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IDENTIFYING FACTORS THAT AFFECT SAUDI NURSES' INTENTIONS TO REPORT

MEDICATION ERRORS IN ARAR HOSPITALS

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ABSTRACT

Background: Medication errors are common health safety issues in the Kingdom of Saudi Arabia (KSA). To avoid medication errors, Saudi hospitals need to identify the causes of such errors and encourage nurses to report them. Currently, most Saudi nurses do not report errors due to the Saudi blaming culture and fear of reprisal. Therefore, Saudi nurses need a psychologically safe environment that encourages them to admit and report errors. Identifying Saudi nurses' perceptions, attitudes, norms, behaviors, and intentions regarding reporting medication errors will help Saudi healthcare organizations to support and encourage a reporting culture.

Purpose: The purpose of this study is to identify factors that affect the intention of Saudi nurses to report medication errors.

Method: A quantitative cross-sectional online survey method was used for this study. The study population is Saudi registered nurses who were working at the time of the study in medical, surgical, and intensive care units at Prince Abdulaziz Bin Musaad Hospital and North Medical Tower in the city of Arar in the KSA. The survey used in this study includes a theory of planned behavior questionnaire, a psychological safety scale, and demographic questions. The data analysis employed descriptive statistics, Pearson correlation coefficients, and hierarchical multiple linear regression to assess significant predictors of reporting medication errors. Internal consistency reliability was tested for the scales

Results: The results of this study confirm that Saudi nurses in two Arar hospitals have moderate intentions to report medication errors. The findings demonstrate that the theory of planned behavior constructs (attitude toward behavior, subjective norms, and perceived behavioral control) are significant predictors to explain Saudi nurses' intention to report medication errors. Psychological safety was not found to be a significant predictor in isolation, but it became a statistically significant predictor after interaction terms were added to the model. The interaction between attitude toward behavior and psychological safety was found to be negative and significant, but the interaction between subjective norms and psychological safety was found to be positive. The results indicated that the TPB survey had good reliability and internal consistency.

Conclusions: The findings of this study may suggest that subjective norms and attitude toward behavior are factors that should be assessed before implementing improvement interventions for reporting medication errors. However, further research with larger samples and various groups is necessary to determine significant predictors of Saudi nurses' intentions to report medication errors.

CHAPTER ONE

INTRODUCTION

One of the main goals of healthcare organizations is to provide high-quality and safe patient care. Therefore, many countries try to improve their patient safety levels to attain a high level of healthcare for their citizens (Mahrous, 2018). The World Health Organization (WHO) defines patient safety as "a healthcare discipline that emerged with the evolving complexity in healthcare systems and the resulting rise of patient harm in healthcare facilities." WHO (2019) states that patient safety focuses on preventing and reducing errors, risks, adverse events, and injuries that may occur during the provision of healthcare. The need to provide safe care has increased due to the existence of unsafe care, which covers a broad spectrum of issues experienced by both patients and healthcare organizations. According to WHO (2019), every year 134 million adverse events and 2.6 million deaths occur due to unsafe care and errors. An 'adverse event' is one of several patient safety concerns that many healthcare organizations face and is defined as an injury that occurs due to medical intervention and is unrelated to the patient's condition (Institute of Medicine, 2000). Adverse events are among the top ten causes of death and disability worldwide, and 50% of these events are preventable (WHO, 2019). Further, according to Mansouri et al. (2019), medication errors are among the most common examples of adverse events. The Institute of Medicine (IOM), in its publication *To Err is Human*, defines 'error' as the failure of designed action to be accomplished as intended.

The Kingdom of Saudi Arabia (KSA) is one of the countries that experiences high rates of medication errors by nurses and is the location focus of this study.

Background of the Problem

The lack of patient safety practices globally has resulted in hospitals spending 15% of their total capital expenditure on patient safety (WHO, 2019). These expenses are related to treating safety-related failures, which include adverse events such as medication errors. The National Coordinating Council for Medication Error Reporting and Prevention (2020) defines 'medication error' as any preventable event that could cause unsuitable medication use or harm to patients and involves factors such as usage, packaging, prescribing, product labeling, dispensing distribution, administration, education, and monitoring. In addition, Lee et al.'s (2019) literature review found medication errors to be the most common outcome of poor patient care. Most hospitals worldwide have a high level of preventable medication errors that are costly. For example, the cost of medication errors in the National Health Service of the United Kingdom is around £1.1 billion annually (Alsulami et al., 2019). According to Almalki et al. (2021), approximately US $42 billion is the yearly cost of medication errors globally. Many hospitals, including Saudi hospitals, spend much money to address medication errors. This money can be used to improve the quality of care that leads to fewer medication errors occur.

Medication errors not only are expensive in the long run and compromise patient safety, but they also diminish confidence in the ability of a healthcare organization to provide adequate care. Medication errors cause patients and healthcare providers to lose trust in the healthcare system (IOM, 2000). In the KSA, in every ten patients is injured while receiving care in hospitals (WHO, 2019). Furthermore, Alshammari et al. (2022) reported that medication errors are the

most preventable cause of patient harm. Ibrahim et al. (2019) also stated that 50% to 80% of medical errors can be prevented. Therefore, to improve patient safety and maintain public confidence in their ability to provide safe care, healthcare organizations need to decrease their medication error rate (Mahmoud et al., 2020). However, medication errors are still a common occurrence in Saudi hospitals that cause a particular threat to the Saudi healthcare system and patient safety.

Medication errors are the most common type of under-reported medical errors in Saudi hospitals (Alshammari et al., 2021). Almalki et al. (2021) reported that the rate of medication errors in Saudi hospitals is approximately 44%, confirming that medication errors are among the leading safety concerns in Saudi healthcare. Alsulami et al. (2019) found that medication errors constitute two-fifths of all errors encountered in the KSA, and Ali et al. (2017) reported that more than two-thirds of medication errors are preventable. Bashaireh et al. (2019) also found that medication errors are the most preventable and frequent adverse events within Saudi healthcare organizations. According to Alshammari et al. (2022), 71,332 medication error cases were reported by 265 Saudi hospitals between March 2018 and June 2019. These results demonstrate that the Saudi healthcare system needs to pay closer attention to the prevention of medication errors given their significant and negative effect on the overall Saudi healthcare system.

The medication errors that occur in the Saudi healthcare system have direct and indirect impacts. The primary direct impact of medication errors is patient harm or even death. Indirect impacts include increased medical expenses, higher mortality rates, and an increased length of hospital stay (Alsulami et al., 2019). Another indirect, but important, impact of medication errors is harm to nurses, because nurses may not trust their organization's efforts to improve patient safety.

Furthermore, healthcare providers who are involved in or responsible for such errors can experience feelings of worry, guilt, blame, anxiety, or depression (AlReshidi, 2020). As a result, some healthcare providers may choose to conceal their feelings and not report their errors, which can contribute to further errors and negative patient outcomes. Thus, healthcare organizations should consider nurses as secondary victims of medication errors.

Nurses have crucial roles in preventing medication errors. Therefore, it is important to make sure that they have good work conditions to be able to take care of their patients. Nurses are considered a major workforce in the healthcare industry and essential contributors to the improvement of patient safety and quality of care (Lee et al., 2018; Mahrous, 2018). Nurses' direct interactions with patients make them uniquely qualified to care for them, possibly more so than other providers. In addition, nurses are trustworthy sources of information to measure patient outcomes in order to improve safety and quality of care (Lee et al., 2018). Nurses also bear significant responsibility for reporting errors. Although nurses do not make medication errors on purpose, the occurrence of unanticipated errors can lead to patient injury or harm. Nurses' perceptions of their work environment are influenced by their performance in patient safety activities (Tondo & Guirardello, 2017), and therefore, such perceptions are important to understand if patient safety is to be improved.

Not all medication errors occur due to nurses' mistakes only but also because of systems' flaws. Medical errors occur in organizations that are ineffectively designed to catch such mistakes in time (Bokhari, 2019). In addition, because healthcare organizations are complex environments, the likelihood of error is high, and in order to avoid medication errors, the causes must be identified. The complexity of the hospital workplace can negatively impact patient safety because unanticipated complications and unintentional errors are inherent of the medical

system due to the general nature of human fallibility and technology (Ozeke et al., 2019).

Medication errors occur in Saudi hospitals due to many factors, including environmental and

systemic factors. Ibrahim et al. (2019) found that 75% of adverse events occur because of

systemic organizational factors, not because of individual error. Several studies have

demonstrated that heavy workloads, insufficient staffing, fear of negative reactions, and unclear

reporting processes are the most common barriers to medication error reporting among Saudi

nurses (Dyab et al., 2018; Samsiah et al., 2020; Yousef et al., 2021). These findings suggest that

healthcare organizations should concentrate more on systemic failures that lead to errors than on

human error in order to improve patient safety and care.

Regardless of the attempts by Saudi healthcare organizations to decrease medication

errors (such as establishing reporting system), serious errors continue to occur. One problem

with the Saudi healthcare system is that it is insufficiently proactive. Hospital management pays

attention to an adverse event only after it occurs in most Saudi healthcare organizations

(Bokhari, 2019), which indicates a lack of preparedness and error prevention policies. Al Wahabi

et al. (2017) found that 91.6% of adverse events can be managed and prevented. By encouraging

nurses to adhere to medication administration guidelines and report errors, healthcare

organizations can identify potential sources of errors and prevent their occurrence. Yousef et al.

(2021) stated that, to achieve better patient outcomes and optimal patient care, medication errors

should be identified and reported, which can be accomplished by preventing repeated errors in

the future and understanding underlying contributing factors.

Reporting medication errors, therefore, is an important component of ensuring patient

safety (Alyami et al., 2022). Hammoudi et al. (2018) showed that 70% of errors recur because

they are not reported. Al Khreem and Al-khadher (2021) found that 95.8% of Saudi nurses failed

to report medication errors due to fear of consequences such as blaming and disciplinary action. Although the failure to report medication errors can hinder the development of strategies to prevent such errors (Samsiah et al., 2020), reporting errors can help discover hidden organizational flaws and potential causes for errors. Determining the various types of errors that occur can lead to protecting patient safety, which contributes to increased quality care (Mansouri et al., 2019). Therefore, Saudi hospitals should support a reporting culture and encourage nurses to report errors without fear of negative consequences.

Establishing a good error reporting system is helpful, but it cannot be the only step that healthcare organizations should take to reduce medication errors. According to Dyab et al. (2018), the effectiveness of a medication error reporting system is based on the system's ability to report the occurrence. Thus, the accuracy of the reporting system is extremely important in preventing medication error (Al Khreem & Al-khadher, 2021). In addition, establishing guidelines for medication error reporting is not always sufficient because healthcare providers themselves have a significant role in the medication error reporting process (Dyab et al., 2018). That is, if nurses do not report their errors or under-report their errors, then healthcare organizations cannot determine the causes of the errors. Nurses have a significant role in the medication error reporting process. Their perceptions, attitudes, and perceived barriers toward medication error reporting are also significant factors in the success or failure of error reporting systems (Dyab et al., 2018). A useful method to increase reporting rates is to assess nurses' attitudes toward reporting medication errors, because a negative attitude towards reporting decreases the likelihood of reporting (Archer et al., 2017; Korhan et al., 2017; Natan et al., 2017) and vice versa. For example, when nurses believe that their error could cause patients to lose their life, they will be more likely to report the error. Understanding the factors that impact the

intention of nurses to report medication errors will help healthcare organizations improve their reporting system.

Nurses currently face many obstacles when deciding whether to report medication errors within Saudi healthcare organizations. Blaming and shaming are dominant cultural norms in Saudi healthcare organizations, and this type of environment can be detrimental to achieving a high quality of care (Bokhari, 2019). Hamed and Konstantinidis (2022) found that such a culture of blame in organizations leads to lower reporting rates. Healthcare organizations have attempted to improve patient safety by blaming and punishing healthcare workers who have committed medical errors (Bokhari, 2019). Nevertheless, medication errors still occur in the Saudi healthcare system, indicating that the punitive approach is not an effective method to prevent these errors (Bokhari, 2019). By taking a punitive approach that blames individuals, organizations do not recognize that many errors are the result of systemic problems within the organization. In order to avoid being blamed for making errors, nurses may ignore and even accept flaws in their organization that could lead to patient harm. The exact number of medication errors that occur in Saudi hospitals is still unknown because of insufficient data collection and reporting systems as well as the fear of lawsuits and punishment (Bokhari, 2019). In short, the Saudi blaming culture is unhealthy and hinders reporting and learning from mistakes, leading instead to under-reporting adverse events and causing harm to patients in the long run.

To improve the culture that surrounds the reporting of errors, the barriers must be identified and removed. Archer et al. (2017) emphasized the importance of recognizing the factors that can impact incident reporting within an organization. In addition to a reporting system, healthcare organizations need to establish a psychologically safe environment that

encourages nurses to admit, discuss, and report mistakes rather than ignoring such errors, which can create larger, catastrophic mistakes that negatively affect patient safety. Non-punitive responses to errors, such as recognition of the benefits of learning from mistakes and discussing them with others, are essential for preventing these errors (Zhang et al., 2019). Doucette (2019) confirmed that building psychological safety is an essential component of increasing error reporting. In addition, Aljabari and Kadhim (2021) demonstrated that work environments that provide psychological safety are linked with better reporting of medical errors. Mutair et al. (2021) similarly proposed that one of the recommendations to improve medication error reporting systems in Saudi Arabia is to establish a psychologically safe workplace environment.

Mutair et al. (2021) emphasized that healthcare providers need to feel safe in order to report errors and learn from their mistakes. In a psychologically safe environment, nurses will feel that their voices and opinions are heard, which can lead to a decrease in recurrent errors. Therefore, creating a psychologically safe work environment will assist healthcare organizations in preventing medication errors because nurses will be more likely to report such errors. On the other hand, a punitive environment decreases psychological safety. Munn (2016) suggested that the fear of reporting errors is an indicator of poor psychological safety. Edmondson (2019) likewise stated that fear of reporting is an essential indicator of low levels of psychological safety in the environment. Derickson et al. (2015) found that, in a psychologically unsafe hospital, nurses did not report errors because of fear of potential negative consequences. Lee and Dahinten (2021) also found that psychological safety is associated negatively with withholding opinions. In a punitive work environment, nurses do not feel safe reporting errors or making suggestions that may improve patient care. In such an environment, nurses are more worried about being blamed, punished, and seen as incompetent than about the possible negative

outcomes of their error. In sum, psychological safety is a critical consideration when examining Saudi nurses' intention to report medication errors.

