the researcher is to disclose any confounding variables (Šimundić, 2013). Confounding variables of experience and reproductive health education will be disclosed in this section. Disclosure of these confounding variables will help the researcher address and recognize potential sources of bias that may infringe on the ethical requirements of a credible study. Insurance that this study was conducted in an ethically sound manner, and all potential sources of bias have been addressed, is paramount to the effective communication of scientific findings (Šimundić, 2013).

Bias can occur in all methodologies; however, in qualitative research, the researchers' lived experience may influence the formulation of interview questions, data collection, and analysis (Smith & Noble, 2014). I acknowledged that previous work

experience with a non-traditional occupational schedule influenced interest into issues of health among female workers in the United States. The limited scope of work in a non-traditional occupation schedule provided me a source of motivation for studying this subject matter, without having direct knowledge of each individual occupation or conditions experienced by all shift workers. The goal of this qualitative study was to gain focused insight into the lived experiences of participants, without interjection of my thoughts, beliefs, or values. Therefore, unknown phenomena or factors may have arisen throughout the study that may contradict or vary from my personal lived experience. In acknowledgement that the experiences of others may differ from mine, any preconceptions that may influence the data collection, analysis, interpretation, and publication of findings were addressed through journaling and reflexivity. Furthermore, none of the selected participants had employment or social connections with me to ensure unbiased participant selection.

According to Suleiman et al. (2020), parents play a key role in providing information and support where a positive parental relationship with open communication may lead to increased awareness of the outcomes of sex and sexuality. In addition to parental influence, formal academic education of reproductive health may be variable dependent upon the presence of abstinence only education (Ott & Santelli, 2007). Participants who went to school prior to 1996 and after 2006 may have received sex education differently than others, as that time marks the height of Abstinence Only Education (AOE). In the 1980s, legislation was enacted that encouraged states to adopt AOE versus comprehensive sex education, beginning with the 1981 Adolescent Family

Life Act promoting self-discipline and chastity, and expanding in 1996 with Title V of the Social Security Act providing grants to states who adopted AOE standards and tenants (Rabbitte, 2018). The defining curricula associated with AOE under section 510 of Title V of the Social Security Act include: (1) teach the psychological, social and health gains realized by sexual activity abstinence, (2), teach abstinence from sexual activity outside of marriage is the standard expectation for all school aged children, (3) teach that abstinence from sexual activity is the only way to prevent out-of-wedlock pregnancy, sexually transmitted disease, and associated health problems, (4) teach that monogamous, married relationships are the expected standard for human sexual activity, (5) teach that sexual activity occurring outside of a married relationship is likely to have harmful physical and psychological effects, (6) teach that out-of-wedlock pregnancies are likely to be accompanied by consequences to the child, parents, and society, (7) teach how alcohol and drug use may increase vulnerability to sexual advances, and (8) teach the importance of self-sufficiency before engaging in sexual activity (Ott & Santelli, 2007). Individuals who received AOE versus comprehensive sex education may have limited perceptions about how sexuality and reproductive health relate. Participants may have differing cultures, religions, and values regarding sex and sexuality; as such, the formulation and delivery of questions was inclusive of all perspectives while maintaining sensitivity to different views. It was the goal of this study to be as universal as possible, so that the data obtained can help further cross-industry knowledge regarding the reproductive health of female shift workers.

Finally, while the process of selecting questions and participants has been discussed in this section, further measures were taken to ensure that data collection, analysis, and reporting were unbiased and scientifically appropriate. Reflexivity was used to examine my judgements, beliefs, and practices during data collection and ensure accuracy of data recorded and reported. Through reflexivity, a researcher evaluates their position as having had or not had shared experiences with participants, being cognizant of similarities and differences, and reporting as such (Dodgson, 2019). Reflexivity was conducted through note taking during interviewing to identify thoughts and comments and memoing post-interview. Through conscious reflexivity, the researcher questions personal assumptions and examines how their final study will serve in providing more understanding of a phenomenon (Gabriel, 2015). Awareness of the effects of my presence in this study not only evolved my personal understanding of the phenomenon but also informs the public and academic community of the perceptions, conditions, and experiences of the female shift worker in the United States.

## Methodology

### Participants

In qualitative research, procedural standardization and random participant selection remove potential influences of eternal variables and bias, and ensure that results are generalizable (Sargeant, 2012). This study was designed to find commonality across experiences associated with reproductive health among females in the United States. In addressing the diversity of industries that engage in shift work, a broad variety of participants were selected for this study. Participants 18 years and older were selected,

with the goal to have a variety of age groups reflected so that a broader perspective of sexual reproductive health could be explored. Investigating participants who have a varied perception of sexual and reproductive health provided insight into the ways in which educational foundations develop perspectives and may further illuminate the social implications involved in female reproductive and sexual health perception and behavior. During interviews, participants were asked to describe the sexual and reproductive health education they received to determine if elements of AOE or comprehensive sex education were influential in their understanding of the role sexual health plays in reproductive health.

The inclusion criteria for this study were any female shift worker who works in the United States and 18 years or older. Individuals under 18 years of age were excluded as their minor status inhibit decisions of bodily autonomy and/or access to reproductive health services without parental consent. In the United States, the legal age of consent to treatment, without parental permission, is 18 years of age. Individuals younger than 18 may have limited rights to independently make medical decisions (Parsapoor et al., 2014). Including participants based on their ability to make autonomous decisions regarding their reproductive health eliminated parental influence that may otherwise influence understanding of reproductive health matters.

Working status was defined as current employment under a non-traditional shift schedule, for a duration of no less than six months. Current employment was further defined as active work in which the employer has the right to control the worker's occupational process (Muhl, 2002). The transition from new hire to productive employee

often comes with an adjustment period, such that the first six months consist of onboarding, training, and establishment of job satisfaction (Bauer et al., 2019). In selecting participants who have been actively employed for no fewer than 6 months the researcher interviewed individuals who have had an opportunity to establish work/life balance suitable to their occupational schedule. All industries were incorporated in the participant recruiting of this study to include but not be limited to retail, healthcare, law enforcement, firefighting, hospitality, entertainment, warehouse work, logistics, military, and administrative. In investigating women's reproductive health among shift workers in Iran, Nikpour et al. (2020) conducted a qualitative phase during which purposive sampling included maximum variation of occupations, ages, and work experience. Nikpour et al. (2020) identified that sociocultural differences may influence findings and as such, this study included maximum variation as to explore reproductive health among female shift workers in the United States to identify differing occupational environments as they relate to the experiences of the workers.

Shift work was defined according to the United States Department of Health and Human Services as occupational hours that include fixed or rotating time in evenings, overnight, or with extra-long workdays (1997) and/or fall outside of traditionally accepted hours between 7-8am and 5-6pm, Monday thru Friday (Costa, 2010). The characteristics of shift work may differ dependent on the organization and work schedule of an individual, and may not be consistent in length of shift, duration of schedule, or time of day (Wöhrmann et al., 2020). For the purpose of this study, inclusion criteria abided by the definition of a shift work system in which fixed working hours are

predetermined by an employer, to which the employee has a designated start and finish time of which management oversees (Tasto & Colligen, 1977). Inclusion for participation in this study was limited to those that have oversight of their schedule to which the employee is unable to modify working hours without managerial authorization. The duration of consistent shift work, outside of the traditional occupational hours, was a minimum of six consecutive months to ensure consistency of adaptive or maladaptive behaviors that may arise as a result of the non-traditional work schedule.

As previous studies have focused on the perspectives of married females only, this study broadened the inclusion criteria to accommodate any relationship status and gender identity to which participants are typically attracted. Female status was limited to biologically born females, as transgender individuals may include more confounding variables that may not be universal to the female experience. While there has been a more nuanced societal understanding of the wide spectrum of gender identity, the biological implications of gender reassignment may greatly affect stress, depression, employment opportunities, and various other psychosocial variables that can influence the lived experience of transgender individuals (Chan, 2019). The voice of transgender individuals is important; however, in the context of this study the reproductive health services received for gender affirmation, coupled with psychosocial influences, may create variables not experienced by biological female individuals.

Participants were recruited using purposive and diversity sampling. In qualitative it is important to ensure that representation considers the multicultural nature of our society through diversity of gender, age, disability, ethnicity, and sexual orientation

(Allmark, 2004). Purposive sampling sought out participants who were knowledgeable about the experience of shift work in the United States, through both snowball and criterion strategies. Criterion strategies involved flyers, both physically posted and posted on social media, to which participants identified as meeting the predetermined inclusion criteria were asked if they knew of others who would be willing to participate in the study. Flyers were posted with clear inclusion criteria and contact information so that upon receipt of expressions of interest to participate, individuals were contacted to ensure they meet criteria, consent to participate, and scheduled for an interview. The flyer used for marketing purposes can be found as Appendix A.

While no definitive number has been determined to meet sample size requirements, the recommendation is to ensure that sample sizes are large enough to allow a study to unfold a rich understanding of a phenomenon or experience (Vasileiou et al., 2018). Sample size determination should be guided by information redundancy, which is the point at which no new information is garnered from interviewing new participants. Guest et al. (2006) found that saturation typically occurred within the first twelve interviews, where in many studies basic elements of metathemes are present by the sixth interview. In establishing a guideline for determining the potential number of interviewees, this study sought to interview a diverse population, and a minimum of 6 and maximum of 10 participants were to be used. There is no universally accepted sample size for reaching data saturation in a qualitative study, as such rich, detailed, thorough data must reflect the replicability of the findings and saturation will be met when no further coding is feasible (Fusch & Ness, 2015).

**Ethical Research**

It is the obligation of the researcher to perform an ethical study that develops generalizable knowledge with the intent to improve the understanding of the human condition and human health. According to the National Institute of Health, there are seven main principles of conduct in ethical research to include: social value, scientific validity, fair subject selection, favorable risk-benefit ratio, independent review, informed consent, and respect for potential and enrolled subjects (2021). To achieve the standards of an ethical study, continual consideration into the guiding principles will be made.

This study brings social value by further exploring the behaviors and conditions that affect the sexual and reproductive health of shift workers. The COVID-19 pandemic significantly altered routine health and lifestyle characteristics of shift workers around the world, which underscored the need to find strategies to manage work and non-work demands to mitigate the interference with on- and off-shift performance (Coelho et al., 2022). Scientific validity was achieved through the design of the study, which generated an understandable research question. By utilizing a qualitative descriptive design, where semi-structured interviews from various sources allow for the description of a phenomena and its characteristics, a better understanding of what contributes to adjustment of a shift work schedule to promote a positive quality of life in regard to reproductive and sexual health can be developed (Nassaji, 2015).

This study sought to achieve fair subject selection by ensuring inclusive criteria that extend to all women who work in varied industries to establish universality and generalizability of findings. Recruiting and enrolling individuals from a variety of

industries who are of age to make autonomous decisions about their reproductive health led to a deeper understanding of the intricacies of managing a non-traditional work schedule against reproductive health, which in turn can potentially improve the lives of other shift workers who struggle with balancing routine reproductive health management and sexual wellness (Costa, 2010). The 'interviewer effect,' in which unscripted, intentioned rapport building conversation derails the intent and uniformity of the interview protocol, was minimized through standardizing interviewing. Standardized interviewing utilized the same set of questions for all interviewees, while allowing for probing, reducing interviewer error, and ensured that all respondents were asked identically worded questions (Bell et al., 2016).

All questions were designed for universality and cultural consciousness, so that even given the private nature of the questions the open-ended structure allowed for individualized interpretation of what is being asked. While some of the questions in the interview may be uncomfortable to answer, continuous rapport building, and assurance of confidentiality ensured favorable risk-benefit ratio. Rapport building is fundamental to the quality of data, as such active listening and the researcher's conscious acceptance and cooperation with the interviewee improved rapport through conveyance of confidentiality and neutrality (Ryan & Dundon, 2008). The risk of asking questions about sexual health and making someone feel uncomfortable was mitigated through jargon-less phasing and concise wording (Turner, 2010). Respect for all potential and enrolled participants was a key element in the design and implementation of the interviews. Informed consent is paramount to an ethical study and is defined by elements of full information, voluntary

participation, and the capacity of one to decide their involvement in a study (Dunn & Jeste, 2001). Participants were accurately informed of the purpose, methods, and use of collected data, where privacy and confidentiality were ensured. Participants were contacted via email, upon selection to participate, and asked to reply with their understanding of participation and consent to proceed. Finally, to minimize conflicts of interest no participants had social or occupational connection to the researcher. Independent review, through peer and institutional entities, monitored design and reporting to ensure that ethical standards were met.

**Instrumentation**

This study utilized semi-structured, researcher-created interview questions to further explore the perceptions of female shift workers' reproductive and sexual health, as well as accompanying behaviors and conditions used to manage the burden of the non-traditional work schedule. To ensure instrumentation bias management and rigor, study-specific interview questions will be used so that participants could provide insider perspectives, without limitation imposed by closed-ended questions (Chenail, 2011). Interview questions were aligned in the literature so the research questions, which are intended to articulate gaps in the literature, were answered. The value of data derived through qualitative interview is dependent on the competence of the research and the appropriateness of interview questions that expand on previous research (Roberts, 2020).

A semi-structured interview guide was used to organize and direct the flow of the interview, allowing the opportunity to tailor follow-up questions as they arose. The semi-structured interview guide followed the protocol outlined in Appendix B. Participants

were asked initial demographic questions to gain baseline information and ensure participant eligibility, followed by study-oriented questions. The open-ended questions explored participants' thoughts, opinions, and perspectives regarding reproductive and sexual health amid a non-traditional work schedule.