Problem Statement

Medication errors are the most common under-reported adverse events in Saudi healthcare organizations and are indicators of unsafe care provided to Saudi patients. Studies have shown that medication errors negatively impact not only patient safety but also nurses and healthcare organizations. To improve patient safety and decrease medication errors, Saudi healthcare organizations should improve the reporting culture, because not reporting errors is the main hindrance to ensuring patient safety (Mansouri et al., 2019). Previous studies show that Saudi organizations have failed to recognize systemic deficiencies in reporting errors. Thus, Saudi health organizations need to identify nurses' reasons for not reporting errors in order to decrease medication error occurrences.

In order to learn from medication errors to prevent them, Saudi nurses need a safe environment that encourages them to admit and report errors. However, before psychological safety can be established or improved in healthcare organizations, an understanding of the nature of psychological safety is needed (O'Donovan & Mcauliffe, 2020). Currently, no data are available about Saudi nurses' perceptions, attitudes, norms, behaviors, and intentions regarding medication error reporting. Identifying these factors will help in better understanding organizational systemic flaws as well as the role of psychological safety for nurses in reporting errors in Saudi hospitals.

Alshammari et al. (2022) noted that few studies from Saudi Arabia have investigated the reporting of medication errors among healthcare providers. Therefore, little is known about the main drivers of Saudi nurses' intentions to report medication errors. Also, few studies have

investigated psychological safety in the Saudi healthcare system. This study aims to fill these gaps in the literature and help address these problems.

Significance of the Study

Patient safety in the KSA always has been and remains a critical health issue. Saudi healthcare organizations face pressure to prevent errors and improve patient safety due to the associated financial expenses and negative impacts on patients. According to Elmontsri et al. (2017), systems need to be created that increase the likelihood of reducing errors. The organizational environment needs to accept human errors and support learning from errors. By reporting and learning from errors, nurses' knowledge and skills can be continually improved and errors can be used as learning resources. Also, because patient safety is based on continuous learning, the reporting of errors and learning from the errors, accidents, near misses, and adverse events that could be avoided or prevented are critical factors (Elmontsri et al., 2017). Reporting errors helps to create a learning environment in which all errors can be a source of learning in a strong safety culture (IOM, 2004). Given time, such learning and growth will lead to an enhanced system in which errors are reduced. The causes of errors that are enabled by the work environment must be identified in order for such causes to be addressed and eliminated (Korhan et al., 2017). One of the ways to identify the causes of errors is simply to report the error. One significant aspect of this study is that reporting errors assists in providing opportunities to determine and correct errors that could endanger patient safety (Bashaireh, 2019).

Non-punitive approaches to error reporting can contribute to increased rates of error reporting. Albalawi et al. (2020) found that the major barrier to reporting medication errors among Saudi nurses is fear of being blamed. Dyab et al. (2018) confirmed that, in order to facilitate and improve medication error reporting, the blaming culture, which is dominant in

Saudi hospitals, should be eliminated. Not only does the blaming approach as punishment lead to the under-reporting of errors, but it also leads to the subsequent continuation of medication errors. In contrast, creating a psychologically safe environment should encourage nurses to report errors. Al Reshidi (2020) reported that a safe environment leads to an increase in error reporting and decrease in the occurrence of adverse events. Saudi healthcare organizations need to learn from previous errors and mistakes and create a non-punitive environment, because a blame-free environment is essential to providing high-quality and safe care (Ferrer et al., 2018). A safe environment will motivate nurses to report errors because the focus will be on the error, not necessarily on the person who made the error. Also, a psychologically safe environment leads to safer health practices that aim to prevent similar errors from occurring in the future (Alsulami, 2019). Therefore, another significant aspect of this study is that it highlights the need to mitigate the blaming culture and establish psychological safety in the KSA's hospitals to encourage error reporting.

According to Ganesan et al. (2017), understanding the causal factors of under-reporting errors will help to establish methods to develop or improve a reporting culture. Yousef et al. (2021) found that many factors are related to the under-reporting of medication errors, including individual fear of reporting errors and embarrassment caused by colleagues' reactions to making an error. When healthcare providers feel fear of job termination and punishment, the under-reporting of medication error practices increases (Ali et al., 2017). Lee et al. (2016) identified factors that impact individuals' intention to report, including fear of punishment, peer pressure, and an unsupportive work environment. Determining and addressing such factors will help to develop administrative and individual steps that will lead to an increase in reporting and a decrease in the number of errors, and will improve patient outcomes (Alyami et al., 2022). By

addressing the nurses' intentions to report medication errors, hospitals can improve or change their reporting system in order to increase the medication error reporting rate among nurses. A significant aspect of this study is that enhanced patient safety can be achieved by formulating and implementing suitable medication error reporting policies (Alyami et al., 2022).

Understanding nurses' behaviors and perceptions also can play a vital role in decreasing medication errors. Yousef et al. (2021) emphasized that understanding healthcare providers' behaviors is the first step to avoiding the recurrence of the same errors in the future. In addition, nurses' perceptions and attitudes can influence the establishment of a safe patient environment because nurses have regular and current awareness of the factors that can lead to harm to patients (Maher et al., 2019). Nurses are likely to be the first to notice safety issues in their organizations (Lee et al., 2019). By identifying nurses' intentions, norms, attitudes, and controllability regarding an organization's reporting medication errors, the organization can strengthen positive norms and attitudes toward reporting and change negative norms and attitudes to decrease medication error occurrences. The organization can also remove the potential barriers to reporting errors among nurses. In this study, the theory of planned behavior (TPB) and its constructs (attitude toward behavior, subjective norms, and perceived behavioral control) were used to assess Saudi nurses' intention to report medication errors. By assessing nurses' intentions, norms, and attitudes related to patient safety-related behaviors, healthcare organizations have the opportunity to prevent and learn from the errors.

In sum, reporting errors is necessary to warn healthcare professionals about patient safety risks (Ko & Yu, 2017). In order to build a safe work environment, nurses should be encouraged to report, admit, and discuss errors without having to consider threats they may face as a consequence. Thus, understanding Saudi nurses' intentions to report medication errors can help

to build suitable plans and programs to improve reporting practices and policies. Addressing the factors that impact medication error reporting can lead to the development of appropriate managerial and individual strategies to increase reporting rates. A first step to developing interventions and policies is to assess the current state of psychological safety in the facility (Hunt et al., 2021). A significant attribute of this study is identifying relationships between psychological safety and each of the TPB constructs to investigate Saudi nurses' intention to report medication errors. The results of this study will contribute to the science of nursing and bring psychological safety to the attention of Saudi leaders. Ultimately, the results will advance reporting practices and improve patient care and safety.

Purpose of the Study

The purpose of this study is to identify the factors that affect the intention of Saudi nurses to report medication errors. This study will investigate the contributions of the TPB constructs and concept of psychological safety to the prediction of Saudi nurses' intentions to report medication errors. The study also will examine the relationships between psychological safety and each of the TPB constructs. The specific aims of the study are to:

Aim 1: Predict Saudi nurses' intention to report medication errors.

Aim 2: Determine the contribution of the TPB constructs toward the prediction of the intention of Saudi nurses to report medication errors.

Aim 3: Determine if the psychological safety construct contributes toward the prediction of Saudi nurses' intention to report medication errors.

Summary

The most common patient safety issue within Saudi healthcare settings is medication errors. Reporting such errors contributes to reducing them. A psychologically safe work

environment leads to the promotion of a reporting culture among nurses. Previous studies show that nurses' intentions, and attitudes toward reporting medication errors, their norms, and evaluations of their ability and controllability over reporting medication errors should be taken into consideration in the context of error reporting.

The remainder of the dissertation is structured as follows. Chapter 2 provides a literature review and includes discussion of the psychological safety concept and the TPB and its constructs as well as a description of the Saudi healthcare system. Chapter 3 describes the methodology used for this study and Chapter 4 provides discussion of the results. Chapter 5 concludes the dissertation with a summary of the study's main components, strengths and limitations, and implications for future research.

CHAPTER TWO

LITERATURE REVIEW

This literature review focuses on studies that support the identification of factors that relate to nurses' intentions to report medication errors. This chapter provides a synthesis of the literature on the concept of psychological safety as well as the Theory Planned of Behavior (TPB), and their relationships to nurses' error reporting. The studies reviewed help to gain a clear definition of psychological safety, including its antecedents, mediators, and outcomes, and to investigate psychological safety at the individual, group, and organizational levels as well as related concepts. This literature review looks specifically at psychological safety in healthcare settings and nursing education. In order to predict and explain Saudi nurses' intentions to engage in safety activities and report medication errors, the TPB is described in terms of its use in the literature. The literature review includes descriptions of the Saudi healthcare system and Saudi quality improvement initiatives as well as incident reporting and barriers within the Saudi healthcare system. The review also addresses advantages associated with reporting errors and strategies that have been used to improve reporting. In this regard, this literature review covers the benefits and impacts of psychological safety on nurses' behavior, intentions, and attitudes toward reporting errors. Also, key gaps in the literature are identified to justify the need for the present study.

Psychological Safety

A healthcare organization is a complex environment where mistakes are common. Therefore, healthcare organizations should create a safe learning environment where nurses feel that they can admit their errors and share their thoughts or opinions, regardless of their perceptions of interpersonal threats. Some nurses view reporting errors as necessary, whereas others see such reporting as a source of problems and embarrassment due to blaming. That is, talking about errors they have made depends on their understanding of interpersonal threats, such as punishment or blame (Edmondson, 1999). Individuals require security in order to overcome interpersonal threats and engage in learning behaviors, which indicates the need to create an environment of psychological safety.

A psychologically safe environment offers nurses the opportunity to overcome their interpersonal concerns, such as fear of being blamed, and encourages nurses to believe that the benefits of safety behaviors, such as reporting errors, outweigh the risks associated with blame or punishment. Edmondson (1999) found that an environment of psychological safety makes establishing learning behaviors easy because it removes the extreme concern about others' reactions to actions and allows nurses to feel secure in performing learning behaviors. Thus, the psychological safety construct has become a significant phenomenon in nursing practice.

Several researchers have discussed the psychological safety concept over the years. In 1965, Schein and Bennis defined psychological safety as an environment where individuals can take risks. They argued that psychological safety is important to make individuals feel safe and confident in their capacity to handle changes in order to accomplish organizational learning. Psychological safety assists individuals in overcoming their interpersonal concerns by eliminating barriers to change and establishing an environment that is forgiving of mistakes

(Schein & Bennis, 1965). These findings suggest that a psychologically safe environment helps nurses feel secure and confident to talk about or discuss their mistakes. In 1990, Kahn defined psychological safety as the ability to display and use oneself without fearing negative outcomes associated with self-image or career. Kahn (1990) reintroduced the concept in a qualitative study to identify ways that psychological safety allows personal engagement in the workplace. Kahn (1990) found that psychological safety influences employees' readiness to use or show themselves physically, cognitively, and emotionally during role performance instead of retreating or protecting and is essential for individuals to engage in their work. Later, Edmondson (1999) defined psychological safety as a shared feeling of safety amongst a team that allows for discussion of interpersonal risk. This definition by Edmondson (1999) is the most commonly used in nursing literature (Newman et al., 2017; Ramalho & Porto, 2021), and most nursing studies reviewed by Newman et al. (2017) follow Edmondson's definition. Thus, this definition of psychological safety is used in this study.

Studies also have investigated the importance of conceptual differences between psychological safety and related concepts, such as trust, psychological empowerment, and work engagement, in order to obtain empirical evidence of the value of psychological safety. First, the psychological safety construct is different from the trust construct. Edmondson (1999) emphasized that, even if psychological safety includes interpersonal trust, it goes beyond trust. Interpersonal trust should not only exist in a psychologically safe environment, but mutual respect among professionals must be involved, too. Edmondson et al. (2004) also clarified that trust and psychological safety are both focused on describing psychological states, including perceptions of risk and options to decrease negative results. Trust can decrease concerns about the potential negative consequences of an individual's behavior, which in turn improves their

trust in their abilities to take interpersonal risks, such as (in the case of nurses) reporting

medication errors. When workers have trust in their organizations, they believe that the

organizational response to their behavior will be constructive, not blaming or shaming.

Psychological safety differs from trust in three ways. The first is the object of focus,

which refers to the focus on self or others. Through trust, people try to protect themselves by

observing others' actions. In contrast, through psychological safety, people try to focus on their

own actions to protect themselves. Edmondson et al. (2004) stated that trust does not accurately

include a description of interpersonal experiences, such as how valued and comfortable

individuals feel in their work. The second difference between psychological safety and trust is

timeframe (Edmondson et al., 2004). With psychological safety, the timeframe for interpersonal

consequences that individuals anticipate when participating in a particular behavior is short term.

Healthcare providers who have a question about a medication may think about the potential

immediate results of their behavior, such as being humiliated, rather than thinking about possible

long-term results, such as hurting a patient. In contrast, the trust construct focuses on expected

results through a wide range of distant future events. The third difference between psychological

safety and trust is the level of analysis (individual, group, or organizational) (Edmondson et al.,

2004). Psychological safety focuses on groups rather than individuals. When professionals feel

reluctant to report errors, this reluctance suggests that their team has similar perceptions about

reporting, whereas trust can refer to a relationship between two individuals.

Besides trust, empowerment and work engagement also differ from psychological safety.

According to Kahn (1990) and Frazier et al. (2017), psychological safety, work engagement, and

psychological empowerment all represent positive motivational states towards individuals' work.

However, these constructs differ in that work engagement and psychological empowerment refer

to an individual's perception of their given job or tasks, whereas psychological safety refers to an understanding of the broader social and work environment and how individuals perceive that others in the workplace will respond to risk-taking behaviors. In sum, psychological safety is conceptually unique and addresses individuals' perceptions of the environment, i.e., where they work, instead of particular jobs or tasks.

In order to examine the psychological safety concept, the antecedent variables must be assessed based on the level of analysis, i.e., individual, group, and organizational levels (Edmondson, 1999; Edmondson et al., 2004; Edmondson & Lei, 2014). Frazier et al. (2017) conducted comprehensive meta-analysis of the antecedents and outcomes of psychological safety at the individual, group, and organizational levels. Although research has suggested that psychological safety is a multidimensional construct, Frazier et al. (2017) found no difference between individual and group levels of analysis. Similarly, Edmondson et al. (2016) reported no significant differences among levels of psychological safety in medical settings.

At the individual level, Frazier et al. (2017) investigated the possible impacts of individual differences and personality traits on the perception of psychological safety and found that having a proactive personality, being emotionally stable, and being open to experiences are important antecedents. These traits make individuals curious and more likely to participate in detecting and solving problems. Newman et al. (2017) also found that individual, but also team, characteristics impact perceptions of psychological safety.

At the group level, Frazier et al. (2017) found that interpersonal relationships, group dynamics, leadership, and organizational norms are antecedents to psychological safety. Specifically, leaders' behaviors are an important aspect of a safe psychological environment. When leaders admit their mistakes and show fallibility, staff also will feel more comfortable

reporting or admitting their mistakes. Edmondson (1999) explained that managers' responses to events and behaviors impact team members' perspectives of appropriate and safe behavior. A leader's behavior should be characterized by three aspects to improve psychological safety: the leader should be available and accessible, explicitly encourage input and feedback, and be a role model of openness and admission of fallibility (Edmondson et al., 2004). When leaders are accessible, staff feel that their opinions are valued. By encouraging staff to express their concerns and ask questions, leaders promote psychological safety. Providing feedback to staff reflects that leaders respect their staff's opinions, which leads to encouraging active participation. Ultimately, the way that leaders act can serve as a model of acceptable behavior within the organization.

At the organizational level, Frazier et al. (2017) identified the most common organizational factors that can affect psychological safety, which include a positive association between work design characteristics, such as autonomy, role clarity, and interdependent work, and perceptions of psychological safety. To create psychological safety, staff should be trusted to make significant decisions and have a clear description of their role in participation. Such practices ensure that employees can depend on each other to complete their jobs. Frazier et al. (2017) noted also that psychological safety is positively associated with supportive work contexts, such as support from team members, leaders, and the organization. Staff need to feel trust, care, and support from their peers as well as their leaders. Newman et al. (2017) also found that supportive organizational practices, leadership, and co-workers' behaviors, such as valuing participation and trust, are all factors that contribute to improved performance, engagement, and commitment among staff.

In addition to describing the antecedents of psychological safety, Frazier et al. (2017) clarified the outcomes of psychological safety, which include engagement, task performance, and some behavioral variables. Newman et al. (2017) also found that psychological safety is positively associated with engagement and task performance. In a psychologically safe environment, individuals can focus on their jobs and feel secure to participate without thinking about possible negative results. At an individual level, psychological safety also is associated with outcomes such as job engagement, organizational commitment, learning from failure, and creative work involvement (Edmondson & Lei, 2014). The Frazier et al. (2017) study similarly reported that psychological safety is positively associated with some behavioral outcome variables, such as information sharing, creativity, and learning behaviors. A psychologically safe environment thus provides nurses with the opportunity to learn, cooperate, and share information. This type of environment also contributes to encouraging nurses to generate novel solutions because they are able to overcome their fear of being blamed or punished if they make a mistake. Thus, establishing a psychologically safe work environment is necessary given the demand for learning and innovation in the workplace.

Many researchers have found that psychological safety acts as a mediator between learning behavior variables, i.e., the antecedents (leader behaviors and availability of resources and information) and outcomes (innovation, performance, and learning) (Edmondson, 1999; Lee & Dahinten, 2021; Newman et al., 2017; O'Donovan & McAuliffe, 2020; Roh et al., 20201; Triplett & Loh, 2018). For example, Edmondson (1999) found a positive association between psychological safety and the availability of resources, information, and leaders' behaviors. The availability of resources and information makes healthcare providers feel confident to engage in risk-taking activities. A leader who is supportive and offers opportunities for questions helps to

create a safe environment in which nurses can admit their mistakes and suggest new ideas. In contrast, a leader who takes a punitive approach makes nurses hesitant to participate in learning behaviors. Supportive leader behaviors promote individuals' confidence in their ability to perform their job, and the availability of resources and information removes barriers to progress. In a systematic review of psychological safety, Newman et al. (2017) examined ways that encouraging organizational practices, supportive leadership behaviors, relationship networks, team characteristics, and individual/team differences impact workplace outcomes at the individual, team, and organizational levels through the establishment of psychological safety.

Reporting errors and taking preventive action are examples of learning behaviors, and these behaviors flourish in a safe environment. Learning behaviors can mediate the impact of psychological safety on performance outcomes (Edmondson, 1999). Edmondson et al. (2004) clarified that an organization should focus on productive discussion to facilitate the early prevention of problems and the achievement of shared goals. Nurses are more likely to report errors or problems if they are confident that their organization will not hold their errors or problems against them. Consequently, a safe psychological environment is necessary to help providers change their behavior (Edmondson et al., 2004). In a safe psychological environment, nurses' willingness to engage in safety behaviors and learn from their mistakes will increase. In order for nurses to participate in learning behaviors, they must feel confident in their own abilities and respected among their coworkers and not fear reprisal or embarrassment when performing learning behaviors.

A psychologically safe work environment is important for healthcare organizations because the healthcare setting is such a high-risk environment where errors cannot be avoided. In a highly complex work environment, providers need to work interdependently to provide safe

care (O'Donovan & McAuliffe, 2020). Thus, determining the practical enablers of psychological safety among healthcare teams is necessary to enhance and sustain a psychologically safe environment. Edmondson et al. (2004) noted that the level of psychological safety influences the way team members react to each other and their behaviors, such as seeking help and feedback, speaking up about errors and concerns, providing innovative suggestions, and communicating with others. Asking for help may make nurses feel that they are incompetent, but psychological safety helps to alleviate their fear of others' reactions and encourages them to ask questions. Nurses may also feel hesitant about seeking feedback to avoid negative criticism and humiliation, but in a psychologically safe environment, nurses may realize that the benefits of speaking up exceed the risks. Nurses also may feel free to offer new ideas, suggestions for change, and recommendations for modifications without having to think about others' reactions.

Studies indicate that psychological safety is beneficial if not critical in the healthcare environment. O'Donovan and McAuliffe (2020) conducted a systematic review of studies published between 1999 and 2019 to identify factors that enable psychological safety in healthcare teams. They found that these factors could be classified into five broad themes: (1) priority for patient safety, (2) improvement and learning orientation, (3) support, (4) familiarity with colleagues, and (5) status, hierarchy, inclusiveness, and individual differences. The first theme, priority for patient safety, includes leader behaviors and professional responsibility. Supportive leader behaviors help nurses feel secure in reporting errors. Nurses who have a sense of responsibility and accountability realize the importance of speaking up for patient safety.

The second theme, improvement and learning orientation, indicates a culture of continuous improvement and change-oriented leadership. O'Donovan and McAuliffe (2020) reported that psychological safety mediates the relationship between a culture of continuous

improvement and providers' engagement and suggestions for improvements. Their study emphasizes the leader's role in supporting continuous quality improvement and psychological safety by encouraging innovative thinking, visualizing change, taking personal risks, and simplifying open discussion of errors and solutions. The third theme focuses on support from leaders, peers, and organizations. O'Donovan and McAuliffe (2020) note that supportive healthcare environments encourage providers to express their concerns, which providers perceive to be a professional duty that is supported by administration and policies. Leader support, shown by listening or providing feedback, improves open communication among providers. Thus, coworkers can share the same norms and values about speaking up. Sharing the same norms contributes to enhancing nurses' willingness to speak up about their safety concerns and fosters psychological safety.

The fourth theme is familiarity, whether among team members or with the team leader and across teams (O'Donovan & McAuliffe, 2020). The healthcare environment should facilitate the development of trust and interpersonal relationships between and among team members. Similarly, due to the interdependent nature of the healthcare environment, it is important to facilitate communication, information sharing, and collaboration across different teams (O'Donovan & McAuliffe, 2020). The fifth theme is status, hierarchy, inclusiveness, and individual differences. O'Donovan and McAuliffe (2020) found that healthcare providers with a higher status report higher levels of psychological safety. Therefore, inclusive leadership behaviors can overcome the negative impacts of low status on psychological safety by smoothing hierarchical differences, thereby contributing to developing a psychological safe environment. O'Donovan and McAuliffe (2020) stated that personal differences, such as gender, personality, and personal control, also can impact psychological safety in healthcare teams. They found that

male healthcare providers are more likely to speak up about safety issues because they have a higher level of braveness and assertiveness compared to many female healthcare providers. Providers who have high levels of personal control also are more likely to speak up compared to providers who do not have high levels of personal control. These five themes relate to team building and establishing trust among team members and thus serve to foster psychological safety in healthcare settings.

The concept of psychological safety, in addition to being studied in the context of the healthcare environment, has been studied in the context of nursing education. Turner and Harder (2018) defined psychological safety as an environment in which learners can engage without feeling fear of punishment or humiliation. They conducted concept analysis of a simulated psychologically safe learning environment and found that such an environment has three essential attributes. The first is that nursing students need to be able to make mistakes without fearing negative outcomes. The second involves the qualities of the facilitator, which include being accessible, respectful, and providing constructive feedback. The third attribute is fundamental activities that are divided into three categories: (1) learners should be oriented to the physical environment; (2) preparation of the learners includes watching a video or reading required materials; and (3) objectives and expectations should be clearly defined among facilitators and learners. Turner and Harder (2018) noted that the benefits of a psychologically safe learning environment include improving innovation, collaboration, and allowing individuals to speak up when they notice errors. Further, Turner and Harder (2018) identified four antecedents of a psychologically safe environment: being in a controlled environment, formative evaluation, confidentiality, and trust. These factors make students feel secure in engaging in risky behaviors that might or might not cause mistakes. Turner and Harder (2018) explained that

the outcomes of a psychologically safe environment in simulation include learning from

mistakes, problem-solving, and skill acquisition. These observations are consistent with those of

Edmondson (1999) who found that learners will have confidence in their actions when the fear of

discomfort and mistakes is reduced and when they realize that mistakes are common in a

simulated environment. Kostovich et al. (2020) also stated that psychological safety in both

healthcare and education settings can facilitate learning processes and lead to enhanced work

outcomes at various levels, including individual and team levels.

In summary, the concept of psychological safety captures nurses' perceptions of the

consequences of interpersonal risk behaviors in their work environment. Asking questions,

seeking feedback, reporting errors, and voicing their concerns are interpersonal behaviors that

can be considered risky due to their possible negative consequences, such as being seen as

incompetent or blamed. Psychological safety is not only a significant concept in the healthcare

setting but also in a simulated learning environment. In both healthcare and education settings,

facilitators and leaders should be accessible and supportive, and providers and learners need to

have the skills and resources to engage in learning behaviors.

The Theory of Planned Behavior

The TPB has been used to understand, predict, and change human social behaviors, such

as exercising, maintaining a healthy diet, donating blood, and using public transportation (Ajzen,

2011). It also has been applied to explain the impacts of peer pressure and behavioral control on

patient safety behaviors, such as reporting incidents and speaking up (Wakefield et al., 2010).

The TPB can provide important information regarding effective interventions that can modify

social behaviors. This theory also helps to understand the factors that influence healthcare

providers' intentions to engage in safety behaviors in order to improve patient safety (Wakefield

et al., 2010), and determining such factors is thus a prerequisite to improving patient safety. The TPB can be applied to investigate and predict nurses' attitudes and behaviors that influence patient safety and quality of care, especially those behaviors and attitudes that are not easily observable, such as adherence to clinical guidelines (Rich et al., 2020).

Ajzen (1991) defined behavior as the result of salient information or beliefs that are considered to be prevalent determinants of individuals' intentions and actions. Along with this definition, Ajzen (1991) stated that the key driver for behavior is the intention to carry out a behavior, which is defined as the willingness and motivational level of a person to perform a given behavior. According to Ajzen (2011), intention is often used as a proxy for measuring actual behavior, especially in cases where direct observation of the behavior is unrealistic or hard to accomplish. Reporting behavior is one such case. Figure 1 presents a schematic illustration of the TPB and indicates that the intention to carry out a behavior can be predicted from three independent determinants: attitude toward the behavior, subjective norm, and perceived behavioral control. No permission is needed to use the TPB in this study. The three constructs and intention jointly signify an actual behavior. Ajzen (1991) and Ajzen and Fishbein (1980) explained that the main factor in the TPB is the individual's intention to carry out a specific behavior. An individual who has a strong intention to participate in a particular behavior is likely to perform that behavior (Ajzen,1991; Ajzen & Fishbein,1980). Thus, the intention construct captures the likelihood that an individual will perform an intended behavior.