All interviews were conducted through Google Meet. Google Meet was chosen over Zoom and Microsoft Teams due to its widespread availability, secure connection, and user safeguards such as anti-hijacking measures and customer data privacy (Singh & Awasthi, 2020). As a free video conference platform, Google Meet allowed for interconnectivity through a secure service that has compatibility with a wide range of devices. The use of on-line interviews was preferred in this study, as COVID-19 remained a threat to health and safety, due to its facilitation of interviewing in a larger geographical radius. While the academic community traditionally assumes that interviews are held face-to-face, access to geographically distant people or access to those in dangerous places make remote interviews advantageous (Block & Erskine, 2012). Interviews were scheduled for 60-to-90-minute time slots, where Google Calendar was used to maintain appointment times and send reminders to the participants prior to their agreed upon time slot. Interviews began with a brief introduction to include thanking participants for their time, reiteration of the purpose of the study, and disclosure of confidentiality. Participants had the opportunity to answer questions asked via the interview protocol guide, and as the facilitator the researcher included follow-on questions as needed to ensure robust answers. Rapport was established through encouragement and restatement of confidentiality, as some questions were sensitive in

nature. Establishing comfortable communication through a curious attitude and courteous approach was an essential part of rapport building during qualitative interview (McGrath et al., 2019). All interviews were transcribed live, using the Google Meet Transcript extension from Google Meets, and include audio recording. Audio recording through a hand-held recording device was used in addition to the voice recording application on the researchers PC, to ensure that a backup file exists. All transcripts were then transferred to a Word document for thematic review to ensure uniformity of all collected data. At any time, participants were able to discontinue the study, with collected data excluded from analysis and findings.

**Data Analysis Plan**

The data analysis procedure for this study included organization and coding of interview transcripts, allowing themes to emerge from the collected data. Data analysis is one of the most complex phases of the qualitative research process as it requires raw data to be transformed into meaningful findings that propel knowledge forward (Thorne, 2000). Once all data had been transcribed, copies were sent to participants for verification and member checking, which ensured rigor and evaluation accuracy. Member checking safeguarded against researcher bias and allowed respondents to validate interpretation of audio (Birt et al., 2016). Participants were able to clarify or revise any statements during the member checking process to ensure trustworthiness and validity of collected data.

Upon completion of member checks, data organization began the analysis process. Data organization in a qualitative study should include collected data, analytical commentary, and observations so that uniform presentation of the information can allow

for easier analysis (Richards and Hemphill, 2017). The analysis of the data investigated if any themes or commonalities exist among participant responses. Data analysis enhanced the quality of data, where data management was a crucial element of the analytical process. Data management through a dataset of interview questions and responses organized information and allowed for familiarization of the data, resulting in the initial generation of codes (Bowen, 2009).

Coding allowed for the categorization and indexing of data and was the preliminary step of establishing a thematic framework (Gibbs, 2007). Inductive coding allowed for codes to emerge from the raw collected data. Manual coding created a categorical construction of conceptual schemes that allowed for comparative data across all interviews (Basit, 2003). Inductive coding condensed raw data into a brief summary, established a clear link between the research objectives and the summary findings derived from the raw data, and developed the structure to which themes will emerge (Thomas, 2006). Though automatic coding software can provide faster analysis, to detect nuances that artificial intelligence may miss manual coding was chosen as the preferred method of thematic analysis for this study. Manual coding allowed for more familiarity with the data and a more critical exploration into how researcher notes and commentary correlated with the data reflected through transcription.

Once initial codes were created, thematic analysis began. Thematic analysis checked for coded categories that share commonalities to reveal themes of repeated patterns of responses (Thomas, 2006). The construction of themes combined and compared how codes related to one another, then created a thematic map in which themes

were independently meaningful but worked together to address the objective of the study (Clark and Braun, 2014). The thematic map allowed for notes to be created by the researcher to evaluate the significance and volume of collected data to ensure that saturation was met and that alignment with the research purpose existed. Supporting data was compared to the generated themes and reevaluation of the thematic map was conducted as necessary to ensure that final reporting illustrated the full breadth of data obtained through literature review and direct interview. In the final reporting, themes were then defined and interpreted, where conclusions were made based on completed analysis of data, codes, and themes. The final report wove together a narrative that described how data was interpreted and why the themes presented reflect the summary of the extracted data, giving meaning and support to the importance of the overall study (Braun & Clark, 2006).

## Issues of Trustworthiness

Trustworthiness in a qualitative study refers to the degree of confidence in data collection, interpretation, and the methods used for quality assurance (Polit & Beck, 2014). Through the demonstration of detailed, consistent, and precise methods of data collection and analysis, this qualitative study reliably represented findings meaningful to the advancement of knowledge regarding the conditions and behaviors that characterize the reproductive and sexual health of female shift workers in the United States. Trustworthiness in this study depended on its credibility, dependability, confirmability, transferability, and authenticity.

## Credibility

Qualitative study credibility is dependent on three distinct inquiry elements: rigorous methodology for gathering high-quality data, researcher credibility, and belief in the fundamental value of naturalistic inquiry (Patton, 1999). In the design of this study, careful consideration into the best research design considered the benefits of both qualitative and quantitative designs as well as their sub-designs. Review of the literature presented in chapter 2, indicated that a qualitative design was needed to further explore the female shift worker experience. In-depth investigation was needed to examine the behaviors, conditions, and factors needed to achieve reproductive and sexual satisfaction within diverse interpersonal and occupational landscapes (Abadian et al., 2021; Zegeye et al., 2020) and the off-shift strategies that produce positive reproductive health outcomes among female shift workers (Gamble et al., 2013). The descriptive method was used as an exploratory approach to identify practical consequences and useful applications to issues of reproductive and sexual health amid female shift workers in the United States.

Researcher credibility was established through disclosure of confounding variables in this chapter. Identified confounding variables were established to be experience and upbringing, which present the lens through which initial investigation of this study began. Bias was considered as the researcher having had experience working non-traditional hours and balancing work/life demands, though the study's intention is to gain knowledge from others without imparting personal insight or influence from the researcher. Additionally, upbringing was presented as a confounding factor where open discussion of reproductive and sexual health provided a foundation of understanding that

may differ from those who have been educated through abstinence only education (AOE). Upbringing was addressed in the thoughtful development of research and interview questions that would be culturally universal. Appreciation of naturalistic inquiry provided further rationale for method choice in this study. The natural, first-hand look into social behaviors began with the researcher's upbringing and experience and inspired further investigation of specific behaviors that produce positive outcomes. Naturalistic inquiry allowed for the researcher to draw on personal experiences and use them as a lens to begin research investigation.

**Dependability**

Dependability refers to the ability of the researcher to establish findings that are consistent with the collected data and repeatable (Golafshani, 2003). To ensure that data was consistent, the use of Google Meet and Google Meet Transcription brought uniformity to the way in which data was collected. Utilizing the same format of interview for all participants, regardless of their geographical location, allowed for consistent researcher conditions. The choice of sample size also played a factor in consistency and repeatability. While there is no standard sample size required for qualitative research, a minimum of 6 participants allowed for overlapping insights, patterns, and themes to emerge. This study sought to find universality in the conditions and behaviors that contribute to the experience of reproductive and sexual health among female shift workers; saturation was met when responses were repeated.

**Confirmability**

Much like dependability, confirmability refers to the degree of neutrality, objectivity, and repeatability of a study (Polit & Beck, 2014). This was achieved through uniformity of record keeping, established process of review, and reflexivity. Utilizing the same format for interview and transcription, documentation was easily retrieved and had uniform presentation. The review process entailed listening to audio recordings while verifying that the transcription application accurately portrayed the statements made through interview, any edits that needed to be made to the transcript were made at this time. Once the transcripts reflected the audio recording, they were individually sent to the respective participant for further validation. Upon receipt of validated transcripts, thematic analysis began. Thematic analysis incorporated notes taken during the interview and compared against verbal input, that developed codes that were used to establish themes. Written results and transcripts were submitted to the Walden University review committee to validate accuracy of reporting.

**Transferability**

Qualitative researchers need to deliver a vivid picture of results and demonstrate the applicability of applying those results to other contexts or settings (Amankwaa, 2016). This study sought to investigate reproductive and sexual health of female shift workers and establish preventative measures and universality that reduce or inhibit negative outcomes. The essence of universality in this study was a driving factor in creating a transferable study that is valid across all nations, cultures, and occupations. This study sought to create recommendations that would be transferable and applicable

across multiple levels so that policies and practices change to improve the outcomes of female reproductive health around the world.

### Authenticity

The extent to which a researcher can fairly and completely illustrate the range of different realities of multiple individuals to convene a realistic picture of shift work is to establish authenticity (Schou et al., 2011). This study incorporated the lived experiences of all participants to illustrate the commonalities that arose among female shift workers as well as provided insight into the positive ways in which the individuals were able to manage and overcome the demands of a nontraditional work schedule. Rich, detailed accounting of interviews and thematic analysis present the various realities of the participants into a cohesive picture of the female experience of shift work in the United States.

## Summary

Chapter 3 has discussed the method through which this study was conducted. As shift work becomes normative across multiple industries and nations, the burden of shift work on female reproductive health has given rise to the need for understanding commonalities of conditions and outcomes associated with reproductive and sexual health among female shift workers that transcend regional boarders (Nikpour et al., 2020). This descriptive qualitative study used semi-structured interviews to generate rich data that explored perceptions of reproductive and sexual health, by investigating foundational understanding of the terms “reproductive health” and “sexual health” and their applicability to day-to-day living amid a non-traditional work schedule. Purposive

sampling recruit 6-10 biological females, 18 years or older, who had worked outside of 7am to 6pm Monday thru Friday for at least six months. There were no industry or relationship status exclusions for participation in this study, as universality of the female shift work experience was anticipated. Transcripts were verified via member checking to support the trustworthiness of this study, and thematic analysis of gathered data included manual coding to ensure all themes were thorough. This study sought to investigate the reproductive and sexual health of female shift workers and established universality that reduce or inhibit negative outcomes across all industries and nations. Issues of trustworthiness were addressed above to indicate the lengths to which were taken to ensure credibility, dependability, confirmability, transferability, and authenticity.

# Chapter 4: Results

## Introduction

The purpose of this qualitative descriptive study was to examine the described reproductive health and sexual health of female shift workers in the United States, to include the exploration of routine healthcare and lifestyle experiences influenced by the non-traditional work schedule. This study explored the following research questions:

*RQ1*: How do female shift workers in the United States describe their reproductive health amid a non-traditional work schedule?

*RQ2:* How do female shift workers in the United States describe their sexual health amid a non-traditional work schedule?

The connectedness of reproductive and sexual health as elements that female shift workers in the United States face influenced the research questions as areas that lack a comprehensive understanding and necessitated further inquiry. This chapter will present the analysis of data collected through semi-structured interviews to present a more complete understanding of the experiences of the contemporary female shift worker. In presenting the analysis of collected data, this chapter will outline the setting, demographics, data collection procedure, data analysis procedures, evidence of trustworthiness, results, and summary of findings.

## Setting

To maximize the reach of this study, participant interviews were conducted via Google Meet. Video conferencing allowed for wider geographic participation while affording interviewees the opportunity to conduct the interview in a setting in which they

felt most comfortable. While I conducted interviews in a private office with no outside interference, participants participated in a variety of locations. Participants were informed at the time of scheduling that the interviews could be conducted without their camera on if they preferred, and six of the eight participants chose to only have audio rather than having their camera on. I conducted all interviews with my camera on so that participants could see non-verbal reactions to their responses such as smiles, head nodding, and engaged listening. These non-verbal reactions allowed participants to see that I was engaged in active listening and free of distractions during the interview process. Six of the eight participants interviewed in a room alone, one had their spouse in the room through the last few interview questions, and one was driving to work. All interview time and dates were dictated by the participants to work around their respective schedules, and flexibility was ensured when participants needed to reschedule due to extended work hours or managing household needs.

## Demographics

Eight individuals were vetted and willing to participate in this study. More than 50 individuals reached out either through the Walden University student email or through the various social media applications with interest in participating; however, many were unable to commit the time needed to conduct the interview. Those who reached via social media responded to the invitation flyer with their personal testimony of experiences working as a female shift worker in the United States; however, their responses were not included in this analysis despite many of the experiences echoing those of the participants.

All participants were female shift workers, living in the United States, who had worked in their respective shift for no less than 6 months. Though the inclusion criteria allowed for any female shift worker aged 18 or older, all participants fell within 31-44 years of age. Of the eight participants, four reported their relationship status as married and four reported their relationship status as single. All eight participants reported having at least some post-secondary education, with the highest degree obtained a master's degree as reported by one participant. Occupations varied by participant, where four individuals indicated working in healthcare, one in postal services, one in law enforcement, and two in food services. Six of the eight participants worked as full-time shift workers, with the remaining two reporting that they work part-time more than two days a week.

## Data Collection

As I sought to maximize the geographical range of potential participants within the United States, semi-structured interviews were conducted through Google Meet. Participants were recruited through social media, where invitation flyers (see Appendix A) were posted and updated weekly to ensure maximum exposure. Social media sites were selected based on recommended applications through Google Play and the App Store through Apple, which included Facebook, Linkedin, Tinder, Reddit, Tik Tok, Instagram, Snapchat, Tumblr, and Wink. The search criteria for these applications used consistent language and included the search terms "social media." The invitation flyer included brief information regarding the study and contact information for potential participation. Interested participants who reached out directly through the applications

were encouraged to provide an email address and were then contacted through my Walden University student email to ensure consistency. One participant was recruited through Tinder, four were recruited through Reddit, and three were recruited through Facebook.

Interested participants were vetted through discussion of the study's inclusion criteria to ensure that all valid and willing participants met the requirements to continue with involvement. Eligible participants where then provided a consent form from the Walden University student email account. The inclusion criteria for this study were female shift workers, in the United States, aged 18 years or older, who have worked scheduled or rotating hours outside of 7am to 6pm Monday through Friday for at least 6 months. Upon receipt of a signed consent form, the researcher invited participants to provide availability for a scheduled Google Meet interview and provided them with a unique link granting access to the agreed upon virtual meeting room. For anonymity, participants were coded with numbered identifiers and no names were used throughout the recorded interview. Interviews were conducted via Google Meet while I was in a controlled and isolated private office space, ensuring privacy and confidentiality throughout the entirety of the interview. Auto transcription was used through the Google Meet extension Google Meet Transcription, where records were promptly downloaded upon completion of each interview and placed on a removeable hard drive that was stored in a locked cabinet in my personal office immediately following the discontinuance of audio recording.