Figure 1. Theory of Planned Behavior
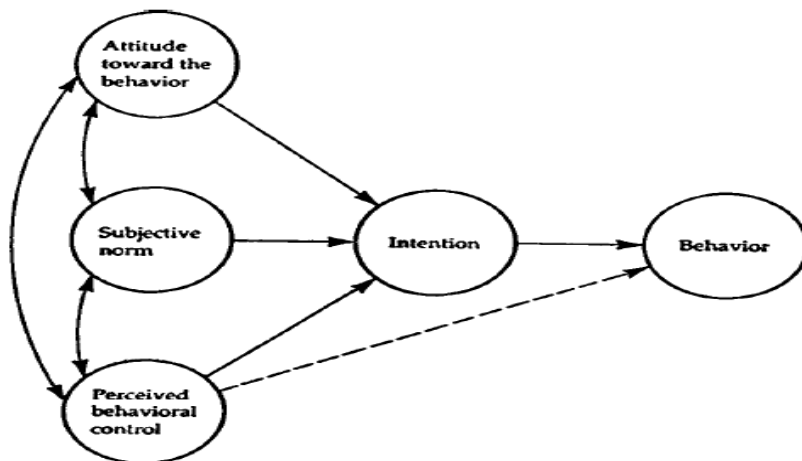
Note: From "The theory of planned behavior," by Ajzen, I. (1991). *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

According to the TPB, attitudes are determined by subjective norms, which refer to the perceived social pressure to carry out or not carry out a behavior. When individuals have a positive attitude toward a behavior, they are more likely to have a strong intention to perform that behavior. Attitude towards behavior indicates the degree to which individuals believe they have an appropriate or inappropriate evaluation of the behavior (Ajzen, 1991). This notion suggests that nurses' willingness to report errors depends on their belief that this behavior will improve patient safety. When nurses perceive that other nurses who report errors are incompetent, this perception negatively impacts nurses' willingness to report errors. On the other hand, when peers or managers consider reporting errors as a useful tool to improve patient safety, nurses will be more likely to engage in this behavior. Consequently, when managers encourage reporting and peers are supportive of reporting behaviors, a positive attitude toward reporting behavior may develop. Thus, organizations should provide the opportunities and

requisite resources to develop positive attitudes and norms to facilitate reporting behaviors. The more appropriate the attitude and subjective norms with regard to the behavior, the greater the perceived behavioral control, and the stronger a person's intention to carry out the behavior will be. Thus, a combination of all TBP constructs leads to the formation of behavioral intention.

Executing a behavior is based not only on intention but also on behavioral control, which in turn includes the motivational factors that impact behavior. The probability of performing a given behavior is based on both intention and behavioral control (Ajzen,1991). Perceived behavioral control refers to an individual's perception of difficulty or ease to carry out the behavior of interest and considers past experience, expected barriers, and obstacles (Ajzen, 1991). An individual's intentions, along with the levels of the individual's behavioral control, will impact the individual's performance. The direct relationship between intention and behavioral control indicates that the intentions of healthcare providers are more likely to be carried out if they have the necessary resources and ability to perform the behavior. Behavioral control is indirectly associated with a behavior, indicating that the impacts of intentions are influenced by perceived behavioral control that affects behavioral performance as well (Ajzen,1991). These relationships demonstrate that perceived behavioral control has a significant role in the TPB.

In fact, perceived behavioral control is often a proxy for actual control and can lead to the prediction of behavior (Ajzen, 2002; 2011). Actual behavioral control is the extent to which an individual has the desired opportunities and resources and intends to carry out the behavior (Ajzen,1991). Ajzen (2002) stated that several behaviors present difficulties in performance that can limit volitional control. Volitional control refers to how much individuals have control over their behavior. Hence, individuals need resources that facilitate performance to strengthen their

ability to perform the behavior. Ultimately, an individual's ability impacts their persistence to face any difficulties with regard to performance. However, perceived behavioral control needs to be realistic (Ajzen,1991). Some behaviors are not under volitional control, which may make perceived behavioral control difficult to implement.

As some behaviors are under volitional control, they can only be predicted by intention. A high level of perceived control should reinforce an individual's intention to execute the behavior and enhance effort and persistence (Ajzen, 2002, 2011). Perceived behavioral control indirectly impacts behavior through its influence on intention. According to Ajzen (2002), many behaviors are difficult to perform, which reflects limited volitional control. For example, when a nurse seeks a promotion within their organization, the execution of this intention is not totally under the nurse's control. Even if the nurse tries everything in their power to obtain the position, another nurse who may be more qualified may be chosen. Thus, a lack of control is present in some situations.

Perceived behavioral control and self-efficacy share some similarities and differences. They both refer to an individual's belief that they are able to perform a given behavior (Ajzen, 2002, 2020). Perceived behavioral control refers to the degree of controllability over a certain behavior, whereas self-efficacy refers to the ability of an individual to perform a given behavior (Ajzen, 2002, 2020). Perceived behavioral control involves carrying out behavior that will result in a given outcome, whereas self-efficacy focuses on the behavior itself, not on outcomes or events (Ajzen, 2002). Ajzen's conceptualization of perceived behavioral control refers to both internal (skills or abilities) and external (time or opportunity) factors. Perceived self-efficacy is the ability to carry out control during performance and judge how successful individuals perform

the required behavior (Ajzen, 1991, 2002). Thus, self-efficacy impacts the options of activities, the effort expended during performance, emotional reactions, and preparation for an activity.

However, according to Ajzen (1991, 2002, 2020), no conceptual difference is evident between perceived behavioral control and self-efficacy. They both refer to an individual's belief that they are able to perform a given behavior, but operationally, they are assessed in different ways. Bandura's (1977) concept of self-efficacy is a graded series of potential obstacles to performing a behavior and, in Bandura's research, participants were asked to indicate how likely they were to overcome each obstacle. To assess perceived behavioral control, participants were asked to rate the extent to which they have the ability to perform the behavior and the extent to which the behavior is under their control. The Bandura study results are consistent with those of Tavousi et al. (2009) who used factor analysis to distinguish between perceived behavioral control and self-efficacy. Perceived behavioral control describes factors that control an individual's decision to perform a behavior.

According to the TPB, beliefs provide the bases for attitudes, subjective norms, and perceptions of behavioral control. Beliefs that are related to intended behaviors help to guide individual decisions to execute such behaviors. Ajzen (1991) stated that attitudes toward a behavior are based on beliefs about the probable outcomes of performing the behavior and appraisal of these outcomes (behavioral beliefs). Subjective norms are based on beliefs about the normative anticipation of others and motivation to adhere to these anticipations (normative beliefs). Perceptions of behavioral control are based on beliefs about the presence of factors that could assist or impede the performance of the behavior and the perceived power of these elements (control beliefs). These different types of beliefs serve as a guide for individuals'

decisions or actions. Thus, the TPB can be used to change or predict behavioral, normative, and control beliefs.

The TPB has been used to understand individual behavior in a multitude of behavioral domains. Casper (2007) applied principles of the TPB to assess the impact of a continuing education class on the intentions and behavior of mental health practitioners. The Casper (2007) study found that the theory-guided class significantly increased the participants' intentions to use the self-report tool compared to the standard class. Nelson et al. (2014) used the TPB to evaluate attitudes, perceived control, subjective norms, and intentions in order to predict healthcare providers' intentions to measure blood pressure accurately and found that perceived behavioral control and social norms were the most significant predictors of accuracy. Guo et al. (2019) found that administrators' attitudes and perceived behavioral control are statistically significant in predicting administrators' intention to use evidence-based management. In addition, Gavaza et al. (2011) used the TPB as a model to predict pharmacists' intention to report serious adverse drug events and found that subjective norms and attitudes are the strongest predictors of intention and that perceived behavioral control does not predict intent. However, Williams et al. (2015) found that perceived behavioral control, descriptive norms, and attitudes towards the behavior are important predictors of pharmacists' intention to report errors.

The TPB also has been used to explain and predict nurses' intentions and behaviors. Javadi et al. (2013) examined predictors of nurses' patient safety intentions and behaviors using a TPB framework and found that the greatest influences on nurses' intentions to perform patient safety behaviors are normative beliefs and subjective norms. Hung et al. (2016) concluded that normative beliefs (nurse managers' and coworkers' expectations or perceptions) are the strongest predictors of nurses' attitudes toward medication error reporting. Lapkin et al. (2015) found that

subjective norms are negatively related to behavioral intention and that attitudes and perceived behavior control are significant predictors of intention in terms of enhancing medication safety and collaborative practice. Lapkin et al. (2015) suggested that healthcare providers may place a low value on others' perceptions regarding medication safety and collaborative practice. Ekayani et al. (2017) and Tabak and Fleishman (2011) concluded that attitudes and perceived behavioral control significantly impact the intention to report adverse events, whereas subjective norms do not impact the intention to report adverse events. Rogers et al. (2017) found that a positive attitude and supportive subjective norms are strongly associated with nurses' intention to use automated dispensing cabinets and that perceived behavioral control is not a strong predictor of the intention of behavior. The varying and conflicting results of the aforementioned studies confirm that the TPB's constructs and influences differ across different behaviors.

Natan et al. (2017) found that all three determinants of intention, i.e., behavioral beliefs, subjective norms, and perceived behavioral control, are strong predictors of nurses' intentions to report errors. This finding is consistent with the results of Angelis et al. (2017) who concluded that nurses' intentions to report adverse drug reactions are impacted by all three determinants of the TPB. Ditching et al. (2020) found that all three TPB constructs are significantly correlated with nursing students' intention to report needlestick injuries. These studies indicate that the more positive the nurses' attitudes and subjective norms are regarding reporting errors, the greater the perceived behavioral control over the behavior, and the stronger the intention to report errors.

In sum, several researchers confirm that the TPB is relevant to understanding healthcare providers' behaviors and intentions, and thus, the theory has been used by many healthcare services (Ekayani et al., 2017; Rich et al., 2020). Many studies have applied the TPB to examine

predictors of nurses' intentions and to identify factors that influence reporting behaviors (Dionisi et al., 2020; Ekayani et al., 2017; Hung et al., 2016; Javadi et al., 2013; Lee et al., 2016; Natan et al., 2017; Rogers et al., 2017; Wakefield et al., 2010). The TPB helps to explain individuals' decisions and actions by being applied to evaluate major beliefs in the population (Ajzen & Fishbein, 1980). Thus, by obtaining enough information about beliefs that need to be changed, a hospital can help nurses change those beliefs and behaviors. The TPB is a useful tool that can be applied to study nurses' attitudes, behaviors, and perceptions of patient safety and their ability to perform nursing skills.

Links between Psychological Safety and Intention to Report Errors

The literature demonstrates the influence of psychological safety on individuals' intentions. Edmondson (1999) found that psychological safety is a key component to discovering and preventing errors and an important determinant of healthcare providers' behaviors. Later, Edmondson et al. (2016) determined that psychological safety is essential to facilitate learning and change within a high-stakes environment. Soola et al. (2021) stated that psychological safety supports patient safety by encouraging nurses to admit their mistakes, which can contribute to quality improvements. Newman et al. (2017) found that the link between "team priority of safety" and reporting errors is strong in a highly psychologically safe environment. These findings confirm that, in order for errors to be reported, healthcare organizations need to build a safe environment that encourages reporting behaviors and makes nurses feel secure in admitting errors, which can serve as a learning source for others. In short, the healthcare literature shows a positive relationship between psychological safety and nurses' intention to report errors or speak up about safety concerns and risks in the healthcare environment (Edmondson & Lei, 2014; Lee

& Dahinten, 2021; O'Donovan & McAuliffe, 2020; Remtulla et al., 2021; Scheepers et al. 2018; Soola et al. 2021).

A psychologically safe environment enhances the ability to predict nurses' intentions to report errors by strengthening the effects of the TPB constructs on the intention. Kim et al. (2021) found that, in a psychologically safe environment, nurses are more likely to have positive attitudes toward reporting behavior because the workplace motivates them to improve the work process and performance. Alingh et al. (2019) stated that, in a safe environment, nurses are more likely to believe in the effectiveness of a reporting system, which will translate into a positive attitude toward reporting behavior. By contrast, Stühlinger et al. (2021) showed that, in teams with low levels of psychological safety, individual nurses feel social pressure to conform to their team norm. That is, any behavior that does not correspond to group norms could be an interpersonal risk for nurses and they may feel social pressure to comply with the norms of their current team. Thus, nurses can feel unsafe when they behave/act according to their attitudes or beliefs that may not match group norms. Nurses who have a high level of psychological safety are more likely to possess common beliefs and accept the risks that are related to reporting behaviors. To engage in safety behaviors, nurses need to have the required resources and control over these behaviors. Song et al. (2020) stated that, in a psychological safety environment, nurses will be more confident in their ability, controllability, resources, and opportunities, and there will be fewer expected obstacles that lead to strong perceived behavior control. Song et al. (2020) also claimed that psychological safety increases individuals' perceptions of ease and decreases their feeling of risk when they express new ideas. Thus, the effects of positive attitudes, favorable norms, controllability, and individuals' ability to act on intentions are strong when the level of psychologically safety is high.

Proposed Theoretical Model

The TPB constructs serve as an important framework for predicting and changing behaviors across different domains, including nursing (Lee & Vincent, 2021; Steinmetz et al., 2016). Ajzen (2002; 2006) noted that the TPB constructs alone may not be enough to capture people's intentions and actions. Therefore, Ajzen (1991; 2006; 2011; 2020) suggested adding more predictors to the TPB when such predictors have important impacts on the outcomes. Psychological safety is a predictor that may have an important impact on intention. Appelbaum et al. (2016) found that psychological safety was a positive predictor of intention to report adverse events. They determined psychological safety as an essential antecedent to the intention to report errors and actual reporting behavior. Many studies also found psychological safety is a positive predictor for intent to report errors (Derickson et al., 2015; Lee & Dahinten, 2021; Munn, 2016). High levels of psychological safety in the work environment encourage members of teams to voice their possible safety concerns and suggest ideas that can improve patient care (Grailey et al., 2021). This type of environment motivates nurses to overcome their fear of potential consequences and supports identification and reporting errors. For this study, the psychological safety construct is added as a variable to the TPB components in the proposed model.

Psychological safety is a multidimensional construct. Psychological safety has both individual and team aspects (Edmondson, 1999; Ito et al., 2022; McClintock & Fainstad, 2022) and reflects individuals' perceptions of the outcomes of their interpersonal risks within their team (Edmondson, 2002) Individuals who feel safe to report errors contribute to having a shared belief among nurses that their unit is a psychologically safe workplace. Therefore, Ito et al. (2022) described individuals' feeling of psychological safety as a prerequisite for creating team

psychological safety. Nurses need to feel psychological safety in order to build a culture of psychological safety in their unit or team. A safe environment in the unit can be built through a set of procedures or policies that assure nurses they will not be punished or blamed for safety-related behaviors, such as reporting errors.