At the start of every interview, participants were provided with a brief introduction as seen in Appendix B, which indicated that the interview would be audio recorded, reminded the participant of the confidentiality statement, and stressed the voluntary nature of participation. All eight participants were provided the definition of shift work as a work schedule that regularly alternates or falls outside of 7am- 6pm Monday through Friday. Upon agreement to proceed, interviews followed the interview questions outlined in Appendix A. Interviews ranged in time based on the amount of information that the participant was willing to share and the depth to which the participant was willing to delve for the study-specific questions. As participants had only viewed a sample of questions that would be asked during the interview process, found within the consent form, participants had no ability to prepare for or anticipate the line of questioning in advance. The shortest interview lasted 27 minutes, and the longest interview lasted 109 minutes. As the interviews were semi-structured, all participants were asked the same questions outlined in Appendix B, but additional questions were asked to further probe statements that were ambiguous or needed further clarification. All participants answered all questions from Appendix B, where interviews were completed asking if participants had anything that they would like to add to the study that was not previously covered. Only one participant asked to add to the study by discussing the importance of mental health practitioner availability in the workplace for shift workers. This participant included an example of how their workplace has hired a psychologist that is not directly affiliated with the law enforcement department in which the participant works but works as an out-of-pocket fee-based practitioner to aid workers in

their non-duty related mental health needs. The participant discussed the importance of mental health as an element related to reproductive and sexual health, which was echoed by several other participants.

Interviews were completed with a closing statement in which I reiterated the maintenance of confidentiality and thanked participants for their contribution to the study. Audio recording was turned off following the closing statement, and auto transcripts were downloaded immediately to an external hard drive. Following the closing of the Google Meet, I immediately went through the auto transcripts and audio recording to ensure that the transcripts accurately captured the responses of the participants; minor edits were made to correct any words that were incorrectly captured during the transcription process. A second passthrough of the transcripts was conducted to redact participant names and any personal identifiers. All transcripts were sent to the participants for member checking, to which none of the eight interviewees made any corrections or additions.

## Data Analysis

Once member checking was completed, data analysis began. Semi-structured interviews provided rich, detailed data that required careful review to identify universalities among the female shift workers' responses. The first step to data analysis included all transcripts to be divided by question into an interview matrix. The interview matrix included the participant ID assigned to them at the time of the interview and all answers were directly taken verbatim from the transcripts and aligned under the respective questions. This process allowed me to become familiar with the data and

allowed for emerging similarities to be found as well as the organization of data in a uniform format. Once all transcripts were entered into the interview matrix, phrases and concepts began to emerge and were highlighted accordingly. Chunk coding was used to highlight significant statements. The primary analysis of chunked codes required line-by-line analysis of transcripts to detect patterns of responses (Mishra & Dey, 2022).

The second level of analysis included further refinement of chunked codes. Inductive coding was used to condense large amounts of chunked data and establish a clear link between the research questions and summaries of the raw data to create a scaffolding of themes that show the universalities of experiences and responses among participants (Ramanadhan et al., 2021). Upon completion of the inductive coding, themes were placed into a separate thematic map for which the researcher went through the individual interview transcripts again and marked on the map the participant ID whose response correlated with the thematic code. The thematic map allowed for a comparison of frequency of response to individual coded themes, allowing for analysis of coding reliability (Byrne, 2022).

Review of the emerged themes from the collected data revealed one overarching theme that transcended both research questions and several themes that emerged from the individual research questions. Six themes emerged from the data that included (a) anatomical and physiological characteristics, (b) education, (c) workplace accommodations, (d) sexual consequences, (f) cognizance of sexual health, and (g) time. Subthemes were also present and will be discussed in the results section of this chapter.

## Evidence of Trustworthiness

Trustworthiness enhances the value and the integrity of the presented data. This study reflects trustworthiness through ensuring credibility, transferability, dependability, and confirmability. In qualitative research, trustworthiness ensures congruence with data findings and reality to ensure that presented findings accurately report and portray participant testimony (Stahl & King, 2020).

### Credibility

This study established credibility through member checking conducted post-interview. Participants were provided transcripts of their interview, to which there were no changes or additions requested by the participants. Participants were provided a consent form that was signed in advance of the interview. In accordance with Walden University ethics and compliance policies, participants must be provided written information that briefly outlines the study, describes participant recruitment and selection, details how informed consent is obtained, and explains the research methodology, data collection and storage process, and risk involved with participation (Walden University, 2023, Institutional Review Board: Information Required for Review). Informed consent is a critical part of the research process, and this study employed digital consent to improve the geographical reach of participants as well as streamline archiving (Phillippi et al., 2018). Transparency regarding how data would be shared and stored further ensured my credibility as well as the data collected.

Prior to beginning the interview, all participants were informed of their right to voluntarily discontinue it at any time and encouraged to make any amendments to their

statements during member checking. Member checking allows for participant validation of data and the resulting interpretations to ensure that the content accurately reflects the words of the interviewee without misrepresentation or misquotation (Nassaji, 2020). During the interview, consistent verbiage was used for the core research questions to ensure that all participants were provided the same line of questioning, with deviations only to ask additional probing questions. All transcripts and data analysis reflected the exact words of the participants. Congruence of data collection is essential to the credibility of any qualitative research study; consistency of questions asked during interviews ensured that participants were offered equitable access to represent their "voice" (Kahlke, 2014).

**Transferability**

Transferability was established by creating detailed inclusion criteria, establishing demographics that would be general enough for future research. The descriptions of participant inclusion criteria allow for applicability of the findings that may be transferred to other contexts (Maher et al., 2018). As transferability encourages future research from readers to use elements that may be applicable to similar studies, this study provided detailed descriptions of participant demographics, recruiting methodology, and data collection (Schloemer & Schröder-Bäck, 2018).

Thick descriptions of participant interview accounts provide the reader with information regarding the expressed perceptions and experiences of female shift workers in the United States. The description of step-by-step processes of recruitment, data collection, and analysis may allow other scholars to follow the same plan (Lemon &

Hayes, 2020). Transferability is established by informing readers of the demographics and methods used in this study that may be applicable in specific industries or other nations.

**Dependability**

Dependability was established through consistent measures of participant recruitment, communication, meeting setting, and core questions asked. Detailed inclusion and exclusion criteria establish the rationale for recruitment and ensure that participants were vetted appropriately. Probing questions were used to ensure that all participants answered the core questions substantively. Code and thematic saturation were the cornerstones of data analysis that considered meanings and interpretations of participant responses (Janis, 2022). As the raw data contained detailed accounts of the participant's experiences, reporting includes direct quotations to better illustrate the findings in the words of the participants. Additionally, per Walden University standards, chair and committee review ensure accuracy of reporting.

**Confirmability**

Confirmability ensures that qualitative research is constructed by the reality of findings through objective pursuit of data and objective interpretation of results (Stahl & King, 2020). During data collection, the researcher presented core and follow up questions without inserting bias, judgement, or altered inflection. Researcher objectivity, when collecting data, ensures that findings are derived from raw data without the insertion of personal bias or influence (Nowell et al., 2017). In reporting collected data,

findings must accurately reflect the responses of participants to which the researcher reports in the section below direct quotation and paraphrasing directly from interviewees.

A key element to confirmability is the ability to establish a direct line between data collected and the data reflected through an audit trail. An audit trail allows readers to trace the logic between data collected and themes reported to determine the reliability of reported information (Carcary, 2009). The researcher utilized committee review of interview transcripts as well as direct quotation to ensure that reported findings are grounded in data.

## Results

In the course of data analysis, six themes emerged from the central research questions. Eight participants engaged in semi-structured interview questions to explore the experiences and perceptions of female shift workers in the United States regarding their reproductive and sexual health as it applies to day-to-day living amid a non-traditional work schedule. There were two central research questions for this study, for which the interview utilized seventeen open-ended questions to unveil commonalities that would emerge as themes and subthemes to further enhance the overall value of the study. Direct quotations presented in the subthemes reinforce the experiences and perceptions of the participants by demonstrating the raw emotions of the participants in response to the interview questions.

### Theme 1: Time

One overarching theme emerged that transcended both central research questions, which was time. In response to the central research questions that asked how female shift

workers in the United States experience their reproductive and sexual health in the context of a non-traditional work schedule, all participants indicated that time was one of the most influential disruptors to achieving optimal reproductive and sexual health. This theme emerged repeatedly as a result of several different questions.

In response to being asked what barriers participants faced to accessing routine reproductive health services various aspects of time were reported by participants. Participant ID 21 described having limited Medicaid coverage during pregnancy, as it ended a month postpartum; “those were like the times when I, I guess took advantage of and saw the doctor… when I was pregnant and then there’s a long period of time that I was uninsured”. Time was a crucial element of how long access to medical care would be available, without employer provided healthcare.

For Participant ID 26, time was a crucial element to ensure that fertility treatment could be successful. They indicated that “everything is so important with the timing. Like my husband had to drop a sample and I have to be available at a certain time. And so I had to be able to watch our son while he’s doing that and they only accepted the samples in the morning, and a lot of the appointments were in the morning when I would still be sleeping”. Managing the time around rebound rest from shift work around fertility treatment took a tremendous amount of coordination of childcare and required the participant to forego sleep.

Participant choice to schedule their workday around their reproductive health issues was discussed. Participant ID 28 indicated that their occupational schedule moving to nights versus days allowed them the time to ensure the pain caused by their menstrual

cycle was able to be managed and endured without interfering with their job performance. They stated “so overnight it was actually easier to deal with because my client would go to sleep and I could have the pain without somebody being there to see it”.

Sexual health and partner availability were affected by the lack of compatible time for many of the participants. Participant ID 25 discussed having to schedule dates very far in advance. They said “we’re scheduling three weeks out to meet up, have coffee, get to know each other, and see if the spark is there, go from there. And who wants to, got to pencil in a date, three weeks out”. Participant ID 22 echoed this sentiment by discussing the reason for their most recent relationship break-up was the result of “the work hours that I work and not knowing my schedule from one week to another was kind of taxing”.

Timing was not always discussed in a negative light, Participant ID 24 indicated that they track their menstrual cycle regularly. When asked why they tracked their cycle they replied, “it was just for personal knowing, easier to schedule things or not schedule things”. Scheduling time to engage in intimate relationships was important when considering how to navigate their reproductive health needs against their sexual health needs.

Though all participants had variations of schedules and occupations, the main theme that emerged from the study pointed to the need to manage time in order to conduct and satisfy reproductive and sexual health needs. Time was a crucial element in preparing for healthcare coverage, fertility windows, menstrual cycles, and sexual health.

### *Subtheme 1: Doctor Office Accommodations*

One of the subthemes that emerged from the data related to Research Question 1 and addressed experiences related to participants' reproductive health. All eight participants discussed the importance of maintaining regular gynecological routine care, however, six of the participants indicated that scheduling routine reproductive health care limited their access to face-to-face care and/or telephonic communication with the medical office staff.

Participant ID 22 stated "it's very hard to schedule anything because you never know to last minute how long am I actually gonna be at work". It was further echoed by Participant ID 25, who discussed how waiting for a doctor's appointment can be difficult depending on the shift that they are getting off prior to their appointment. They stated, "sometimes I miss a lot of appointments because I oversleep because I had a busy night and even if like, I say get off at six so they don't open til 7:00- that hour, I'm like crashing".

Sleep, a required part of human survival, is forfeited in many cases by shift workers who are seeking out routine reproductive health care. Participant ID 23 said "doctors want to schedule you at 9:00 and so just like physically making it to an appointment on no sleep whatsoever is tough". This sentiment was echoed by Participant ID 26 who shared "logistically, the scheduling's really hard. Like trying to get appointments there where I can actually get sleep".

For participants that are able to attend their routine reproductive healthcare appointments, the physical appointment time is not as big an issue as the follow-up or

reminder calls made by the medical office staff. Participant ID 28 indicated that their patient chart noted they were unavailable to come to appointments in the afternoon and that any automated or office calls needed to be conducted in the early morning. They asserted “Like to get them to accept the fact that calling me at two o’clock in the afternoon is like calling me in the middle of the night. So if my doctor wanted to talk to me or my doctor wanted to make an appointment, that it was inappropriate to try to make an appointment for two or three in the afternoon”.

Participant ID 26 also indicated follow-up phone conversations with medical staff interrupts the time they have for sleep. They asserted “getting calls from people with results and they call, you know, whatever time is good for them- which is normal time for normal people, but for me, I’m sleeping so the call wakes me up”. The time difference in medical office hours and time for shift work sleep recovery often overlap.

***Subtheme 2: Scheduling Intimate Time***

As previous chapters of this study have revealed, sex and intimacy have a profound effect on quality-of-life and overall health. Among both married and single participants, scheduling intimate time with a partner is a challenge dealt with by female shift workers. Scheduling intimate time emerged as a theme through three main interview questions. The first question asked participants to describe their own sexual health, the second question asked how sleep was affected by their reproductive and sexual health needs, and the third question asked how shift work affected their sexual health. This line of questioning revealed that due to the nature of a shift worker schedule, having time to

initiate intimacy was a challenge that required careful consideration of sleep deprivation, partner's schedule, and time for dating.

In juggling the physiological need for sleep and sex, the female shift worker must decide whether to forego sleep to engage in sexual activity or to forgo sex for sleep. Participant ID 24 discussed prioritizing sleep over sex and said, "I have less sex if I'm overworked and busy and tired". Interest in sex wanes when fatigue sets in was the sentiment echoed by several of the participants. Participant ID 26 stated flatly "I'm definitely less interested if I'm tired". Participant ID 25 indicated, in response to how shift work affects sexual health, "I don't prioritize it [sex]. I don't make time for it; I don't feel like I can because when everybody's day's ending mine is just starting".

Participant ID 23, as a currently single female, indicated that a past relationship with someone in the same line of work failed due to the inability to mutually schedule intimate time. Participant ID 23 indicated "shift work is a little bit tough on my relationships, so I've not been having a sexual partner for really quite some time now. Probably like eight months and it kind of like ruined my last relationship. Just because it's so difficult, you know, because this is my breakfast time [late evening] and you know, so whatever, so dating and stuff is hard".