Despite the variety of levels of psychological safety, the literature tends to focus on the individual level (Carmeli et al., 2010; Kark & Carmeli, 2009; Lee et al., 2016; Leroy et al., 2012; Nembhard & Edmondson, 2006; Rogers, 2020; Scheepers et al. 2018). In a systematic review of the literature, Newman et al. (2017) found that 29 studies measured psychological safety at the individual level and that the most used scale was Edmondson's (1999) scale. Since the TPB described individual-level predictors of actions, it is important to meet the principle of compatibility by ensuring that all constructs are measured at the same level of specificity (Ajzen, 1985; Fishbein & Ajzen, 2011). Thus, all constructs of this study, including psychological safety and the TPB items were measured at an individual level.

Psychological safety impacts the relationship between three TPB predictors and intentions to report errors. Facilitating positive attitudes toward reporting errors creates a set of positive shared beliefs among team members and increases team members' ability to report errors and control behaviors. Nurses may accept risks related to reporting behaviors. Catalano et al. (2021) argued that individuals hold attitudes and beliefs about normative pressure and whether they believe their behavior is under their control, which cannot be enough to develop strong intentions if the situational environment is not supportive. Psychological safety strengthens the effects of the TPB constructs (attitudes, subjective norms, and perceived control) on intentions. Lee et al. (2016) found that higher levels of individual psychological safety have positive impacts on norms of incident reporting. As a result, higher levels of psychological safety

can strengthen its relationships between attitudes, perceived norms, perceived control, and intentions. Thus, nurses' decisions about whether to report medication errors are based not only on their attitudes towards reporting, social pressure to report, and perceived control over this behavior, but also on feeling psychologically safe within their work environment.

However, when Saudi nurses perceive that the level of psychological safety is low in their work environment, they will hesitate to report medication errors or remain silent about them because they perceive reporting as punitive behavior. Once nurses feel safe when reporting errors, they will adjust their behaviors to feel appreciated in their work environment. Even if they have positive attitudes, norms, and controllability, they will not be able to overcome interpersonal risks within a blaming environment. Within psychologically unsafe teams, members are less likely to overcome social constraints and pay little attention to their personal attitude and abilities in order to develop a behavioral intention. In the proposed model, psychological safety was hypothesized to moderate the relationship between the TPB constructs and Saudi nurses' willingness to report medication errors. The direct effect of psychological safety on Saudi nurses' intentions also was examined. Figure 2 presents a schematic illustration of the proposed theoretical model for this research.

Figure 2. Proposed Theoretical Model
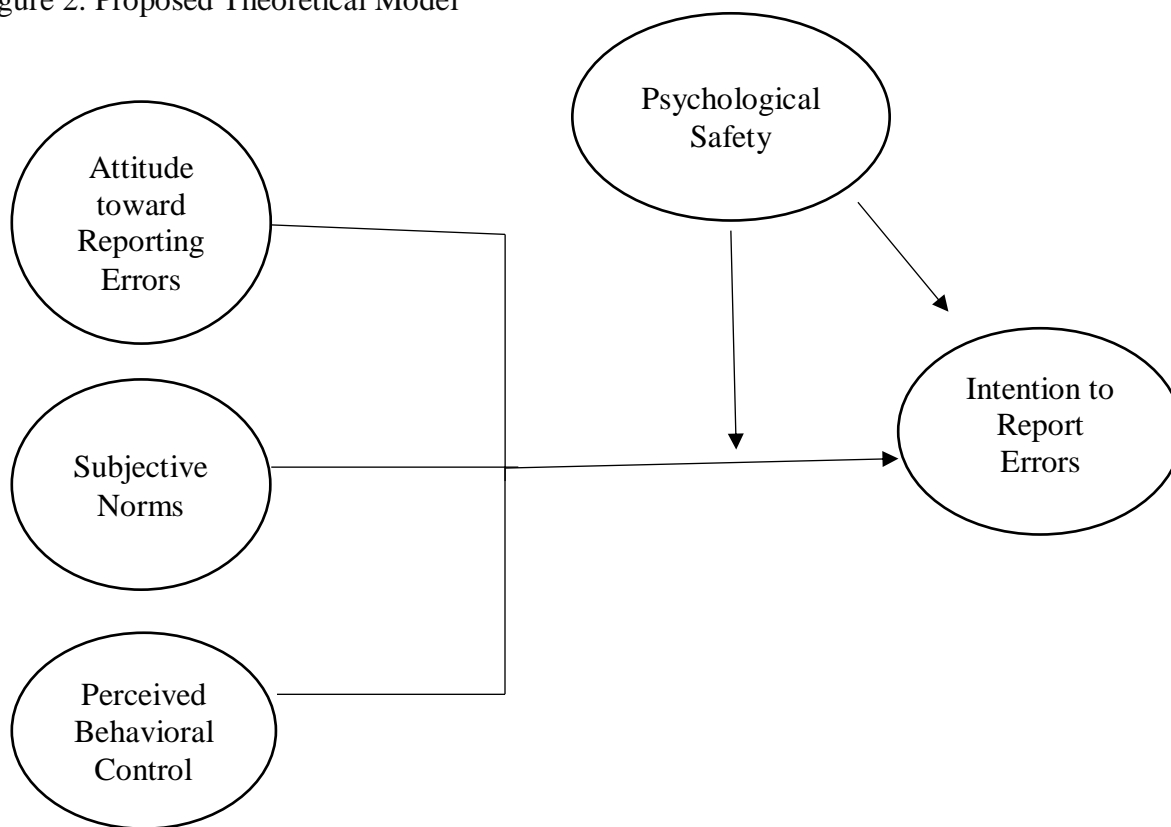
Healthcare System in Saudi Arabia

The Ministry of Health (MOH) in the KSA is the main government agency that is responsible for providing care to Saudi patients, whether curative, preventive, or rehabilitative (Ferrer et al., 2018). The MOH has provided universal access to healthcare for Saudi citizens for several decades (Santa et al., 2018). Although healthcare services in Saudi Arabia are free, several challenges are associated with their provision. The most common challenges are the increasing costs of healthcare expenses and Saudis' expectations for medical care to be safe and high quality within a transparent environment (Rahman, 2020). In both public and private Saudi hospitals, medical errors are a frequent problem. When medical errors occur, the financial burden to provide medical care or to pay for the repercussions of these errors falls on the MOH.

To prevent such additional expenses, Saudi Arabia is undergoing a healthcare transformation (Alharbi et al., 2019), with a shift to restructure the healthcare system, privatize public hospitals, and incorporate insurance coverage for Saudi and foreign workers. In 2016, the Saudi government presented a new guide, named the Kingdom's 2030 Vision, to transform various aspects of the healthcare system (Alharbi et al., 2019). One of the main objectives of the 2030 Vision is to increase the quantity of Saudi health sectors and promote quality healthcare services (AL-Dossary, 2018).

Saudi Patient Safety Initiatives

As a result of the Kingdom's 2030 Vision, the Saudi healthcare system has proposed many initiatives to improve patient safety. For example, Alshammari et al. (2021) reported that the Saudi Patient Safety Center was established to improve patient safety and decrease medical errors and patient harm through several strategies, such as establishing a national culture of patient safety reporting and raising awareness of safety issues (Bokhari, 2019). Also, the Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI) is a national accreditation agency that deals with enhancing healthcare quality and establishing safety standards (Bokhari, 2019). The MOH has mandated that all Saudi hospitals should be accredited through the CBAHI (Alshammari et al., 2021). The Saudi MOH also adopts a no-blame culture in terms of reporting medication errors (Alshammari et al., 2022). The MOH does not require any identifying information as to the person who reported the error in order to encourage Saudi nurses to detect and report actual or possible errors. Therefore, all Saudi hospitals must improve medical safety to meet national standards of quality and patient safety (Bokhari, 2019). Ultimately, the MOH aims to mitigate as many medical errors as possible through strategic institutional changes to improve patient safety.

To this end, in 2019, the MOH developed a strategy to increase reporting of medication errors, including an electronic form that is accessible to all healthcare providers. The MOH also developed a job description for medication safety officers and compiled guidelines for medication error reporting. The MOH can now monitor sentinel events (defined as a patient safety event that results in death, permanent harm, or severe temporary harm) by notifying, investigating, and reviewing the occurrences of these events across the Saudi system within the established reporting system (Altalhi et al., 2021). Saudi hospitals are required to report sentinel events within five days of detection. The type of event, location, contributing factors, and influence on patient care are reported through a secure web-based portal in a system designated for reporting sentinel events. The MOH requires Saudi hospitals to submit a root cause analysis based on causative systems, processes, human factors, and prospective corrective actions (Altalhi et al., 2021; Bokhari, 2019). In addition, the Saudi Food and Drug Authority established the National Pharmacovigilance Center to monitor safety matters regarding medications, and thus, the Center has an important role in the detection of adverse drug reactions and their evaluation and prevention (Mutair et al., 2021). In response to the recommendations of the CBAHI and Saudi Patient Safety Center, Saudi healthcare organizations have begun to pay attention to patient safety improvements and decrease medical errors.

Errors Reporting in Saudi Arabia

Healthcare organizations aim to provide high-quality and safe care to patients. Therefore, most organizations try to decrease all types of errors, including medications errors. Medication errors are an international issue and are the most common type of under-reported medical errors (Alshammari et al., 2021). According to Rutledge et al. (2018), medications errors that are under-reported affect patient safety by impairing performance advancement efforts. The most

common method to decrease such errors and protect patients is incident reporting. The information taken from incident reports can be used as a source to develop individual or organizational learning (Alarfj, 2020; Al-Rayes et al., 2020; Banakhar et al., 2017). Data from reports also can lead to a better understanding of the nature and cause of errors and help discover events that might have caused harm to patients if not handled in time (Alarfj, 2020; Banakhar et al., 2017; ElKhider & Savage, 2019). A reporting system assists in identifying possible risks and alerting healthcare organizations to potential system failures (Hamed & Konstantinidis, 2022) so that organizations can determine if they need to change a process or reform a system. Therefore, incident reporting serves as a powerful tool for safe healthcare practices by creating learning opportunities to prevent future errors.

Healthcare organizations need to understand the surrounding factors of error reporting, and thus, an effective error reporting system is an essential strategy to improve patient safety (Alsabaani, 2020; Chen et al., 2018). A successful incident reporting system assists healthcare organizations in creating a culture of safety because it serves as a central component of safe health practices (Al-Rayes et al., 2020). Evaluating such reports can lead to new policies and procedures that aim to decrease the possibility of repeating of past incidents. Healthcare organizations encourage reporting errors because of the benefits to patients, providers, and healthcare organizations. Reporting medical errors can smooth the examination of factors that lead to errors or harm, improve the understanding of ways to reduce contributing factors, and lead to safe clinical practice (Chen et al., 2018). Healthcare organizations can use data from error reports to discover the causes of errors and follow up with improvement strategies.

Investigating all the factors that are related to medication errors is important to identify the causes of the errors (Rutledge et al., 2018). Healthcare organizations need to identify such

factors, such as managerial factors and the workplace environment, to decrease errors. Because reporting errors helps to identify the factors that lead to medication errors, reducing barriers to reporting errors is an important task. Saleh and Barnard (2019) identified such barriers in Saudi hospitals as fear, misunderstanding what represents an error, concern about the ramifications of reporting and handling the error, and the perception of the significance of the error and its reporting process. Moon and Kim (2017) reported that the main obstacles to reporting errors are fear of criticism and blame, a limited communication system regarding error reporting, and a lack of knowledge and procedures about reporting errors. Hamed and Konstantinidis (2022) conducted a qualitative systematic review to identify barriers to incident reporting among nurses and found that fear of negative consequences, such as being blamed or seen as incompetent, is the most frequent barrier to reporting errors Aljabari and Kadhim (2021) and Archer et al. (2017) also found that fear of consequences is the most significant barrier to reporting errors. Because these study results indicate that fear of consequences is the most important factor in underreporting errors, nurses may perceive reporting errors as risky behavior due to the possibility of negative results.

ElKhider and Savage (2019) stated 53% of Saudi nurses perceived fear of consequences as a barrier to near-miss reporting. They defined near-miss events as unplanned events that are more likely to result in damage to patients. ElKhider and Savage (2019) reported that Saudi nurses were afraid of the adverse consequences of reporting their errors, being blamed or reprimanded, and having administrators or colleagues develop a negative attitude towards them or consider them incompetent. These ElKhider and Savage (2019) study results are consistent with the results of other Saudi studies (Al-Otaibi et al.,2018; Archer et al.,2017; Nkurunziza et al., 2019; Saleh & Barnard, 2019). In addition, Aljabari and Kadhim (2021) conducted a

systematic review of the literature to analyze common barriers to reporting medical errors in several countries and discovered that the fear of consequences is the most prominent barrier reported by 63% of nurses. These studies indicate that poor psychological safety in Saudi hospitals with a punitive reporting environment can make nurses feel fear of blame, punishment, losing their jobs, or respect and thus feel insecure to discuss or report errors.

Other barriers to reporting medication errors among Saudi nurses include lack of time and the complexity of the reporting process (Banakhar et al. 2017). Hammoudi et al. (2018) concluded that the most likely reason for underreporting medication errors is the administration's response, which includes leaders' lack of positive feedback and concentration on personal failure rather than on system failure. ElKhider and Savage (2019) showed that 27% of Saudi nurses felt a lack of positive feedback from administrative leadership. That is, some nurses do not report errors because feedback is either lacking or unhelpful. AlQudehy et al. (2018) found several barriers to reporting sentinel events at a Saudi hospital, including poor communication regarding policies and procedures, lack of motivation among healthcare providers, punitive approaches, and the absence of feedback from the hospital administration. Barriers to reporting errors can differ from one institution or country to another, but the literature is consistent that the primary barrier to Saudi nurses reporting errors is fear.