While intimate time was not just limited to sex, Participant ID 28 stated that scheduling difficulty "does affect your ability to set up things that could lead to sex or lead to intimacy". Participant ID 27 also indicated that up until relatively recently, their spouse was active-duty military which limited their ability to fulfil sexual needs. Participant ID 27 indicated "we never see each other. It's like we're two ships in the

night". Participants also indicated that when they do have time with their spouse, the time is needed to discuss household business or conduct household maintenance activities. The lack of time to engage in sexual activity has impacted the lives of some of the participants by interrupting the homeostasis of the relationship. Participant ID 26 stated "I've been so busy before and so is my husband where, like, it wasn't a priority [sex] and I definitely saw a rift. I just didn't feel as close to him and I need to feel close to him for this to work".

The relationship rift has caused many of the single participants to indicate that initiating a new relationship due to their irregular schedule affected their sexual health. Participant ID 22 indicated that shift work's influence on their sexual health made it "difficult to be able to start another relationship… The work hours and not knowing my schedule for one week to another was kind of taxing". Participant ID 25 stated that shift work has an impact on their sexual health because they "work when people are typically going on a date" which makes it difficult to find partners with compatible schedules to initiate a relationship. Participant ID 25 stated that they wished online dating sites would have an indicator that the individual worked nights so that others would be aware, and they could potentially find people to date with compatible schedules more easily.

Scheduling time for sex can have an impact on those who are trying to conceive and procreate. Participant ID 26 indicated that they have been struggling with fertility for quite some time and are actively going through treatments that require sex during specific ovulation windows for successful conception. As fertility treatment requires consistent monitoring, the appointment times related to fertility care can impact sleep. They stated,

"it's hard to get appointments and you kind of just have to take them when you get them because you have to wait like a couple months… so yeah definitely interrupts sleep". The combination of doctor appointments and fertility-related sex timing can be a tremendous hurdle that female shift workers must consider when dealing with their sexual and reproductive health.

**Theme 2: Anatomical and Physiological Characteristics**

In response to RQ1, when asked what reproductive health means to the participants, unanimously the participants indicated that reproductive health involved the wellness of the anatomical parts associated with their reproductive system. Wellness was described in terms of physical organ health, regular menstruation, and ability to have children. Several participants indicated that reproductive health included sexual health and sexuality as characteristics that related to reproductive health.

Participant ID 21 indicated "to me reproductive health is, is the health of my reproductive organs and the activities that are associated with those organs". Five of the eight participants indicated that their reproductive health had complications that required medical intervention. Participant ID 21, 24, and 28 indicated having some form of reproductive organ surgery or reproductive organ removal. Participant ID 26 and 28 indicated having issues with fertility and Participant ID 21, 27, and 28 indicated having menstrual issues that were abnormal. Abnormal menstrual issues that were indicated included frequent rupturing cysts, heavy bleeding, fibroids, mood swings, and hormone fluctuations that impaired the participant's ability to work free of pain. The three

remaining participants, Participant ID 22, 23, and 25, indicated that they had no reproductive abnormalities.

All participants, when asked what resources they use to protect their reproductive health indicated that they regularly engaged in gynecological screening such as pelvic exams to ensure optimal health. Additionally, participants indicated utilizing mammograms, sexually transmitted disease/infection screening, birth control, and engaging in safe sex practices were among the most common forms of protection used to maintain reproductive health.

***Subtheme 1: Barriers to Reproductive Healthcare Associated With COVID-19***

As all participants indicated that regular gynecological check-ups were necessary to the maintenance of their reproductive health, several participants indicated that the COVID-19 pandemic interrupted their routine health appointments. The interruption of routine healthcare ranged from only a few months late on a pelvic exam up to a few years as related to the COVID-19 pandemic. Participant ID 24 indicated that during the COVID-19 pandemic they "didn't go to a doctor or into a medical facility, probably the entire time, so it was years of not having a PAP smear". Participant ID 28 indicated "I stopped getting mammograms. I didn't go in for any pap smears. Um, I think there was about two years there where I wasn't getting the routine testing that I was supposed to be getting".

As indicated in Theme 1: *Time*, scheduling appointments for routine health services is a burden that shift workers face, the COVID-19 pandemic amplified the barriers to healthcare access by limiting care to emergent necessity only in many areas.

For those who had not received their routine checks prior to the initial stages of the pandemic, there was a lag in healthcare access.

For Participant ID 26, the COVID-19 pandemic placed a barrier to fertility treatment. As stated, there was a "huge change in infertility fields because that was not considered vital so we just had to wait, when we would have started [fertility treatment] sooner". Participant ID 27 discussed that during the peak of the COVID-19 pandemic access to non-emergent care was limited. They stated, "if you were just having like small issues, like you couldn't really be seen in-person". The lack of face-to-face care was further expanded upon by Participant ID 27, who said, "when you're assessing a patient, is being able to see them and put eyes on them and, you know, and having that connection especially with OBGYN related things". The lack of in-person OBGYN care was referred to as potentially awkward to some people with out the lack of "provider to patient connection, to really be able to feel like they're comfortable speaking up and getting the care they need and advocating for themselves".

***Subtheme 2: Shift Work and Female-Specific Anatomical Issues***

In response to the interview question regarding shift work's influence on the participants reproductive health, a common sub theme emerged involving the influence of female-specific issues and the workplace. Common concerns involved menstruation, pregnancy, and urination. In some form or another, all participants indicated that shift work influenced their reproductive health.

Menstruation issues such as heavy bleeding, pain, irregular menstruation, and cysts were among the most commonly discussed issues faced by the participants. Despite

discomfort and cleanliness issues raised by the participants, pressure to perform their job duty required modification of behaviors associated with the anatomical and physiological characteristics of their female body. Participant ID 21 stated in regard to working despite menstrual discomfort, “it was a very complicated relationship because if you don’t go to work, you don’t get paid”. Participant ID 28, who suffers from Premenstrual Dysphoric Disorder (PMDD), indicated fearing for their job due to needing to call out of work when they had issues associated with their condition. For many of the participants, the fear of losing their position at work as it related to their reproductive health was a major concern.

Participant ID 24 stated “I remember a few times just having to kind of power through and like bleeding though like the pad that I was wearing and my underwear and like, thank goodness, we’re all in black so it didn’t show. But I do recall a couple of times that it was hard for me to keep up on that, I guess the cleanliness of it when I was on my period”. Participant ID 28 discussed their method of dealing with heavy menstrual bleeding, “I had to deal with a lot of bleeding and a lot of pain… I gave up last year and just started wearing incontinence pad, incontinence underwear”. Incontinence underwear was also discussed by Participant ID 22 who stated that the nature of their work prohibited frequent bathroom breaks which led to recurrent urinary tract infections, leading them to utilize incontinence underwear to protect themselves from urinating and bleeding on themselves during extended periods in which a bathroom is not accessible.

Menstrual pain was discussed frequently as a factor that impacted job performance specifically as a female shift worker. Participant ID 21 stated “even when you’re feeling very poorly, in my case like I had exploding cysts, … I was in agonizing

pain and when you're a waitress you have to be very smiley and the amount of money that you earn is directly connected to how pleasant your customers feel that you behave". Participant ID 28 also discussed that pain was a factor that should be accommodated for in the work place stating "we give everybody a cigarette break… and nobody bats an eye at it but if you need to go sit in the bathroom and be in pain for 20 minutes, you know, it's like a big deal… we're willing to give somebody a(n) extra breaks for something that's literally killing them… we're not willing to give the break to somebody who has no choice about the matter of whether or not they're bleeding".

The stress associated with shift work also was indicated to have an impact on female reproductive health according to several of the participants. Participant ID 23 discussed the influence of job-related stress on their menstrual cycle and said, "just a couple months into it when I was like 'oh I have not had a period in a really long time' and that was the first time I learned that like that's normal under like extreme stress". Participant ID 27 also stated "having irregular sleep cycles and high amounts of stress definitely make its impact on my cycles for sure". Overall, female-specific reproductive health issues are compounded by the non-traditional work schedule associated with shift work.

**Theme 3: Workplace Accommodations**

A third theme that emerged from the data was the need for workplace accommodations associated with female-specific reproductive health issues. In response to RQ1, participants described their reproductive health as needing workplace accommodations. The suggested workplace accommodations would allow for improved health outcomes among female shift workers and increase productivity according to the

participants. The accommodations participants discussed were in regard to menstruation and pregnancy predominantly. Participants discussed the need for extended and/or more frequent bathroom breaks, paid leave options, and better educated employers on female reproductive health.

As stated in previous themes, the need for bathroom breaks is a vital part of maintaining urinary and menstrual cleanliness and safety. Having time to safely use the restroom, without fear of losing their job or having pay deducted, is a theme that was discussed by several participants. In response to the question what would improve outcomes among female shift workers, Participant ID 28 stated “I think that understanding that women need to go to the bathroom more often, or the bathroom break needs to be longer. Or, you know, that they may need to take a day off for a period.”. Participant ID 22 reiterated the sentiment for paid time for bathroom breaks by stating “it would be nice if they had a little more leeway with that”.

Participant ID 27 stated in regard to maternity leave “make it longer”. Participant ID 27 discussed having had a difficult previous pregnancy during which they experienced hyperemesis that created significant limitations to their job function. While many of the participants indicated there were protocols at their workplace for pregnancy, they all indicated that pregnancy could limit the functions of their position. Despite not having been pregnant before, Participant ID 23 indicated that there would be a “huge financial burden” if they were sick during pregnancy and had to take extended time off. The recommendation for appropriate accommodations to mitigate safety risks associated with heavy lifting was also discussed by three of the eight participants.

Management and corporate education regarding female-specific reproductive health was a recurrent subject in participant interviews. Participant ID 21 stated that it would be helpful to have "systems in place that create a vocabulary for people that don't understand reproductive health needs to have a reference point". Participant ID 24 expanded that "the employer should make consideration to that [routine health care appointment accommodations] because an employee's health is the most important thing". Additionally, Participant ID 28 expressed that employers should be "accommodating to the way that women have to deal with the period. We don't have a choice. We don't do this for fun". Having employer support and accommodations appropriate to female-specific reproductive health is an essential part of improving worker conditions.

**Theme 4: Reproductive Health Education**

Unanimously among the participants, reproductive health education in the K-12 education system was limited in focus to reproductive organ anatomy and physiology, rather than inclusive of reproductive behavior. Regardless of the participant's educational background all participants referenced limited education regarding reproductive behavior beyond menstruation and childbirth. The educational foundation, prior to 18 years of age, among all eight participants in the school setting is consistent with their description of reproductive health as the wellness of reproductive organs. In connecting reproductive health education to RQ2, the lack of reproductive health education during adolescence and early adulthood lead participants to risky behavior and sexual ignorance. All participants gained knowledge of sexual health through self-promoted education that

aided in improving sexual quality-of-life and boosted confidence in safe sexual and reproductive health activity.

Participant ID 21 indicated that their home education regarding reproductive health was comprehensive, “I had parents that were veery open and straight forward and wanted to make sure that we knew, my brother and I, were very clear on our own responsibilities without reproductive health”. They also stated that their school education was “very reproduction focused and not behavior focused. So, like we didn’t learn about sexual health or STI’s. We learned about menstruation and reproduction. Did not learn about consent.”.

Participant ID 22 briefly discussed their educational foundation as “pretty generic, basic… I’m in a very southern area so it was abstinence only and basically just the science aspect of it, of ‘this is how babies are made’. Participant ID 23 reiterated basic biology of reproductive system education “I remember in like fifth grade watching a video of like childbirth and being traumatized… I don’t think I knew anything about it [sex], I don’t think we got like sex ed or anything like that”. Additionally, Participant ID 24 stated, “I don’t necessarily remember having being taught anything more than really basic stuff in school. Like really, really simple. Like, this is a penis, this is a vagina, this is the female reproductive organs, this is the males”.

Participant ID 25 indicated that they “learned a lot” in the context of stigmas. Their education was “you get married and you have sex with the first time, it’s a Christian value, nobody wants used goods… the lower your number, the more respected you are, you should have very limited partners, well it’s okay for men to go out and have

a number of like numerous partners". Participant ID 27 discussed "I was raised in a very Southern Baptist bible-belt, religious, military family. So I grew up in very straight purity culture very, you know, 'we don't have sex before we're married because you know, we're gonna die and go to hell. You're a whore and all this stuff, so sex and sexuality was a very taboo subject and it was a very shamed subject".

Participant ID 28 indicated that they had a mother willing to answer any and all questions regarding reproductive health, however school education was limited to menstruation and anatomical parts of the reproductive system. Participant ID 26 indicated their mother bought them a book but school education was described as "I don't remember being, you know, asked if we had any questions or if there's anything we wanted to talk about or anything like that- it was just kind of like 'these are the girl parts, these are the boy parts, you know- condoms at the nurses office. If you need birth control, go to Planned Parenthood".

Participant ID 27 discussed the impact of their lack of sexual health knowledge as it related to their reproductive health by discussing their experience with their first pregnancy. They reported that they had been injured and required antibiotics, while taking birth control. They recounted "No one educated me on the fact that when you are taking a hormonal birth control, antibiotics, it can lower the efficacy of your birth control. And because I was not educated, I got pregnant when I was 17 years, and I did because I was not educated on safe sex. I was not educated on birth control options. I was not educated on any of the things that every girl in the world should be educated on strictly

because of someone else's religion". Stigmas associated with sex and sexual health can have a lasting impact.

Participant ID 21 described their formal education as "consent was not a conversation that anybody had, different versions of how sexuality can be expressed wasn't a conversation". Participant ID 28 defined their sexuality as bisexual and discussed how sexual ignorance with same-sex partners caused them to contract a sexually transmitted infection from a female partner. They stated, "the only time I've ever gotten an STD was from a woman and that was shocking, because I didn't really even have a concept that you could get them from another woman". The participant continued that more education is needed to discuss the transmission of sexually transmitted diseases and infections beyond heterosexual and male-on-male sexual relations. Female-to-female transmission of sexually transmitted diseases and infections, from the perspective of Participant ID 28, should be included in sex education.

***Subtheme 1: Sexual Health Self-Promoted Education***

While all eight participants indicated having had limited sexual health education in a school setting, all eight participants indicated seeking out education regarding their sexual health on their own. Self-promoted education regarding sexual and reproductive health was reported as having been obtained through OBGYN instruction and/or through personal research.

Participant ID 22 indicated speaking with their OBGYN regarding their reproductive health and that they read "or I watch a lot of them documentaries on Netflix". Participant ID 25 also indicated speaking with their care provider to discuss

"what options that I had and then research those options and made a decision on what would be best and listen to the recommendations of my care provider on what would be best for me and my body". Using a mixture of professional recommendations and personal research enabled these participants to better inform themselves about sexual health and reproductive health needs.

Participant 26 stated that their mother "bought a book and she just told me to tell her if I became sexually active, so that she could take me to the doctor- I just wanted to keep it private and I knew, like I just went to Planned Parenthood by myself and got the pill". Participant ID 24 also indicated, "my first pap smear, I might have gone to a Planned Parenthood, something like that because I wanted birth control without my mother knowing".

As sex and sexuality are unique to the individual, many participants indicated utilizing on-line resources such as podcasts, Reddit, and web-based medical information sites to increase their knowledge base regarding their sexual health. Participant ID 26 stated they use Reddit to inform themselves on safe sex practices, "we like to try new stuff so just read through like how it's done and safe". Participant ID 28 discussed how the internet has been useful in providing a wealth of knowledge as "an amazing resource as long as you use it properly. I make sure that I use reputable sites". In using internet resources, coupled with the advice of medical caregivers, participants are able to take charge of their sexual health education and make more informed decisions that aid in enhancing their sexual quality-of-life.

As Participant ID 21 indicated they have an ethically non-monogamous relationship, they have sought out education specific to their sex preference. They stated, “I read books and I listen to podcasts, and I have been to a therapist that specializes in alternative relationship and sexuality- because the complicated landscape to navigate especially with multiple partners and people having feelings, so I think that it’s kind of important to self-educate”.

**Theme 5: Cognizance of Sexual Health**

In response to RQ2, all participants responded to the importance of sexual health as an integral part of reproductive health. When asked in interview what role they believe sexuality and sexual activity play on reproductive health, the consensus was that sexuality and sexual activity influence mental health and decisions regarding sexual safety. Overall, the perception is that sexual activity either conducted by oneself, with one partner, or with multiple partners requires personal attention to ensure safety.

Five of the eight participants directly addressed the risk of sexually transmitted diseases and/or infections where four directly discussed the need for testing to ensure safe and protected sex. Participant ID 21 discussed the personal role that a sexually active person has in protecting not only their own sexual health but ensuring their partners are safe, “I have a lifestyle that lends me to multiple partners. I’m very conscientious about frequent STI testing”. Participant ID 24 also discussed the influence of multiple partners by stating “the more partners that you have, the more safe you have to be and so there’s a lore more, you know, proactive things, you know, using contraception and being tested more often for STDs”. Participant ID 26 discussed how stigmas of multiple partners may

make some individuals feel less comfortable discussing their sexual activity with their medical care team. Participant ID 26 stated “I’ve had some shame before because there was a brief moment where I had more than one partner and I need to seek, not help but I needed an exam, and I felt you know, they ask you all those questions and I just didn’t want to go because I didn’t want to be asked, you know, how many partners have you had”.

All participants indicated a mental element associated with sexuality and sexual health, whether it was increased awareness of behavior or simply a confidence factor that improves quality-of-life. Participant ID 25 stated that sexuality and sexual activity give a “boost of confidence”. Participant ID 27 discussed “if you are happy in your sexuality, I feel like you’re more confident and you’re more willing to advocate for yourself and speak up when something is right because you feel comfortable in your life”.

**Theme 6: Sexual Consequences**

All eight participants, when asked how changes to their reproductive health would impact their job as a shift worker, provided a response that was indicative of a sexual consequence. Either positively or negatively, sexual activity that led to a pregnancy would have an impact on a work-life balance. In response to RQ2, the experience of sexual activity comes with concerns for the consequences that could arise from pregnancy.

Many participants indicated that pregnancy would create a significant life burden that would impact their ability to maintain their quality-of-life in their current position as a shift worker. Participant ID 23 stated “that would be a nightmare, if I wasn’t like fully

prepared and like a surprise pregnancy would be worst case scenario for me". Participant ID 24 indicated that an unplanned pregnancy "would be super detrimental, it would be almost impossible to do my job". Participant ID 25 discussed the reality of childcare and sleeplessness associated with having a child, stating "am I gonna be up all day or half day with my kid and then up all night, and vice versa? Do I change the kid to my kids sleep cycle or change my sleep cycle or what?". The consequence of sexual activity is an ever-present issue of consideration for the female shift worker as the impact to not only their own life would be significant, but it would require considerations to the wellbeing and care of their offspring as well.

Not all pregnancy related consequences were perceived negatively. Though Participant ID 21 no longer had the ability to bear children, they experienced pregnancy as a shift worker 20 years ago which allowed them temporary health insurance and allowed them access to healthcare during a period of time that they would otherwise have been uninsured. They stated that they "took advantage of and saw the doctor when the kids were, when I was pregnant".

While many of the participants indicated using some form of birth control or abstinence from sexual activity, several indicated that current political and legal decisions have influenced them to take action to protect their sexual and reproductive health. Participant ID 28 indicated that they have been in discussions with their medical care team regarding having a hysterectomy because "babies can come from things that are not always choices". Participant ID 24 stated "when Roe verse Wade was overturned, I immediately called to schedule to have my tubes removed". Participants behaviors, in

taking actions to remove reproductive organs, show the degree to which cognizance of sexual activity consequences on their current life circumstances as a shift worker in the United States.

## Summary

This qualitative descriptive study sought to investigate two central research questions:

*RQ1*: How do female shift workers in the United States describe their reproductive health amid a non-traditional work schedule?

*RQ2:* How do female shift workers in the United States describe their sexual health amid a non-traditional work schedule?

In conducting semi-structured interviews with eight participants, through Google Meet, six themes emerged to address the central research questions. These themes included a) time, (b) anatomical and physiological characteristics, (c) education, (d) workplace accommodations, (e) sexual consequences, and (f) cognizance of sexual health. Of these themes, time was the most common response that influenced both the descriptions and experiences of reproductive and sexual health.

Time was the most prevalent response from all eight participants, which addressed both research questions for this study. Participants indicated that time to engage in routine healthcare to protect and/or manage their reproductive health. Participants indicated that even if they were able to schedule routine healthcare services, it came at the cost of sleep many times. The careful balancing of health needs and time needed to sufficiently rest often result in the choice between one or the other.

Additionally, participants indicated that time to plan and engage in sexual activity was influenced by their shift work schedule. Participants again reiterated that the choice between sexual activity and sleep made it difficult to engage in a fulfilling sexual life. For participants that were single, many indicated that time to meet individuals or engage in non-marital relationships was often hindered by the lack of time. Initiating non-marital relationships was described as a difficult undertaking when the participants' schedule conflicted with their prospective partner's, resulting in missed opportunities to initiate and engage in sexual relationships.

In response to RQ1, all eight participants described their reproductive health as the functioning of their reproductive organs. Five of the eight participants indicated having had reproductive health complications that required medical intervention. All participants discussed that they regularly engage in routine gynecological care to protect and maintain optimal reproductive health. In regard to the functioning of reproductive health, two subthemes emerged.

The first subtheme discussed the barriers to reproductive healthcare access as a result of the COVID-19 pandemic. Reproductive health access was delayed or willfully avoided during the pandemic. Non-essential reproductive healthcare, such as fertility treatment or in-person non-emergent care, was limited during the pandemic according to some of the participants. Others indicated that they avoided routine care as a result of the pandemic.

The second subtheme that emerged from the functioning of reproductive health provided insight into the female-specific anatomical issues that female shift workers face.

Menstruation, pregnancy, and urination were among the concerns of the participants that required behavior modification. Cleanliness and pain management were among the top issues discussed, with two participants indicating the need to use incontinence pads to aid them in their day-to-day functioning at work.

Responding to RQ1, participants described the need for workplace accommodations that would allow for improved outcomes among female shift workers. Pregnancy and menstruation were among the most commonly described factors that needed workplace accommodations. Participants discussed the need for longer bathroom breaks, properly informed management, and paid time off to mitigate menstrual issues. Pregnancy related accommodations such as enhanced safety measures to protect pregnant workers and extended maternity leave were indicated as potential ways to relieve the burden of shift work while pregnant.

Unanimously, reproductive health education in the K-12 education system was indicated to have been limited to reproductive organ function rather than focus on reproductive behavior. All participants indicated that their school-based education strictly focused on reproductive organs. Several participants indicated that their conservative upbringing brought stigmatized education against sexual health, limiting sex to a married, heterosexual experience. The lack of proper reproductive health education was indicated by participants to have led to risky sexual experiences. A subtheme emerged from reproductive health education, self-promoted education. Participants indicated seeking out reproductive health education through medical practitioner recommendations, personal research, and qualified therapist intervention.

In response to RQ2, all participants indicated the importance of sexual health. The overall perception of sexual activity required personal consideration to safety and mental health. For participants with multiple partners, regular gynecological check-ups were essential to ensuring personal and partner safety. Mental health was also an element discussed, where sexual health was indicated to have a direct impact on self-esteem and personal satisfaction.

The final theme to emerge from the interviews responded to RQ2 and indicated the participant's understanding of sexual consequences. Pregnancy was the unanimous consequence that was discussed. All participants indicated that pregnancy would impact their position as a shift worker. While some participants indicated that their workplace provided accommodations for pregnant women, those accommodations would require changes to their day-to-day job functioning. For those without workplace accommodations, pregnancy would have a negative impact on financial and ability to maintain their current quality of life.

# Chapter 5: Discussion, Conclusions, and Recommendations

## Introduction

The objective of this study was to gain insight into how female shift workers in the United States perceived and described their reproductive and sexual health amid a non-traditional work schedule. This qualitative descriptive research design focused on gaining in-depth insight into the experiences of female shift workers through semi-structured interview. Eight participants provided rich descriptions of their experiences as female shift workers in the United States, detailing the conditions, behaviors, and perceptions of work requirements that affected their reproductive and sexual health. Completion of data collection and analysis revealed six themes: (a) time, (b) anatomical and physiological characteristics, (c) workplace accommodations, (d) reproductive health education, (e) cognizance of sexual health, and (f) sexual consequences. Of the six themes that emerged, time was the one theme that transcended both core research questions of this study.

Previous research has found that shift work has a profound impact on overall health to include increased incidence in circadian dysregulation, psychological disorders, metabolic disorders, gastrointestinal disorders, cardiovascular disorders, increased risk of cancer, and female reproductive health dysfunction (Costa, 2010). This study focused on female reproductive health to further increase understanding of how female shift workers experience their reproductive and sexual health. This study builds on many aspects of previous research and further explores the conditions and behaviors that lead to reproductive and sexual health outcomes. This chapter will discuss the interpretation of

findings, limitations of the study, recommendations, implications for social change, and conclusion.

## Interpretation of Findings

The following core research questions guided this study:

*RQ1*: How do female shift workers in the United States describe their reproductive health amid a non-traditional work schedule?

*RQ2:* How do female shift workers in the United States describe their sexual health amid a non-traditional work schedule?

### Theme 1: Time

In response to both RQ1 and RQ2, time was reported to be the most influential factor that participants faced in managing and maintaining reproductive and sexual health. The lack of time was noted by all participants to engage in routine, off-shift behaviors necessary to engage in routine health care and to fully satisfy sexual life needs. Time constraints were discussed as significant stressors that required careful scheduling and potential sleep-loss, resulting from the demands of a non-traditional work schedule. Predominantly, the lack of time to engage in non-work-related activities came as a byproduct of work taking precedence over personal-life activities where sleep was a crucial element necessary to be able to engage in subsequent work shifts. Despite the need for sleep, participants often discussed having to forgo or shorten the amount of sleep that they engaged in to manage non-work related tasks that affect their quality-of-life.

Previous research has shown that shift work promotes poor health behaviors as a result of long, irregular working hours that interrupt a natural work-life balance (McHugh

et al., 2020). Time is a crucial element to overcome when balancing work against the needs of sleep, social interaction, preventive healthcare, sexual needs, and availability of resources. For some participants time management meant understanding the length and duration of healthcare coverage, where for others time management dictated fertility treatment, scheduled dating, menstrual planning, and sexual health. Managing off-shift behaviors against time constraints, dictated by the non-traditional schedule, required all participants to consider their willingness to sacrifice some aspect of their personal or social life. Sacrifices reported were sleep duration, relationship seeking, menstrual pain management, and accessing routine healthcare.

In discussing how time constraints impacted their sexual life, Participant ID 25 stated, “As far as my sexual health, like dating wise, it has a huge impact because I make my schedule like two months in advance and I work the overnight shift- so when people are typically going on a date and stuff, I can’t do that.” For participants with a long-term spouse, time was discussed as a crucial element to compete with. Participant ID 26 discussed competing with the demands of fertility treatment while also scheduling fertility appointments that would have the least impact on sleep, asserting, “Logistically, the scheduling’s really hard… everything is so important with the timing.” Timing issues with healthcare access were reiterated by Participant ID 27, who stated, “The lack of time, within the non-traditional schedule that I do work it just makes things very difficult to get where I need to.” Participant ID 28 discussed, from a longitudinal perspective, how time has been an element that increases knowledge of how to mitigate female-specific reproductive health issues. As discussed by Participant ID 28, “It has been an adjustment

over the years to figure out how to do your work and deal with all the menstrual problems."