Several strategies have been implemented to promote a culture of error reporting and eliminate barriers to reporting errors among Saudi healthcare providers Rutledge et al. (2018) argued that barriers to reporting medication errors can be modified and are important to take into consideration when improving patient safety. Banakhar et al. (2017) investigated strategies that include employing a computerized system to report medical errors, not holding error reporting against those who reported the error, encouraging nurses to report medical errors, providing

feedback about the error that was reported, utilizing clear guidelines and procedures for reporting errors, and training nurses about procedures for reporting medical errors. ElKhider and Savage (2019) determined that incentives and rewards are not significant in improving the reporting of near misses. Archer et al. (2017) examined factors that contribute to facilitating patient safety and incident reporting and found that a positive attitude towards incident reporting and a high value placed on incident reporting can lead to an increase in the probability of reporting. Similarly, Moon and Kim (2017) identified factors that impact attitudes toward incident reporting, including communication about patient safety, transparency of decision-making after errors were reported, and the belief that reporting incidents will improve patient safety.

In addition, changing the work environment and strategies related to reporting errors can help overcome these barriers (Aljabari & Kadhim, 2021). Also, when administrators' responses to errors focus on nurses instead of focusing on the system, the error reporting rate decreases (Aljabari & Kadhim, 2021). To improve error reporting rates, work environments should be characterized by psychological safety (Aljabari & Kadhim, 2021). Nurses with higher levels of psychological safety have a greater intention to report, ask, and express their concerns, which leads to positive attitudes toward error reporting. Therefore, nurses' attitudes and behaviors and the work environment should be assessed to improve the error reporting culture. Based on these studies, nurse managers should consider several facets of the work environment to enhance positive attitudes toward error reporting, including establishing a safe psychosocial environment (Moon & Kim, 2017). When healthcare organizations consider accidents and mistakes as individual causes rather than faults of the system as a whole, this viewpoint leads to creating barriers to error reporting. To understand such barriers, a safe psychological environment needs to be established.

Psychological Safety and Reporting Errors

Nurses' willingness to speak up about their safety concerns to improve patient safety is as important as reporting errors (Lee & Dahinten, 2021). O'Donovan and McAuliffe (2020) emphasized the need to understand factors that help improve psychological safety within the healthcare environment, which suggests the need to understand nurses' motivators and barriers to reporting errors. Gilmartin et al. (2018) explored the role of psychological safety in adherence to the central line insertion checklist and found that the level of psychological safety increased, and the reported rates of nonadherence decreased. Similarly, Appelbaum et al. (2016) stated that a safe psychological environment increases professionals' willingness to report patient safety events. Psychological safety leads to establishing a non-threatening environment where nurses can seek help or feedback, acknowledge their own mistakes, and offer suggestions for improvement. A safe environment is an important element in improving patient safety because nurses are more likely to engage in interpersonally risky behaviors, such as speaking up and seeking feedback (Hans & Gupta, 2018; O'Donovan et al., 2021).

A psychologically safe work environment encourages nurses to overcome any concerns or fear they may have in reporting errors and contributes to decreasing nurses' fear of negative consequences when reporting errors (Lee and Dahinten, 2021). Alingh et al. (2019) similarly stated that psychological safety relieves the fear of negative personal consequences. Gilmartin et al. (2018) reported that a high rate of error reporting was observed in units that had high levels of psychological safety whereas a low rate of error reporting was observed in units that had low levels of psychological safety. A psychologically safe environment encourages healthcare providers to raise safety concerns because these providers are not fearful of potential negative consequences (Grailey et al., 2021). In this environment, individuals will feel confident that their

organizations will listen to them rather than blaming or punishing them and they will feel safe in expressing their concerns and taking interpersonal risks to improve patient safety.

Psychological safety affects several aspects of the healthcare environment in addition to reporting errors. Devaraj et al. (2021) stated that psychological safety is a robust predictor of team performance, improving engagement, and satisfaction. Psychological safety is positively linked with engagement in quality improvement of work, creative team performance, and peers' performance feedback among healthcare providers (Kessel et al. 2012; Nembhard & Edmondson, 2006; Scheepers et al. 2018). Thus, nurses' willingness to explore and innovate will increase in a safe psychological environment. Because hospitals are challenging environments and the stakes are high, nurses need to feel respected and that their opinions or work are valued. On the other hand, lack of psychological safety prevents nurses from speaking up and may cause them to conceal their errors. In such cases, the dominant norm is silence, which contributes to an increase in errors and prevents the discovery of the causes of these errors.

The absence of psychological safety negatively affects nurses' willingness to report errors. Gilmartin et al. (2018) stated that a lack of error reporting was observed in units that have low levels of psychological safety. Appelbaum et al. (2016) reported that, when nurses are afraid to take interpersonal risks to avoid being blamed or to be seen as incompetent, such situations lead to low psychological safety. McClintock and Fainstad (2022) found that teams that lack psychological safety are known for fear, silence, and avoiding negative consequences. Hunt et al. (2021) noted that psychological safety is impacted by the possible consequences of taking interpersonal risks. If nurses feel that they will be blamed or punished for reporting errors, then they will avoid taking interpersonal risks, such as reporting errors or speaking up. Grailey et al. (2021) stated that fear of blame or repercussion limits individuals' psychological safety.

According to Edmondson (2019), fear decreases psychological safety. Edmondson (2019)

showed that, in a punitive environment, individuals not only are afraid to speak up about

potential safety concerns, but they also will withhold ideas for improvement. This type of

environment not only negatively impacts patient safety but also the potential for quality

improvements in organizations, where individuals' errors can be a source of valuable data for

learning. Edmondson (2019) highlighted that learning can take place when enough psychological

safety is present to provide lessons for individuals' failures.

Because a safe psychological environment is linked to improving patient safety and

learning, understanding the facilitators and barriers to establishing psychological safety is

important. Facilitators can help to develop a safe psychological environment. Remtulla et al.

(2021) identified several facilitators of psychological safety: leader inclusiveness, an open

culture, support in silos, boundary spanner (a person responsible for establishing connections),

strong interpersonal relationships, small groups, and a vocal personality. When leaders

encourage participation and support their teams, this environment facilitates psychological

safety. Also, a work environment needs to have a non-judgmental atmosphere and accept all

members' contributions. Similar individuals within a group will be able to strengthen their

collective voices and establish unity within the subgroup. To facilitate psychological safety, a

team needs a boundary spanner to link sub-groups. Also, individuals who have a vocal

personality, strong interpersonal relationships, and those who are in small teams feel safe

speaking up and are confident in expressing their concerns.

Furthermore, Remtulla et al. (2021) identified four barriers to psychological safety:

hierarchy, a perceived lack of knowledge, authoritarian leadership, and personality. Hierarchy is

a barrier at the organizational level where the feelings of inferiority and others' opinions are less

valued. When nurses feel their opinions are meaningless, they will be reluctant to express their concerns or report errors. A perceived lack of knowledge and authoritarian leadership are barriers at the team level. When nurses are unfamiliar with a specific discussion topic, they may feel anxious about saying something wrong or displaying a lack of knowledge. Further, authoritarian leadership leads members to feel impotent, as most decisions are made without discussion. At the individual level, dominating and shy personalities are considered barriers to psychological safety because they can prevent nurses from seeking help or feedback and sharing their mistakes with others.

Research Gaps

The literature is lacking with regard to studies of safety, quality, and guidelines for reducing medication errors through error reporting processes in Saudi Arabia (Saleh & Barnard, 2019). Alshammari et al. (2021) stated that the available data on medication errors and reporting practices are lacking for Saudi healthcare organizations and found that 58.8% of Saudi healthcare providers have not reported medication errors and 89.8% of nurses report that they have insufficient knowledge about medication errors and reporting forms. The reason for this outcome might be that most Saudi nurses do not adhere to an electronic reporting system. No known study has specifically assessed Saudi nurses' beliefs, attitudes, subjective norms, and intention to report medications errors.

In addition, the literature is lacking in general with regard to the topic of psychological safety in Saudi Arabia. Understanding the factors that contribute to reporting errors is crucial in order to develop proper interventions that prompt error reporting (Natan et al., 2017). Further, no studies are available in Saudi literature that link the TPB and reporting behaviors, and thus, nothing is known about using the TPB to predict error reporting by Saudi nurses. Studies also are

limited regarding identifying and evaluating the barriers and facilitators of medical error reporting among Saudi nurses. In order to design interventions that are aimed at improving a reporting culture in the future, identifying the factors that impact reporting among Saudi nurses is necessary. This study attempts to fill these gaps in the literature and contribute information about the effects of the TPB and psychological safety on Saudi nurses' intention to report medication errors.

Summary

The literature review confirms the impact of the TPB constructs on nurses' intentions to report medication errors. However, the influence of each of the TPB constructs on nurses' intentions is inconsistent across institutions, cultures, and behaviors. The literature review supports exploring the utility of the TPB constructs in predicting intentions in order to develop interventions. Although earlier studies have suggested adding a psychological safety construct to the TPB, they have reached inconsistent and conflicting conclusions regarding the effect of psychological safety specifically. Some researchers claim that psychological safety influences intentions. Others argue that the effects of attitudes, norms, and perceived control on intention are strengthened by psychological safety. Therefore, this study focuses on assessing the role of the psychological safety variable as a moderator and direct predictor of the TPB constructs.

CHAPTER THREE

RESEARCH METHODS

This chapter describes the research design used for this study, followed by discussion of the population and sample selection process and data collection procedures. This chapter also provides a detailed description of the measures and data analysis as well as ethical considerations.

Research Design

A quantitative cross-sectional online survey method was used for this study. A non-experimental correlational method was chosen to explore Saudi nurses' attitudes, subjective norms, perceived control, perceptions of psychological safety, and intentions to report medication errors. The cross-sectional design was implemented because the data were collected at a single point in time.

Population and Sample

This study was conducted in the city of Arar, the capital of the Northern Borders Province in Saudi Arabia. The target population for this study was inpatient registered nurses (RNs) employed in hospitals in Saudi Arabia. The accessible population included Saudi RNs working in medical, surgical, and intensive care units at Prince Abdulaziz Bin Musaad Hospital and North Medical Tower in Arar. The MOH manages both of these hospitals. The eligible number of nurses was approximately 300 nurses for both hospitals. The sample was selected according to convenience sampling.

The inclusion criteria for participation in this study were (1) Saudi RNs with at least six months of work experience and (2) these RNs' willingness to participate in the study. Exclusion criteria are (1) nurses working in units other than those specified (i.e., medical, surgical, and intensive care units), (2) non-Saudi nurses, and (3) nursing students.

According to calculations obtained using G*POWER software, the effect size was derived from the literature and was estimated to be moderate (Applebaum et al., 2016; Lapkin et al.,2015). Francis et al. (2004) also recommended a medium effect size for calculating sample size using power analysis in studies of the TPB. Sample size was calculated using A Priori G*Power analysis (F tests, linear multiple regression, fixed model, R^2 deviation from zero), resulting in the suggested sample size of N = 109 based on α = .05, power (1-ß) = .80, medium effect size = .15, and a total of eight predictors (attitude, perceived behavioral control, subjective norms, psychological safety, and four demographic variables). The sample size of N = 109 achieved more than 80% power to detect an effect size of f^2 = 0.15 attributed to the main predictor variables using an F-test with significance level α = 0.05 after controlling for the four demographic variables (Faul et al., 2009).

Data Collection

The web-based survey that was used to collect the data for this study included questionnaires on psychological safety and the TPB. The researcher sent emails to the chief nursing officers of both hospitals to explain the study and to request the chief nursing officers to encourage RN participation in the study. After obtaining approval from the Saudi Health Department in Arar in the Northern Borders Province, the chief nursing officers sent emails to Saudi nurses that included an invitation letter along with the link to the survey and additional sociodemographic questions (see Appendix A). The researcher sent three reminders one week,

two weeks, and three weeks after the initial email. The survey was administered using Qualtrics online software. An English version was used, as English was the most common language used in the targeted units.

Upon clicking on the survey link to access the questionnaires, an information page appeared that explained the study. At this page, nurses had the option to click YES to continue and complete the survey or NO to exit the survey. The survey was designed to take between 10 and 15 minutes to complete.

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Measures

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The first part of the survey included questions about the TPB and four demographic characteristics. The TPB questions were divided into four sections that corresponded to the constructs of the TPB: attitude, subjective norms, perceived behavioral control, and intention. The demographic characteristics were level of education, years of experience, unit of practice, and age. The second part of the survey consisted of the seven-item survey developed by Edmondson (1999), the Psychological Safety Scale (PSS). The dependent variable for this study was Saudi nurses' intention to report medication errors and the independent variables were attitudes toward a behavior, perceived behavioral control, subjective norms, psychological safety, and demographic factors.

The demographic variables were included as covariates in the analyses because of their importance in affecting nurses' beliefs. Saudi studies have found a statistically significant association between Saudi nurses' reporting of medication errors and participants' age and years of experience (Al Khreem & Al-khadher, 2021; Al-Otaibi et al., 2018). Chen et al. (2018) also found that level of education, age, and years of service impact nurses' intentions to report errors. According to Ajzen (1991, 2002, 2006, 2020), removing demographic variables allows for more

concentration on the TPB constructs, which in turn allows deeper exploration of beliefs. Thus, the demographic variables were controlled due to their potential effects on the outcome (intention).

Theory of Planned Behavior Survey Questions

Based on the literature, the TPB has been applied successfully to explain nursing behaviors across different contexts. Lee and Vincent (2021) systematically analyzed and evaluated the TPB and found that it has been tested broadly across various human behaviors, including nursing. The TPB constructs (attitudes toward a behavior, subjective norms, perceived behavioral control, and intention) can be evaluated by asking direct questions about the respondent's ability to perform a behavior or asking indirect questions about the respondent's beliefs about their capability to handle particular prohibiting or facilitating factors (Ajzen, 1991, 2002, 2006, 2011). Lee and Vincent (2021) also showed that no single standard instrument has been developed that can be applied consistently to TPB concepts. Each behavior should be defined in terms of its target, action, time, and context. Ajzen (1991, 2002, 2011) found that five to six items can be employed to evaluate each of the theory's three major constructs, and seven-point bipolar adjective scales are usually used for this purpose. Lee and Vincent (2021) found that the measurement of individual concepts of the TPB differ across different terms. Most researchers developed their own questionnaires based on Ajzen and Francis et al.'s (2004) guidance manual.