Irregular working hours associated with shift work often encroach on time that is reserved for leisure, social, and family activities (Arlinghaus et al., 2019). Managing work-life demands against finite hours in a day was reported by all eight participants as a regular chore. According to the U.S. Department of Labor, Bureau of Labor Statistics (2018), United States employed adults spend over half of their non-sleeping lives at work or participating in work-related activities. With a significant amount of time spent engaging in work and work-related activities, the need for conscious decision-making of non-work-related activity planning requires careful engineering of time management. Participants often indicated needing to plan doctor's appointments around sleep need, requesting doctor communication at hours that would not interrupt sleep, and scheduling intimate time. Participant ID 26 expressed, "Logistically, the scheduling's really hard, like trying to get appointments that where I can actually get sleep." It is a regular consideration for shift workers to balance their work schedule, need for sleep, and non-work-related activities. Participant ID 28 further discussed the difficulty of time management: "It makes it harder to set up date nights to set up times to do things because you're working weird hours and you're working, you may be working six to nine on this day and twelve to twelve or seven to seven on this day and it does affect your ability to set up things that could lead to sex or lead to intimacy." In answering RQ1 and RQ2, time was an overall factor that influences how shift workers describe their reproductive and sexual health.

### *Subtheme 1: Doctor Office Accommodations*

In relation to the theme of time, a subtheme emerged indicating the relationship between the need for doctor's office accommodations and shift work. In addressing RQ1, all eight participants expressed the importance of maintaining their reproductive health with routine gynecological care. Time became a point of focus, as scheduling appointments and appointment-related phone calls were reported to interrupt sleep. Participant ID 28 stated, "I ended up having notated in my file not to schedule appointments past like 9:30 or 11 o'clock in the morning" in order to maintain their sleep schedule. Many of the participants indicated that they would often miss medical appointments due to falling asleep, as well as having to forgo or even rearranging sleep due to the lack of flexibility from medical offices to accommodate around the non-traditional work schedule. Participant ID 25 confirmed "sometimes I miss a lot of appointments because I oversleep because I had a busy night."

Inattentiveness to reproductive health, defined as not having enough time to engage in routine healthcare needs as a result of work-related fatigue and off-shift life demands, is a known side effect of shift work (Nikpour et al., 2019). Participants confirmed that lack of time reduced the ability to regularly attend routine, non-emergent healthcare appointments. Sleep was the most common reason for lack of compliance to routine gynecological surveillance, as appointments often were scheduled too late in the day for the participant to adequately sleep before the appointment or would require waking from sleep to attend to routine care.

Participants also indicated within this subtheme that non-emergent medical appointment phone calls that interrupted the time during which the individual would be able to sleep. Appointment reminders and follow-up calls were often reported to fall within an overlapping timeframe of shift work sleep recovery and medical office hours. Participant ID 26 stated, “Getting calls from people with results and they call, you know, whatever time is good for them which is normal time for normal people but for me I’m sleeping so the calls wake me up.” Participants who requested that their medical records reflect their work schedule to ensure early morning appointments and reachable time windows for which phone contact from healthcare staff reported reduced sleep interference. Participant ID 28 discussed, “Getting them to accept the fact that calling me at two o’clock in the afternoon is like calling me in the middle of the night, so if my doctor wanted to talk to me or my doctor wanted to make an appointment, that it was inappropriate to try to make an appointment for two or three in the afternoon and that took a while of ‘no, not that time, these times I can do.’”

These findings point to the need for shift workers to communicate with their healthcare providers and staff that they work irregular hours that require accommodations to scheduling and phone communication to reduce sleep interruption. In a study of 204 30- to 64-year-old patients, lack of time was among the critical influences on individuals’ willingness to participate in routine health checks (Chien et al., 2020). This study also noted that motivation to engage in health screenings, when properly encouraged and made accessible, decreased health risks. Access to healthcare within available off-shift time may additionally improve the motivation of shift workers to engage in routine health

checks. Participant ID 27 expressed, “OBGYN care is very elusive, which is king of upsetting honestly, you know- they’re always booked up, they always have like a wait list and you know there’ll be an issues and they say ‘oh we can see you in three weeks’ and like, I’m having an issue now.” Findings show that patients are sensitive to long lead times, which result in appointment “no-shows” that may be mitigated by shortening waiting times and ensuring that scheduled appointments are on time to reduce scheduling-related issues for patients (Marbouh et al., 2020). Time is a valuable commodity among shift workers, where health care providers should ensure that their scheduling practices maximize access to care to better serve individuals whose schedule may be limited during traditional work hours. In providing appropriate access to scheduling needs, healthcare providers may reduce the burden of health risks associated with shift work through early screening and routine care.

***Subtheme 2: Scheduling Intimate Time***

In addition to Subtheme 1, a second subtheme emerged from the theme of time, which included scheduling intimate time. In response to RQ2, participants described their sexual health as being influenced by access to a partner. Often, it was reported that conflicting schedules would reduce the ability of the participant to engage in intimate and/or sexual activity. This issue was compounded for participants who were single and actively seeking a partner. All participants, regardless of their relationship status, indicated that intimate and sexual time was more difficult due to their irregular work schedule. While many participants indicated that they would not forgo sleep in order to

have sex, participants unanimously agreed that sexual health is an essential part of reproductive health and influences quality-of-life.

Reduced intimate and sexual contact, associated with lack of off-shift time, has been shown to decrease libido, increase anorgasmia, and influence relationship satisfaction among female shift workers (Barnaś et al., 2015). Many participants indicated that they lacked interest in sex when they were tired and often did not prioritize sex over sleep. Participant ID 24 explained, "The fact that I prioritize sleep over sex, it [sexual health] definitely starts to lack I guess. I have less sex if I'm overworked and busy and tired." Bilge et al. (2020) found that sexual satisfaction and pleasure are important factors contributing to wellbeing, noting that in their study of 163 shift working nurses in Turkey, that shift work adversely effected sexual health as a result of excessive tiredness which impacted sexual drive. Despite reduced libido, some participants indicated that lack of sexual intimacy has impacted relationship satisfaction among themselves and their partner. These findings support previous research on libido and shift worker sexual health; however, it should be noted that participants did indicate the importance of sexual health as a fundamental part of reproductive health. Participant ID 24 discussed the role of sexuality on reproductive health: "I think it improves it, I mean, just the physical act of sex release so much endorphins and I mean you feel good. So I think it kind of trickles into feelings of connectedness and love and satisfaction."

Participants also described having reduced time for finding and scheduling sexual activity. Dating and engagement in activities with potential sexual partners was reported to be hindered by conflicting schedules or the lack of overall time availability for seeking

partners. Single participants reported it was difficult to find potential partners who had compatible schedules or were understanding of changing work schedules. This difficulty in finding partners reduced the desire of single participants to actively seek out new relationships. In context to how shift work affects their sexual health, Participant ID 22 stated, “I work hours that I work and not knowing my schedule for one week to another was kind of taxing, oh yeah, and it makes it very hard to plan things.” This sentiment was echoed by Participant ID 23: “Shift work is a little bit tough on my relationships, so I’ve not been having a sexual partner for really quite some time now, probably like eight months, and it kind of ruined my last relationship.” In a previous study, the impact of shift work on psychosocial relationships indicated that the stress of shift work placed a significant strain on relationships and often made the shift worker feel isolated due to time associated with “anti-social” work hours (Nea et al., 2018).

Married or partnered, participants indicated that compatibility with their partner’s schedule often became difficult and would interrupt intimacy and impact relationship stability. Participant ID 26 indicated, “I’ve been so busy before and so is my husband to where, like, it wasn’t a priority [sex] and I definitely saw a rift, I just didn’t feel as close to him and I need to feel close to him for this to work.” Participant ID 27 reiterated that their schedule often conflicted with their husband’s, and it felt like they were simply “ships passing in the night,” which impacted their ability to engage in sex. Kulik and Liberman (2020) found that among 276 Israeli heterosexual couples, the amount of time an individual was able to devote to non-work, family-focused domains impacted sexual life satisfaction where work-family time management was the key to a successful

relationship. To overcome the stressor of conflicting schedules, Participant ID 27 discussed engaging in more communication with her husband to improve their emotional connection, “Which is good but I can definitely tell a difference in our sex life.” The findings of this study contribute more to the understanding of how managing tiredness against sexual health, mitigating conflicting schedules between partners, and devoting time to engage in intimacy are crucial elements necessary to satisfy wellbeing and a positive sexual quality-of-life.

**Theme 2: Anatomical and Physiological Characteristics**

Unanimous consensus among participants regarding RQ1 indicated that reproductive health, to the participants, is the overall wellness of anatomical parts and functioning of the reproductive system. Several participants described reproductive health as including sexual health. In describing their personal reproductive health, five of the eight participants described their reproductive health as including dysfunction such as frequent ruptured cysts, heavy menstrual bleeding, fibroids, mood shifts, hormone fluctuations, and infertility. These findings were consistent with previous research that discussed reproductive health outcomes among female shift workers.

The description of reproductive health provided by the participants was consistent with that of the National Institute of Health (NIH). The NIH describes reproductive health as the condition of the reproductive system throughout all developmental stages, which includes the organs, hormones, and hormone-producing glands (n.d.). Participant descriptions of what constitutes reproductive health and their description of their personal reproductive health primarily focused on anatomical reproductive features and their

respective relationship with fertility and overall health. When asked directly what reproductive health means to them, Participant ID 21 stated “the health of my reproductive organs and the activities that are associated with those organs”. Participant IDs 22 and 25 indicated that reproductive health was “keeping a body healthy to be able to have children” and “making sure you’re taking care of the reproductive system regarding your ovaries, your uterus, planning for menopause, breast exams, and just your sexual wellness” respectively.

***Subtheme 1: Barriers to Reproductive Healthcare Associated With COVID-19***

As all eight participants indicated that reproductive health involved the physical wellness of the reproductive system and that routine gynecological monitoring was necessary to maintain health, a subtheme emerged. Subtheme 1 of Theme 2 uncovered barriers to reproductive healthcare access associated with the COVID-19 pandemic. Routine healthcare was either electively paused or unavailable for many of the participants.

As mentioned in Theme 1, time to make routine healthcare appointments is hindered by the irregular occupational hours associated with shift work. For many of the participants, the COVID-19 pandemic added an additional barrier to routine gynecological care by reducing the availability of in-person appointments, cancellation of elective procedures, and increasing concern of COVID-19 transmission. Participants who were not turned away from providers for routine care stated that they paused routine care electively. Participant ID 28 indicated in regard to pausing their routine care during the COVID-19 pandemic, “I stopped getting mammograms, I didn’t go in for any pap

smears, um I think there was about two years there where I wasn't getting the routine testing that I was supposed to be getting".

While access to routine gynecological health care was limited during the COVID-19 pandemic for much of the general population, the additional burden on shift workers decreased compliance to routine health checks. According to the CDC, by June of 2020 about 41% of the United States population avoided or delayed medical treatment of which 32% would have been considered routine healthcare (Czeisler et al., 2020). Participant ID 24 stated that during the height of the COVID-19 pandemic, "I didn't go to a doctor or into a medical facility probably the entire time, so it was years of not having a pap smear and not having care readily available". In a study of 5,656 participants investigating the prevalence of healthcare avoidance during the COVID-19 pandemic, 20.2% participants indicated having avoided routine healthcare with female patients as the predominant demographic that avoided healthcare the most (Splinter et al., 2021). This study further supports previous findings that indicate patient-driven choices to delay or cancel routine healthcare during the COVID-19 pandemic.

***Subtheme 2: Shift Work and Female-Specific Anatomical Issues***

A second subtheme emerged from Theme 2, further contributing to the understanding of RQ1. This theme emerged from a line of questioning that asked the participants to describe how shift work influenced their reproductive health. The subtheme produced a wealth of information in regard to how the participants viewed work demands against their own reproductive health needs. Amenorrhea, extreme pain

during menstruation, and heavy bleeding were among the most commonly discussed participant experiences that were attributed to their shift work schedule.

Wang et al. (2016) found, through researching 139 Chinese shift work nurses, that menstrual cycle dysfunction was a common byproduct of shift work, with night shift increasing prevalence of menstrual cycle irregularity. Ok et al. (2019) found that 25,534 shift workers experienced 15.85% more menstrual irregularity and dysfunction prevalence than non-shift working peers. Long working hours, circadian dysregulation, and work stressors were among the reasons attributed to increased incidence of menstrual irregularity in both studies.

Physical pain and heavy bleeding were among some of the issues that participants indicated most affected their work performance. Despite pain and the discomfort associated with excessive bleeding, participants indicated that they were still required to work at the same level of expectations as their male and non-menstruating peers. Participant ID 21 stated, “there’s a lot of pressure to perform even when you’re feeling poorly, in my case like I had exploding cysts, I was in agonizing pain and when you’re a waitress you have to be very smiley and the amount of money that you earn is directly connected to how pleasant your customers feel you behave”. To combat heavy bleeding/frequent need to urinate and the lack of appropriate number of bathroom breaks, two of the eight participants discussed using incontinence underwear to allow for relief as necessary. Participant ID 28 indicated, “I gave up last year and just started wearing incontinence pads… it was easier to wear those and deal with the shift work then it was to try and get away to change a pad every three to four hours”. This study further

contributes to the understanding of female shift worker menstrual irregularities and highlights the pain and discomfort that participants were expected to endure while working a non-traditional shift.

Shift work associated amenorrhea also was discussed by two of the eight participants as a result of lack of sleep and high levels of job stress. Participants indicated that job-related stress and lack of appropriate rebound sleep often disrupted or stopped menstruation. Several studies have examined the relationship between amenorrhea and shift work. Mayama et al. (2020) found that among 1249 shift working female nurses, over 30% of the nurses working night shift have irregular menstrual cycles and secondary amenorrhea. Participant ID 27 discussed, “having irregular sleep cycles and high amounts of stress definitely make its impact on my cycles for sure”. Participant ID 23 also recounted, “I was like just a couple months into it [shift work] when I was like ‘oh, I have not had a period in a really long time’”. The findings of Mayama et al.’s study are consistent with the findings of this study in which participants regularly experienced disruptions to their menstrual cycles as a result of shift work.

**Theme 3: Workplace Accommodations**

In response to RQ1, all eight participants indicated that workplace accommodations were necessary for female shift workers to improve reproductive health outcomes and increase worker productivity. Workplace accommodations recommended by participants included extended and/or additional bathroom breaks, paid leave options for menstruation/ pregnancy, and better educated employers regarding female

reproductive health. These recommended accommodations were associated with female-specific reproductive health issues.

Access to bathroom breaks, as frequent as necessary, is an essential factor in maintaining sanitary working conditions, personal hygiene, and personal safety. While federal standards require employers to allow employees to have access to bathrooms as needed, many employees report supervisors withholding bathroom access to maximize productivity (Johnson et al., 2019). Participants discussed the fear of losing their job or pay reduction if they needed to use the bathroom frequently, as well as reporting not having sufficient access. Under OSHA standards 29 CFR 1910.141, 29 CFR 1926.51, and 29 CFR 1928.110, employers must allow workers to leave their work area as needed for bathroom breaks, avoid unreasonable restriction of bathroom use, and ensure bathroom restrictions do not impede the ability of the worker to relieve themselves as necessary (OSHA, 2011).

Despite regulations in place to protect employees, participants in some occupations reported that their job function did not always allot time to use the bathroom as necessary. Participants in the medical field discussed that bathroom breaks could not always be taken depending on the condition of the patients they are caring for, especially in an emergency situation. Participant ID 28 sneered in reference to cigarette breaks being available over bathroom breaks, “it’s always aggravated me that we’re willing to give somebody an extra break for something that’s literally killing them when we’re not willing to give the break to somebody who has no choice in the matter of whether or not they’re bleeding”. Another participant working for the postal service discussed that

access to a physical bathroom often conflicted with their rural route, where stopping for regular breaks would increase the time on their shift. Participant ID 22 stated in reference to their lack of access to a physical bathroom, “I had a hard time getting off the route to go to the bathroom, so unfortunately I would just try to hold it all day and that would actually cause UTIs”. Despite federal standards, the practicality of bathroom breaks often conflicts with job functions.

Longer paid maternity leave was also discussed as a recommendation to improve reproductive health outcomes among shift workers. Many of the participants voiced concerns regarding the possibility of being sick while employed and pregnant. Participant ID 27 recounted having been very ill in a previous pregnancy and indicated, “I’m scared, like I very very much want another child but I’m afraid like at the point where we are now if I were to get pregnant and be that physically ill I’ll be unable to work”. Federal standards established under the Family and Medical Leave Act (FMLA), ensure that certain employees are granted 12 weeks of unpaid, job protected, leave per year (U.S. Department of Labor, n.d.). Despite these provisions, workers are not guaranteed pay and qualification for FMLA coverage is reserved for workers who have been employed by their employer for a minimum of 12 months. FMLA does not adequately support shift workers who do not have the financial means to support themselves with 12 weeks of unpaid time, those who have been employed for less than 12 months, and those who may have difficult pregnancies.

Additionally, this subtheme produced insight into employer perceptions of supervisory knowledge and education regarding female reproductive health. Many of the

participants voiced concerns that male supervisors, management, and/or corporate leaders lacked sufficient knowledge of the needs of female shift workers in regard to their reproductive health. Participant ID 21 suggested that it would be beneficial for employers to have "systems in place that create a vocabulary for people that don't understand reproductive health needs to have a reference point". Expectations of performance in instances of painful menstruation, miscarriage, pregnancy, or other female-specific reproductive health concerns were reported by participants as additive factors that place undue stress and discomfort to the workplace. Participants added that many female supervisors were more understanding and allowed for more adaptations without stigmatizing requests for alternative workplace accommodations. Participant ID 21 stated "I do think that female management has a deeper understanding of the experiences of their [female] co-workers".

Previous studies have indicated a stark difference in management style between male and female supervisors due to male leadership misunderstanding of female reproductive issues. In an Australian-based study of 48 men, attitudes and perceptions of menstruation were investigated, revealing that male education on the role and impact of menstruation was grossly lacking in empathy and intensity of regular impact on the female body (Peranovic & Bently, 2017). Additional research has indicated the need for reproductive health leave and accommodations to enhance female employee health management, concluding that previous stigmatization of reproductive health issues in the workplace were once taboo but in addressing the impact that these issues have on worker quality-of-life ultimately reduce objectification and advance gender equality (Levitt &

Barnack-Tavlaris, 2020). This study further supports female shift worker perception of the need for workplace accommodations to tend to reproductive health needs as well as contributes to the female perspective of male management and their role in implementing work requirements that may be difficult to fulfil in certain female-specific reproductive health issue instances.

**Theme 4: Reproductive Health Education**

There was unanimous consensus among all eight participants, which lead to the fourth theme to emerge from this study, that the United States K-12 education system limited its focus of reproductive health to the anatomy and physiology of reproductive organs rather than inclusive of reproductive behavior. In responding to RQ1, participants indicated having limited school-level education prior to 18 years of age regarding reproductive health. When asked what reproductive health means to the individual participants, all eight participants responded in a consistent manner of focusing on the anatomical and physiological aspects of reproductive organs rather than elaborating much on reproductive behavior or sexuality.

All eight participants indicated having had abstinence-only education in the school setting, with several self-disclosing that they grew up in conservative areas. Sexual ignorance was discussed as having had a profound impact on reproductive behavior outcomes among two of the participants. Participant ID 27 discussed having become pregnant at 17 years old as a result of ignorance regarding the use of birth control and antibiotics stating, “I was not educated on safe sex, I was not educated on birth control options, and I was not educated on any of the things that every girl in the world

should be educated on". Participant ID 28 discussed having contracted a sexually transmitted disease as a result of ignorance of same-sex STD transmission and indicated, "the only time I've ever gotten an STD was from a woman and that was shocking because I didn't really have a concept that you could get them from another woman so if we get more education that it's just not a heterosexual problem". In the context of LGBTQ+ sex education, findings show that abstinence-only education only compounds health disparities among the community and leaves out crucial information involving non-heterosexual safe-sex practices (Charley et al., 2023). Additionally, funding for abstinence-only education has been shown to have no effect on adolescent birth rates but does cause sexual ignorance in regard to effective birth control measures, which may lead to unwanted pregnancies (Fox et al., 2019). These findings are consistent with those of this study, which highlights the impact of abstinence-only education on future perspectives of reproductive health. While sex education is not the responsibility of the workplace, the impact of sex education on reproductive health may have a cumulative effect that may exacerbate shift work-related health risks outlined in chapters one and two of this study.

***Subtheme 1: Sexual Health Self-Promoted Education***

Despite all eight participants discussing having had limited K-12 school-level sexual health education, all eight participants discussed having personally sought out sexual health educational material as adults. In response to RQ1 and RQ2, participants discussed the need for self-promoted education to protect their reproductive and sexual health. Many participants reported receiving reproductive and sexual health education

through their OBGYN while others reported using documentaries, books, online search engines, and therapists. A mixture of professional recommendation and self-discovery aided participants in ensuring they engaged in best practices to protect their health. In protecting personal health through education, participants were able to maintain better health by mitigating risky behavior that may inhibit their ability to fulfil their job functions.

The current narrow focus of sex education in the United States is primarily on sexual risk rather than sexual health. Guidelines, measures, and programs expanding the range of sex education to expand on sexual health through safe practices has been shown to improve the perceptions of sex and destigmatize various sexual acts (Kantor & Lindberg, 2020). Participant ID 21 indicated that as they are in an ethically non-monogamous relationship with their spouse they have "been to a therapist that specializes in alternative relationships and sexuality because it is a complicated landscape to navigate". Other participants, such as Participant ID 25 indicated having taken a "sexual behavioral course" to expand their knowledge on pleasure-based sex.

Research supports the power of pleasure-based sex education. Koepsel (2016) found that increasing pleasure-based sex education enhances female empowerment, reduces unwanted pregnancy, and reduces sexually transmitted disease rates. Participant ID 28 indicated using the internet to enhance their pleasure-based sex education stating, "I've learned almost everything from those things [internet searches] that didn't come from like my normal you know elementary education of sexuality". Participant ID 26 indicated using internet searches for pleasure-based sex education because "we like to try

new stuff so just read through like hot it's done and safe". Online research of sexuality-based activity is on the rise and previous research shows that while there are negative aspects of internet-based research, the ability to freely search without judgement or stigma increases knowledge base of safe, pleasure-based sex acts (Döring, 2009). This study further provides evidence that adult curiosity into pleasure-based sex enhances the motivation to seek out safe measures that were not previously taught in school, while further highlighting the importance of sexuality on quality-of-life.

**Theme 5: Cognizance of Sexual Health**

In responding to RQ2, all eight participants indicated that sexual health was an important aspect of reproductive health. When asked further to describe the role that sexual activity and sexuality have on reproductive health, all participants indicated a positive correlation between mental health and decision making of sexual activity. Overall, sexual activity either with a partner(s) or through masturbation was reported to have an impact on mental health.

Five of the eight participants addressed the risks of sexually transmitted diseases, which led to decision making regarding safe sex practices. In engaging in sexual activity with non-married partners, participants discussed the need for routine STD/STI testing. One participant indicated that due to social stigma, having multiple partners may be uncomfortable to discuss with medical practitioners and reduce the desire to be tested for sexually transmitted conditions. Participant ID 26 indicated, "there was a brief moment where I had more than one partner and I needed to see, not help but I needed an exam, and I felt- you know, they ask you all those questions and I just didn't want to go because

I didn't want to be asked [number of partners]". While protection is a necessary aspect to maintaining reproductive health, comfort in being able to express exact circumstances is a necessary part of a complete medical screening. Fear of judgment that can reduce preventative screening measures can directly impact the safety and health of workers (Hussein & Ferguson, 2019).

In a study of 3515 U.S. adults, 42.8% of women reported that there was a high level of importance of sexual health to the overall quality of life (Flynn et al., 2016). All participants agreed there is a mental element to sexual health and sexuality. Participants reported that sexual health and sexuality promoted a more conscious observation of one's reproductive health, increased reproductive health surveillance, and improved mood. Participant ID 21 stated that sexuality in their life has "a very profound role, it has a tremendous impact on how people make decisions". Research on reproductive health decision-making among women in 27 sub-Sahara African countries revealed that women with sexual autonomy further empowers them to take personal measures to protect and enhance their reproductive and sexual health (Darteh et al., 2019). This study further supports previous research indicating that women who are able to take charge of their sexual health have a vested interest in maintaining and monitoring their reproductive health.

**Theme 6: Sexual Consequences**

Sexual health as a positive influence on mental and reproductive health has been previously established, where the byproduct of sexual activity led to the formation of the sixth theme of this study. In answering RQ2, pregnancy as a sexual consequence was

discussed by all eight participants. While not all participants discussed sexual consequence in a negative light, all participants agreed that pregnancy would alter the job function of the individual shift worker.

For many participants, pregnancy would create a significant burden impacting the ability to maintain a positive quality-of-life. Participant ID 24 stated that pregnancy would be "super detrimental, it would be almost impossible to do my job". The stressors of sleep debt, alterations to current job function/position, and the need for childcare were relayed by many of the participants as a negative, life-altering consequence of pregnancy that would be undesirable at the time of the interview. Participant ID 23 reiterated that pregnancy would result in a "huge financial burden… plus childcare and my sleep schedule and all that mess would be really really difficult". Shift work has been associated with increased family conflict, isolation from loved ones, and feeling unable to fulfil domestic duties, which has been shown to increase depressive symptoms and reduce sleep quality (Leung et al., 2020). Shift working parents who feel excessively stressed and fatigued have been shown to utilize strict parenting approaches that may lead to behavior problems among young children and increase the stress load of the parent (Yeo & Teo, 2013). While the burden of pregnancy and maternity leave were addressed in Theme 3, the compounded burden of post-natal child caregiving can have a cascading effect from parent to subsequent generations. Participant ID 25 mused out loud, "What's the balance for me? Am I gonna be up all day or half day with my kid and then up all night, and vice versa. Do I change the kid to my sleep cycle or change my sleep cycle, or what?"

While pregnancy was often discussed as a negative consequence to sexual activity, for participants who did not have access to healthcare through their employer, pregnancy provided an opportunity for temporary health coverage through government programs such as Medicaid. Participant ID 21 indicated that while previously pregnant they received Medicaid that allowed for prenatal and postpartum care which were "times when I, I guess took advantage of and saw the doctor". This limited coverage for healthcare allowed participants to engage in routine health checks that otherwise would not be financially possible.

Many of the participants indicated using birth control or abstinence to protect against unplanned pregnancy. Two of the eight participants discussed recent limitations to abortion access as having influenced their decision to take more permanent measure for birth control through surgical removal of reproductive organs. The recent case of Dobbs v. Jackson Women's Health Organization removed federal protection of abortion rights from women and directly impacted the rights of employers regarding certain female reproductive health care coverage (Vanderwal & Johnson, 2022). Participant ID 24 indicated that as a result of the Dobbs v. Jackson case, "I immediately called to schedule to have my tubes tied". Drastic measures, such as removing reproductive organs because the risk of pregnancy would be so detrimental to their circumstances, show the level of awareness that participants had about their ability to maintain their current quality of life.

Pregnancy planning is one of the most important issues participants in this study indicated needing to consider when discussing sexual activity. According to the U.S.

Census Bureau, when working females become pregnant there may be enduring financial and workplace setbacks that impact their ability to maintain positions and earn promotions (Sandler & Szembrot, 2019). In a study of 27 employed women, the described impact of high risk for preterm pregnancy on earning potential ranged from work-hour reduction to curtailed promotions or employment termination (Wheeler et al., 2020). This study highlights the cognizance and measures that participants have in regard to the effect of pregnancy on their work capacity. This study further demonstrates the instability of female workers' employment and quality-of-life, should changes to their reproductive health or status occur.