For this study, the behavior is reporting medication errors and the target is Saudi nurses. The action is reporting and documenting the nurse's own medication errors. The context is two Arar hospitals, and the time is during the past three months. Many studies, including this study, employed the manual by Ajzen and Francis et al. (2004) to guide the development and scoring

method for TPB questionnaires (Gavaza, 2010; Kim et al., 2021; Lee et al., 2016; Rogers, 2020; Yami, 2015). According to this guidance manual, instruments should be developed in two stages. The first stage is conducting qualitative studies. The second stage is survey development, pilot testing, and survey administration. As shown in this study's literature review, previous researchers conducted an elicitation study (interviews) using the TPB framework to gather data on commonly held beliefs and then formatted all variables based on the TPB guidelines. The researchers also used direct measures to assess the three TPB constructs based on Ajzen and Francis et al.'s (2004) guidance manual. Prior studies found that direct measures are stronger predictors of intention than indirect measures; therefore, the direct measures of Ajzen and Francis et al.'s (2004) guidance manual were adopted for this study (see Appendix B).

Behavioral Intentions

Behavioral intentions is defined here as the expected likelihood that Saudi nurses will report medication errors via hospital protocols. Saudi nurses' intentions to report medication errors were measured based on three items. The items asked nurses to report the extent to which they will try, plan, and intend to report medication errors that they will encounter. The strength of the behavioral intention was measured using a seven-point bipolar scale ranging from strongly disagree (1) to strongly agree (7). The total possible scores range from 3 to 21. Higher total scores indicate a greater intention to report medication errors.

Attitude Toward Behavior

Attitude toward behavior is defined as the degree of the positive or negative value placed on reporting medication errors by Saudi nurses. This TPB construct was assessed using a single item, followed by items that were used to measure the nurse's overall evaluation of the behavior. The strength of the attitude toward behavior was assessed using a seven-point bipolar scale

ranging from strongly disagree (1) to strongly agree (7) for five items: worthless versus valuable, unpleasant versus pleasant, bad versus good, unenjoyable versus enjoyable, and harmful versus beneficial. The total score from these five items indicates the nurse's overall positive or negative attitude toward reporting medication errors.

Subjective Norms

Subjective norms are defined as the degree to which individual nurses perceive social pressure by their team (their peers and leaders) to report medication errors. It also refers to the degree to which individual nurses think their peers and leaders anticipate and support their reporting behaviors. Saudi nurses will be more likely to report errors when their managers and colleagues support or approve their reporting behaviors. Saudi nurses rated their agreement with four statements using a seven-point bipolar scale. Higher scores reflect greater social pressure to engage in the behavior.

Perceived Behavioral Control

Perceived behavioral control is defined as Saudi nurses' perceptions of their ability and their controllability to report medication errors. According to Ajzen (2006), perceived behavioral control captures individuals' perceptions of their ability to perform a given behavior and their beliefs about the controllability of the factors that enable them to perform a behavior. When individuals have more capacities, resources, and opportunities, they will experience fewer expected obstacles, which leads to stronger perceived behavior control. Ajzen (2006) and Francis et al. (2004) developed four items to assess respondents' perceived capability and their beliefs about controllability. For this study, the four items were used to measure nurses' perceived behavioral control over reporting medication errors. The items were measured using a seven-

point scale and the scores were summed. Higher scores indicate that Saudi nurses possess the ability to report and have control over reporting medication errors.

Psychometrics Analysis of TPB Questions

As no standard TPB questionnaire is currently available, many researchers have used the format presented in Francis et al. (2004) and Ajzen's work. According to Gavaza (2010), the Cronbach's alphas are .75, .81, .71, and .95 for attitude, subjective norms, perceived behavioral control, and intention, respectively. These results exceed the recommended criterion of at least .70 for internal consistency (Hair et al., 2011). To obtain valid evidence of the response processes, Gavaza (2010) used a focus group to identify behavioral, perceived control, and normative beliefs and found that the three TPB constructs (attitude toward behavior, subjective norms, and perceived behavioral control) were normally distributed.

Because the three TPB constructs are considered to be predictors of the latent variable, which is intention, a formative measurement model assessment tool can be used. Hair et al. (2011) and Urbach and Ahlemann (2010) recommended statistical criteria, including multicollinearity, to assess the quality of a formative measurement model. Urbach and Ahlemann (2010) stated that, to evaluate indicator validity, the degree of multicollinearity among the formative indicators should be evaluated using variance inflation factors. Gavaza (2010) assessed multicollinearity using the correlation coefficients of the variables, tolerance, and variance inflation factors. The correlations among the constructs ranged from .14 to .55, which meets the recommended criterion that all the other constructs must be less than .70 (Urbach & Ahlemann, 2010). That is, the TPB constructs differ significantly from each other, indicating that multicollinearity is not a problem. The variance inflation factors ranged between 1.057 to 1.888, and the tolerance values ranged between 0.530 and 0.946. These values are consistent with the

recommended criteria that variance inflation factors should be less than 5 and tolerance values should be close to 1 (Hair et al., 2011). Thus, the predictors (attitude toward behavior, subjective norms, and perceived behavioral control) are not highly correlated with one another, which is consistent with Ajzen's work. The results support that Gavaza's (2010) TPB questionnaire has adequate validity and reliability.

Yami (2015) examined the usefulness of the TPB in explaining Saudi nurses' intentions to comply with a preoperative skin preparation policy. The Cronbach's alphas of the direct measures of attitude, subjective norms, perceived behavioral control, and behavioral intention were .93, .72, .80, .93, respectively (Yami, 2015). Rogers (2020) also used the TPB to understand medical error reporting behaviors among healthcare providers. For construct validity, Rogers used the Spearman rank correlation coefficient (*rho*) to identify the strength of the relationship between the TPB variables (attitudes, subjective norms, perceived behavioral control) and the behavioral intention variable. Yami (2015) and Rogers (2020) found that all the directly measurable TPB constructs were correlated with behavioral intention at a significance level of $p < .01$. These results are consistent with the TPB guidelines developed by Ajzen (2002) and Francis et al. (2004). Thus, Yami's (2015) results support the usefulness of the TPB model in predicting Saudi nurses' intentions to report medication errors.

Kim et al. (2021) also used a scale based on Ajzen and Francis et al.'s guidance manual (2004). They applied the TPB to identify factors that influence nurses' behaviors regarding patient safety management activities. The Cronbach's alphas were .77 for attitude, .91 for subjective norms, .88 for perceived behavioral control, and .90 for behavioral intention. These results exceed the recommended criterion for internal consistency of at least .70 (Hair et al., 2011). Kim et al. (2021) stated that, because the correlation coefficients for the variables were

not in excess of .80, multicollinearity was not a concern. For the validity tests, Kim et al. (2021)

reported that the average variance extracted (AVE) was greater than its coefficient of

determination (R^2). AVEs that are higher than .50 can be used to justify the use of the construct

(Hair et al., 2011). Previous findings confirm that the TPB questions that were used in this study

had sufficient validity and reliability.

Lee et al. (2016) also developed a TPB questionnaire based on Ajzen and Francis et al.'s

manual to identify factors that influence nurses' intentions to report incidents. Confirmatory

factor analysis showed that item loadings for attitude toward behavior ranged from .77 to .92,

subjective norms from .92 to .94, perceived behavioral control from .79 to .94, and intention

from .80 to .94, with Cronbach's α values of .85, .90, .86, and .90, respectively. Lee et al. (2016)

found that the composite reliability ranged between .74 and .91 and the AVEs ranged between

.51 and 0.77. These estimates are better than the recommended criteria, where composite

reliability must be > .7 and the AVE must be >.5 (Hair et al., 2011). For discriminant validity,

Lee et al. (2016) compared the shared variance among factors to the AVE from each factor. The

results showed that the shared variance was less than the AVE. These findings indicate that the

Lee et al. TPB questionnaire achieved a satisfactory level of reliability and validity.

However, various study results show some differences. For example, Gavaza (2010) and

Yami (2015) found that only pharmacists' attitudes and subjective norms are significant

predictors of intention, whereas Kim et al. (2021), Rogers (2020), and Lee et al. (2016) found

that all the TPB constructs are significant predictors of intention. These results indicate that

adding more variables, which would include psychological safety, to the TBP model may

increase its predictive power (Lee et al., 2016; Rogers, 2020). Gavaza (2010) and Yami (2015)

recommended adding psychosocial factors to the TPB model to predict behavioral intention.

Therefore, for this study, the psychological safety variable is a reasonable construct to add to the TPB model.

Psychological Safety Scale

To assess Saudi nurses' perception of psychological safety, a seven-item survey developed by Edmondson (1999), the PSS, was used for this study. Edmondson developed the PSS based on theory, observations, interviews, pilot testing, and strict scale construction protocols. The PSS has been used in both medical and non-medical professional settings across different cultures. It is comprised of two belief subscales (team psychological safety and team effectiveness) and two behavioral subscales about team learning. This study, along with others noted in this subsection, focused only on the psychological safety subscale. According to Edmondson (1999), individual team members' perception of team psychological safety is dependent on whether their team is safe to take interpersonal risks. For this study, psychological safety refers to the extent to which Saudi nurses feel psychologically safe in their team to take interpersonal risks to report medication errors. The PSS items are on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) (see Appendix C). Higher scores indicate a greater perceived sense of psychological safety among nurses, meaning that nurses are more comfortable reporting errors.

Newman et al.'s (2017) review showed that most studies of psychological safety have used Edmondson's seven-item scale. Edmondson (1999) conducted qualitative interviews to generate the scale, then tested it through psychometric analysis (N = 427), and used factor analysis to determine discriminant validity, which resulted in one factor. The inter-item correlations ranged from .28 to .48, with Cronbach's α = .82. These results meet the criterion for scale internal consistency and homogeneity (Tabachnick & Fidell, 2007). Thus, Edmondson's

scale gained attention from several researchers for examining psychological safety across different samples. For example, Lee and Dahinten (2021) conducted exploratory factor analysis that resulted in a one-factor model. Their model explained 42.0% of the variance, and factor loadings ranged from .57 to .68. Similarly, Appelbaum et al. (2016) found a one-factor model with factor loadings ranging from .33 to .76, with Cronbach's alpha of .79 for seven items. Carmeli (2007) also found one factor with seven items ranging from .70 to .86 and explained 62.10% of the variance, with Cronbach's alpha of .89. Moreover, Scheepers et al. (2018) used the seven-item to examine the relationship between physicians' perceptions of psychological safety and performance feedback from their peers. Their components analysis showed that items of the two constructs were discriminant as two different constructs. Scheepers et al. (2018) also found moderate inter-scale correlations ranging from .56 to .80, with Cronbach's alpha of .76. They reported adequate factor loadings ranging between .52 and .84.

In addition, Carmeli et al. (2009) adopted five items from Edmondson's scale. The Cronbach's alpha was .78 and factor analysis explained 23.99% of the variance, with factor loadings ranging from .62 to .76. The factor analysis produced a two-factor model for the psychological safety and learning behavior measures. The Carmeli et al. (2009) study results show that each item loaded significantly onto the scale with which the item was associated. Standardized coefficients from items to factors ranged from .51 to .85 (Carmeli et al., 2009). The results also show that each indicator variable and its respective items are statistically significant ($p < .01$). The relationship between indicators and constructs indicates convergent validity. Carmeli et al. (2009) also examined the discriminant validity of related concepts through confirmatory factor analysis. The results show that a three-factor solution provides a better fit with the data: $\chi2\ (297) = 603.2$; root mean square error of approximation (RMSEA) = .07. The

Carmeli et al. (2009) findings are consistent with those of other studies, including Edmondson's

work, which found that psychological safety is positively associated with learning behaviors,

inclusive leadership, and team cohesion (Appelbaum et al. 2016, 2020; Carmeli et al., 2009; Lee

& Dahinten, 2021).

The previous findings also are consistent with Kark and Carmeli's (2009) study that

showed Cronbach's alpha of .76. The results of their six-item measurement model showed

acceptable fit with (χ2 (152) = 311.5; comparative fit index (CFI) = .90; RMSEA = .09). These

findings align with the recommendation that a RMSEA that is less than .05 is good and values

between 0.05 and 0.08 are acceptable (Hu & Bentler, 1999). Also, CFI $\geq$ .95 is considered a

good fit. The standardized parameter that was estimated from items to factors ranged from .51 to

.91. The Kark and Carmeli (2009) findings show relationships among indicators and constructs.

Kark and Carmeli (2009) also assessed two alternative measurement models and found that the

three-factor model had the better fit. These results are consistent with Carmeli et al.'s (2010)

study that assessed inclusive leadership, psychological safety, and employee involvement. Lee et

al. (2016) demonstrated AVE of .51 and composite reliability of .75 on a five-item scale. Kessel

et al. (2012) found that all four items loaded on a single factor had loadings ranging from .78 to

.90, with Cronbach's alpha of .81. Thus, previous studies confirm that the PSS is a valid

instrument that has psychometric properties for the psychological safety construct.

The literature also shows that the PSS has various versions with good internal

consistency coefficients. Studies have demonstrated that the PSS has strong psychometric

properties (Newman et al., 2017; O'Donovan et al., 2020). Studies have found Cronbach's alphas

of .82 and .66 for six items (Baer & Frese, 2003; Triplett & Loh, 2018), .82 for six items

(Rogers, 2020), .74 for three items (Tucker et al., 2007), .73 for four items (Nembhard &

Edmondson (2006), and .80 for seven items (Leroy et al., 2012). These cited studies confirm that psychological safety significantly correlates with other constructs in Edmondson's work, with no explanations for diverse item quantities (Ramalho & Porto, 2021). Based on the literature, the psychometric properties of Edmondson's PSS suggest evidence of high reliability, internal consistency, and discriminant validity for its application in several professions, including healthcare providers.