## Limitations of the Study

This study had several limitations worth noting. One limitation to the study involves transferability, where the study was limited to only eight participants who self-reported their employment status as shift workers and their sex as female. The data was limited to individuals who work non-traditional occupational hours, either fixed or rotating, that fall outside of 7am to 6pm Monday through Friday. This study did not isolate any one occupation or shift as its focus, which did not produce generalizable data for any specific occupation or shift. Additionally, male shift workers were not researched in this study, so the descriptions of male shift workers regarding their reproductive and sexual health were not assessed. Assigning appropriate inclusion and exclusion criteria is an essential duty of the researcher; however, certain exclusion criteria may limit the presence of perspectives to a small representative sample of a larger phenomenon (Bernadette, 2021). This study purposefully excluded individuals who would not have

first-hand knowledge of female reproductive experiences as a shift worker in the United States. The resulting study participant size may inhibit the generalizability of findings for a larger population (Price & Murnan, 2004).

A second limitation of this study is the use of Google Meet to conduct interviews. While virtual interviews allowed for a broad geographical reach of participants, it may have discouraged potential participants who were not comfortable with virtual meetings and/or the platform used. The threat to validity in utilizing a tool that may not be familiar for potential participants may have reduced the number of willing individuals who may have been able to contribute to this study (Leung, 2015).

A third limitation to the study was the time participants had to agree to for interviewing. Though interest for participation included over 50 individuals, only eight were able to commit to the time required to complete the interview. As such, the data reflected the experiences of a limited number of participants. While there is no one-size-fits-all recommended number of participants, the number of participants must ensure that thick and descriptive data is obtained (Fusch & Ness, 2015). Though data collected provided a robust understanding of the experiences of female shift workers descriptions of reproductive and sexual health in the United States, additional participants may have presented a broader variety of perspectives.

## Recommendations

According to Nikpour et al. (2019), our understanding of reproductive health experiences of female shift workers is limited from a global perspective. In qualitative studies, the exploration of female shift workers' reproductive and sexual health

experiences and perceptions are scarce. A clear understanding of sexual health among female shift workers is exceedingly rare. This study filled a critical knowledge gap on the descriptions of reproductive and sexual health of female shift workers in the United States. While this study provided essential information on the lived experiences of female shift workers, further gaps in knowledge have been uncovered. As such there are several recommendations for future research.

The first recommendation would be to explore the dating experiences of female shift workers. This study uncovered that there was limited research available regarding the barriers shift workers experience regarding dating amid a non-traditional work schedule. Though this study provided insight into the difficulty female shift workers have in finding time to initiate and/or maintain a non-marital relationship, further research should investigate the behaviors associated seeking out potential partners and the barriers experienced.

This study revealed that female shift workers were willing to take permanent surgical measures to prevent pregnancy as a result of changing abortion rights legislation. This study also revealed that pregnancy was among the most concerning outcomes of sexual activity, having been reported by many that pregnancy would be a negative life-altering event. Further research should investigate the impact of Dobbs v. Jackson Women's Health Organization on shift worker perceptions of autonomy in decision making regarding their reproductive health (Dobbs v. Jackson Women's Health Organization, 2022). Reducing fear regarding a potential unplanned pregnancy will allow workers to focus their attention on job performance rather than the possibility of having

to have unplanned offspring that require greater levels of sacrifice that would further detract from the ability to perform current job functions.

The last recommendation for future research would be to evaluate the impact of medical care availability, after traditional clinic hours, to accommodate shift worker schedules. Availability of routine medical care that would not inhibit the sleep schedule of shift workers should be investigated to see if it increases patient compliance with routine screening. As shift work becomes more commonplace in the United States, identifying accommodations that may be helpful in increasing preventative care may reduce the health effects of shift work.

## Implications for Social Change

Adaptability is a core concept of balancing work-life demands. According to Rutenfranz et al. (1981), adaptability to shift work via stress mitigation stress through positive cognitive and behavioral activities may lessen the negative effects of the non-traditional work schedule as it impacts individual health. This study promotes positive social change by bringing awareness to the barriers, challenges, and experiences of female shift workers as they manage their reproductive and sexual health. This study provided a voice to an understudied population and brought to light the ways in which participants were able to adapt to the shift work schedule.

This study recommends changes to be made from employers regarding the accessibility of bathroom breaks, increasing awareness of female-specific reproductive health concerns, paid leave options for female-specific reproductive health concerns, and extended paid maternity leave to include extenuating circumstances during pregnancy. In

valuing the health and wellness of the human capital that makes 24/7 industry productivity possible, increasing accommodations that promote health and wellness will reduce the fear among shift workers of potential loss of employment due to female-specific reproductive health issues. Educating employers on the needs of female shift workers will bring a better understanding of the conditions that impact worker performance. As this study was based on the adaptation to shift work concept model proposed by Rutenfranz et al. (1981) and Ollson et al. (1990), providing access to accommodations would best improve health outcomes among female shift workers in the United States.

This study also recommends that shift workers themselves engage in time management strategies that improve their reproductive and sexual health. Scheduling in advance routine health checks, ensuring that workplace policies are in place to accommodate reproductive health needs, and advocating for oneself are among the recommendations that can be conducted by shift workers. In prioritizing time to engage in intimate behavior and routine health checks, shift workers may decrease known risk factors that would impact the worker's quality-of-life.

## Conclusion

This study investigated how female shift workers in the United States described their reproductive and sexual health. The participants of the study provided rich detailed accounts of the conditions, barriers, and experiences that influenced their perception of their personal reproductive and sexual health. Thematic analysis of collected data revealed six major themes.

The first theme to emerge was unanimously discussed among participants and included the concept of time as an influential factor that impacted reproductive and sexual health. This theme addressed RQ1 and RQ2 in how participants described their reproductive and sexual health. This theme revealed two subthemes: the need for schedule accommodations for routine gynecological care as well as barriers associated with scheduling intimacy.

The second theme that emerged was that female shift workers describe their reproductive health in terms of anatomical and physiological wellness of reproductive organs. This theme further revealed barriers that participants faced in accessing routine healthcare during the COVID-19 pandemic as well as female-specific reproductive health concerns. The third theme to emerge was the need for workplace accommodations to address female-specific reproductive health concerns. Workplace accommodations requested by the participants included better access to bathroom breaks, paid leave options for pregnancy and menstrual dysfunction, and increased education of employers regarding female reproductive health issues. Reproductive health education was the fourth theme to emerge. Findings show that all eight participants perceived their school-level (K-12) reproductive health education as having been limited to reproductive organ functioning rather than reproductive behavior, requiring further self-promoted education to make best-practice decisions regarding personal wellness. The second through fourth themes addressed RQ1 by increasing awareness to how female shift workers describe their reproductive health.

In response to RQ2, participant interview uncovered two themes related to how female shift workers experience their sexual health. Theme 5 revealed that participants identified sexual health as an integral part of reproductive health. In discussing sexual health and wellness, participants discussed how sexual activity promoted increased routine surveillance of reproductive health as well as increased positive mental health. Despite the benefits of sexual activity, Theme 6 revealed that participants were cognizant of sexual consequences. In addition to concerns of sexually transmitted diseases, pregnancy was the most concerning consequence that was reported by many participants to be a negative impact on quality of life.

This study unveils the reality of female shift worker reproductive and sexual health experiences in the United States. In providing a voice to an understudied population, participants were able to directly contribute to the understanding of the contemporary worker. The awareness that this study brings regarding the conditions and barriers that female shift workers experience may increase employer and routine medical care accommodations that would best support the contemporary female shift worker in the United States.

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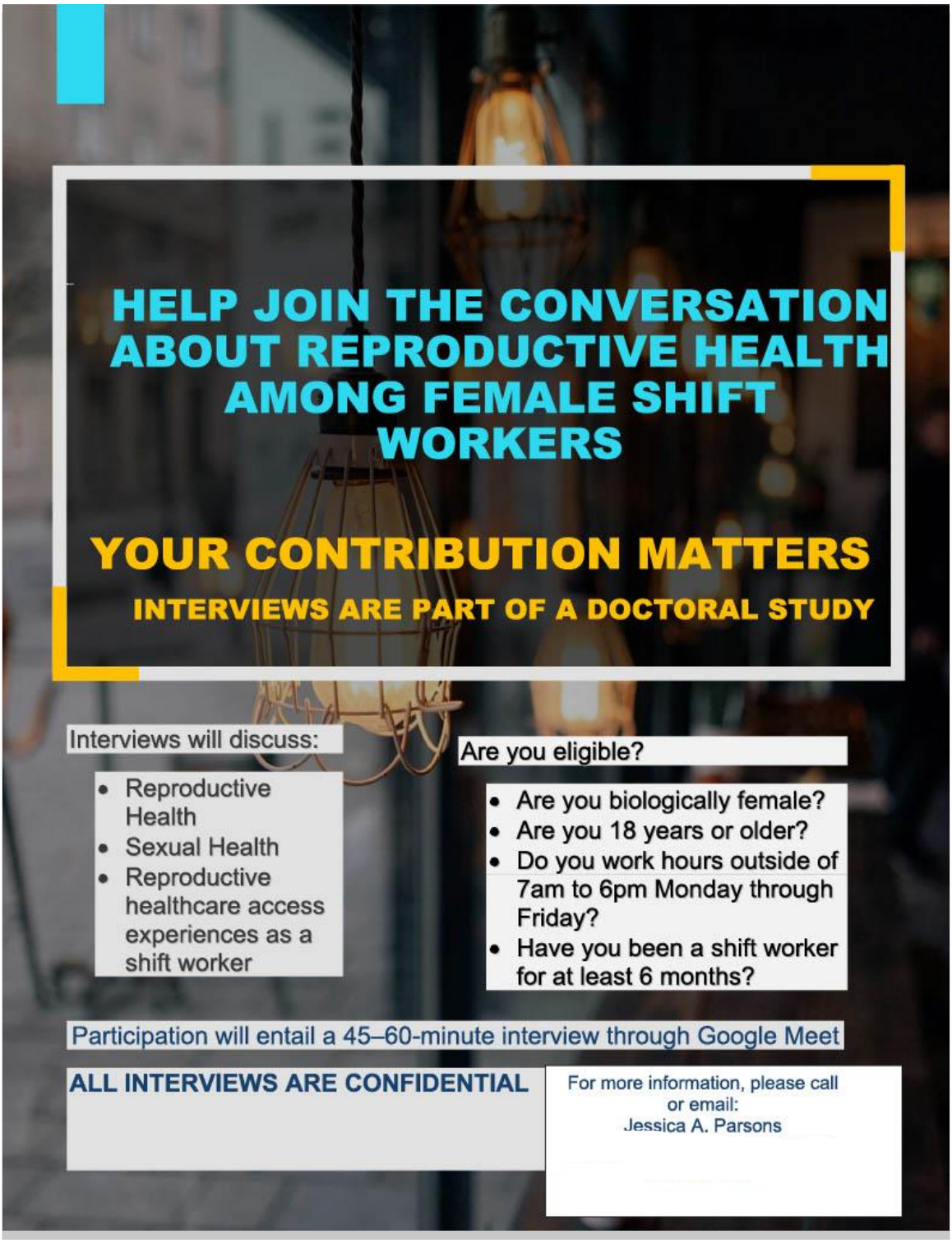
Appendix A: Invitation for Participation Flyer



Appendix B: Shift Worker Reproductive Health Interview Protocol

**Introduction**

Thank you for taking time to participate in this interview today. This interview will be audio recorded, and your confidentiality maintained throughout the process. This study seeks to understand the off-shift conditions and behaviors that contribute to the management of sexual and reproductive health through insight into perceptions of women's (?) health amid the shift work schedule in the United States. I would like to reiterate that participation is voluntary and at any time, if you choose to change your mind and stop participating, simply say "stop, I would like to stop participating". Some of the following questions will be personal in nature, however as a researcher I will not impart any bias or judgement or share personal information. All personal identifiers will be redacted in my analysis, confidentiality will be maintained throughout this entire process, and transcripts of this interview will only be shared with my oversight committee at Walden University. Before we begin, I would also like to define one of the terms that I will be using throughout this interview. We will be discussing shift work, which is defined as a work schedule that regularly alternates or falls outside of 7am- 6pm Monday through Friday. If you are ready to proceed, let us get started.

**Section I:**

Demographics:

1. Age _____

2. Industry of Occupation _____

3. Position _____

4. Typical Schedule _____

5. Full-time or part-time _____

6. Relationship status _____

7. Living arrangements _____

8. Number of children at home _____

9. Length of time employed at the current location _____

10. Length of time as a shift work employee _____

11. Highest level of education _____

**Section II:**

1. Describe what reproductive health means to you.

2. How do you describe your own reproductive health?

3. How would you describe the influence of your shift work schedule on your reproductive health?

4. What resources or measures do you use to protect your reproductive health?

5. Please share barriers or challenges you have encountered in seeking routine reproductive health services amid a non-traditional work schedule.

6. How has the COVID-19 pandemic affected your access to routine reproductive health services?

7. What role do you believe sexuality and sexual activity play on reproductive health?

8. How would you describe your educational foundation, prior to 18 years of age, regarding sexual and reproductive education?

9. How would you describe your sexual health?

10. In what ways do you believe sleep is affected by your reproductive or sexual health needs?

11. What resources have you utilized to better inform yourself on sexual health and how have they been helpful to you?

12. How has shift work affected your sexual health?

13. If changes to your current reproductive health occurred, to include pregnancy or disease, how do you think it would affect your employment as a shift worker?

14. What has helped you be successful at maintaining reproductive and sexual wellness?

15. What advice would you offer other female shift workers to manage their reproductive and sexual health?

16. What do you believe would improve reproductive health outcomes among female shift workers?

17. Is there anything else you would like to add to this interview?

**Closing Statement**

Thank you for taking time to answer these interview questions. I appreciate your candid responses and understand that some of these questions may have been uncomfortable to answer, however your responses have helped me gain a better understanding of your perceptions of reproductive and sexual health amid a shift work schedule. Again, your responses will be confidential, and recordings will be disposed of after my analysis and transcripts have been completed. Transcription of this interview may take a few weeks, but I will contact you as soon as they are complete so that you can review before I begin analysis and reporting. If you would like a copy of your transcript

at any time, please let me know and I will be happy to provide you with them. Do you have any questions?