Despite the variety of levels of psychological safety, the literature tends to focus on the individual level (Carmeli et al., 2010; Kark & Carmeli, 2009; Lee et al., 2016; Leroy et al., 2012; Nembhard & Edmondson, 2006; Rogers, 2020; Scheepers et al. 2018). In a systematic review of the literature, Newman et al. (2017) found that 29 studies measured psychological safety at the individual level and that the most used scale was Edmondson's (1999) PSS. Ramalho and Porto (2021) investigated the viability of the psychological safety construct at the meso level. Their tests of absolute deviation and intraclass correlation coefficients showed that psychological safety is an individual construct that can translate to the team level, which is consistent with prior studies (Carmeli, 2007; Edmondson, 1999; Leroy et al.,2012; Nembhard & Edmondson, 2006; Tucker et al., 2007).

Data Analysis

SPSS software version (28) was used to analyze the data in this study. The demographic variables and sample characteristics were analyzed using descriptive statistics, which included means and standard deviations. Summated scales were created for the variables, i.e., intention, attitude toward behavior, subjective norms, perceived behavioral control, and psychological safety. Missing values and patterns of the variables were assessed. Before testing the regression models, the data were checked for different types of outliers. Pearson correlation coefficients

were used to calculate the association between variables. Cronbach's alpha coefficient was used to determine the reliability and internal consistency of the study's scales.

Research Questions and Hypotheses

RQ1 What are the relationships between attitude towards behavior, subjective norms, perceived behavioral control, and the intention to report medication errors?

RQ2: What are the relationships between attitude toward reporting behavior, subjective norms, perceived behavioral control, psychological safety, and the intention to report medication errors?

RQ3: How does psychological safety influence nurses' intention to report medication errors?

H_1: Attitudes toward reporting a medication error have positive associations with a Saudi nurse's intention to report medication errors.

H_2: Subjective norms have positive associations with a Saudi nurse's intention to report medication errors.

H_3: Perceived behavioral control has positive associations with a Saudi nurse's intention to report medication errors.

H_4: Psychological safety has a direct positive influence on a Saudi nurse's intention to report medication errors.

H_5: Psychological safety is a moderator between attitude and intention to report medication errors.

H_6: Psychological safety is a moderator between subjective norms and intention to report medication errors.

H_7: Psychological safety is a moderator between perceived behavioral control and intention to report medication errors.

Figure 3 presents the hypothesized moderated model used in this study. To test the hypotheses, hierarchical and linear logistic regression analyses were conducted. Psychological safety was investigated as a contextual variable to understand the degree to which it moderates the relationship between the TPB constructs and nurses' intentions to report medication errors. Moderation analysis was conducted to assess whether or not psychological safety moderates the relationship between the TPB constructs and nurses' intentions to report medication errors. To investigate for moderation, hierarchical linear regression was conducted. First, the TPB variables were entered. Next, the psychological safety variable was entered. Finally, the product terms for the interaction between each of the three TPB variables and psychological safety were entered and were removed from the model if they were not statistically significant at the Cronbach's alpha level of 0.05.

Figure 3. Hypothesized Moderated Model
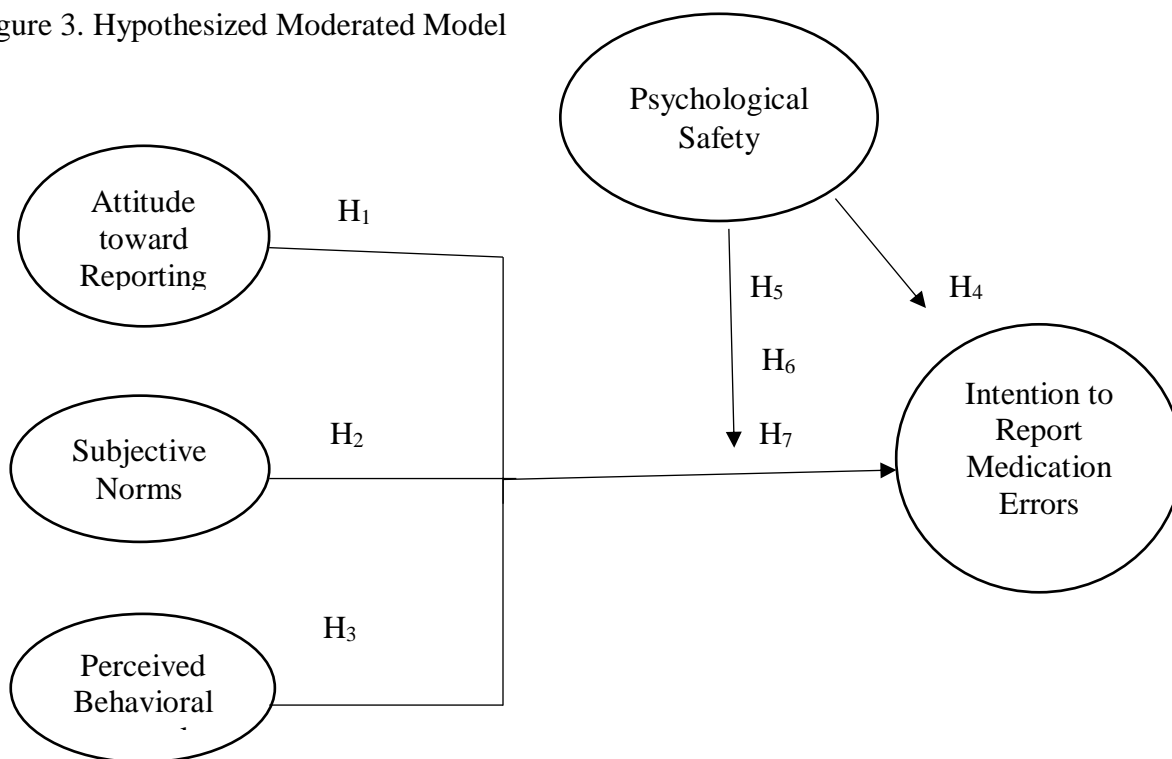
Ethical Considerations

Prior to data collection, ethical approval for this study was obtained from the Institutional Review Board at Loyola University Chicago. Permission also was obtained from the Saudi Health Department in the Northern Borders Province. The purpose, risks, and benefits of participation were explained in the invitation letters. The study was not expected to have any associated risks because the data were collected anonymously and treated confidentially. A secure file was created as part of the approval process.

Summary

Past studies of error reporting confirm that there may be several reasons for Saudi nurses not reporting medication errors, and investigation into the predictors of Saudi nurses' behavior is limited in the literature. Therefore, a methodology is needed to discover the factors that encourage Saudi nurses to report errors, because the reasons nurses do not report errors are

critical for identifying and predicting ways to improve error reporting in Saudi hospitals. Based

on prior studies, this study's measures have sufficient psychometric properties and have been

used across different cultures.

CHAPTER FOUR

RESULTS

The purpose of this study is to use the TPB to examine the relationship between the TPB

constructs (attitude towards behavior, subjective norms, perceived behavioral control) and

psychological safety in order to predict Saudi nurses' intention to report medication errors. The

study explores the relationship between the three TPB constructs and psychological safety. This

chapter describes the data preparation procedures and statistical analyses and presents the

findings with regard to the sample characteristics, descriptive statistics for the study variables,

correlations between variables, and main study research questions.

Data Preparation Procedures

The data for this study were collected using the web-based survey tool Qualtrics XM®,

hosted by Loyola University Chicago (Qualtrics, 2022), with 110 records exported from

Qualtrics into Excel (Microsoft Corporation, 2022). All variables were independently

inspected for missing data. The missing data received a user-defined missing value (-99) to allow

SPSS to perform computations by omitting missing values through listwise deletion. Sum scores

for each study variable were calculated. Age and years of experience had 0.9 % (n = 108)

missing values and unit of practice had 9.2 % (n = 99) missing values. The constructs of

intention and subjective norms did not have missing values, but the remaining constructs had

at least one missing value for at least one item. The percentage of missing values across the constructs ranged from 0.9 to 2.7 percent. One participant was deleted from the study because two items of the attitude towards behavior construct were missing. Data for 109 participants were retained and analyzed.

The pattern of missing values is more significant than the number of missing values (Tabachnick & Fidell, 2007). Missing values that are scattered randomly throughout a data matrix present less critical problems than patterned values. To identify patterns of missing values, Little's missing completely at random (MCAR) test was performed. The results are chi-square = 24.685, df = 33, and p = .851, which indicate that the missing values were MCAR. Regression imputation was utilized to replace the missing data because the amount of missing data was small, less than 5% of cases (Allison, 2001). The estimates for the missing cases were derived from a regression model that used the variables of the questionnaire items that were not missing in order to build the model.

The assumptions of regression were evaluated prior to data analysis. The assumption of the independence of observations was assessed using the Durbin-Watson statistic. A Durbin-Watson value should be 1 to 3 (Field, 2009) and is 2.05 for this study. The normal distribution of all the study variables was assessed via skewness and kurtosis; Table 1 presents the results. Byrne (2010) and Hair et al. (2010) argued that data can be normal if the skewness value is between -2 and +2 and the kurtosis value is between -7 and +7. Based on these criteria, the results shown in Table 1 indicate little skewness and kurtosis and do not differ significantly from normality. The skewness values of the intention variable indicate a substantial left skewed distribution. The kurtosis values demonstrate that the psychological safety distribution is overly

peaked (leptokurtic). Also, a *z*-score was obtained by dividing the skewness and kurtosis values by their standard errors. For medium-sized samples ($50 < n < 300$), the absolute *z*-value should be less than 3.29, which corresponds to an alpha level of 0.05 (Kim, 2013; Tabachnick & Fidell, 2007). Based on this criterion, the distribution of the sample is approximately normal in terms of skewness and kurtosis. Figure 4 (Appendix D) presents a histogram, normal probability (P-P) plot, and normal quantile-quantile (Q-Q) plot to describe the normality of the error distribution. The histogram illustrates that the standardized residuals of the regression analysis have a normal distribution with slight deviation.

Table 1. Skewness and Kurtosis Results

Variables	Skewness	Standard Error	Kurtosis	Standard Error
Intention	-1.18	231	.497	.459
Attitude	.018	231	-.715	.459
Subjective Norm	-.504	231	-.095	.459
Perceived Behavioral Control	-.869	231	.621	.459
Psychological Safety	.545	231	1.490	.459

Figure 5 (see Appendix D) presents scatter plots that were used to assess the linearity assumption. The partial regression plots do not indicate curvature in the relationships between the dependent and independent variables. Rather, the results show a relatively linear relationship between the dependent and independent variables, with some minor deviations from normality.

Figure 6 (see Appendix D) presents a residual scatter plot for the homoscedasticity assumption and shows that the residuals are evenly scattered around zero with no clear pattern. Multicollinearity was assessed by evaluating the values of the correlation coefficients of the

variables, tolerance, and variance inflation factors. Independent variables should not be strongly correlated with each other when .70 and higher reflect highly correlated variables (Tabachnick & Fidell, 2007). In this study, the variance inflation factors ranged from 1.033 to 1.293 and the tolerance values ranged from .774 to .968 for all the independent variables. The results indicate no multicollinearity. Outliers were assessed using Cook's and Mahalanobis distances. Mahalanobis distance values range from .09 to 18.87. In this study, the critical value of the Chi-square (X^2) distribution at $p = 0.01$ (df = 4) was 18.467. Cook's distance values range from .0 to .192, with a cutoff value of 1 (Cook, 1977). In this study, the standardized residual values ranged from -2.84 to 2.18. These results indicate no extreme outliers and, thus, all the regression assumptions are met.

Participants' Characteristics

This study had a total of 109 participants who completed the survey. All were Saudi nurses. Table 2 presents a summary of the participants' demographic statistics. Most participants were between 30 and 39 years old (58.7% of the study sample). Most (41.3%) were working in medical units. Of the participants, 41.3% had worked in their profession for more than ten years. Nearly half the sample (57.8 %) reported having a bachelor's degree.

Table 2. Demographic Characteristics of Sample

Factor	Sample
	n (%)
Year of Experience	
2-5	29 (26.6)
6-10	34 (31.2)
More than 10	45 (41.3)

Age

    Under 30 years old   32 (29.4)

    30- 39 years old   64 (58.7)

    40-49 years old   12 (11)

    Over 50 years old   0

Level of Education

    Diploma   46 (41.2)

    BSN   63 (57.8)

    MSN   0

    Doctoral   0

Unit of Practice

    Medical Unit   45 (41.3)

    Surgical Unit   28 (25.7)

    Intensive Care Unit   26 (23.9)

Note: $N = 109$.

Descriptive Statistics

Table 3 presents the overall range, means, and standard deviations (SDs) for the items of

intention, attitude toward behavior, subjective norm, perceived behavioral control, and

psychological safety. The average score for intention is 16.06 (SD = 5.12), indicating that

participants were likely to intend to report medication errors. For subjective norms, the average

score is 17.39 (SD = 5.56), indicating that participants had moderately positive perceptions about

social pressure from important referents (people important to them) to report medication errors.

The average score for attitude is 23.34 (SD = 7.38), indicating a moderately positive overall

evaluation of reporting medication errors. For behavioral control, the average score is 20.09 (SD

= 5.75), indicating that participants had moderately high perceptions about their ability,

controllability, and confidence to report medication errors. The average score for psychological

safety is 20.70 (SD = 4.93), which suggests that the nursing team had some level of

psychological safety in their units, but that it could be increased.

Table 3. Theory of Planned Behavior Predictors and Psychological Safety Range, Mean, and
Standard Deviation Results

Variables	*M* (SD)	Range
Intention	16.06 (5.128)	3- 21
Attitude	23.34 (7.38)	6 - 35
Subjective Norm	17.39 (5.569)	4 - 28
Perceived Behavioral Control	20.098 (5.759)	4 - 28
Psychological Safety	20.70 (4.93)	7 - 35

Table 4 presents the Pearson correlation coefficients that were calculated to determine the

correlations between each TPB construct and psychology safety. The results demonstrate that

intention (to report medication errors) is significantly correlated with all the TPB constructs at

the $p < .001$ level, with weak correlations between attitude and subjective norms ($r = .354$, $p <$

.001) and perceived behavioral control ($r = .389$, p $< .001$). Subjective norms are significantly

correlated with perceived behavioral control ($r = .352$, $p < .001$). However, psychological safety

is not significantly correlated with any of the TPB constructs. Perceived behavior control is

negatively correlated, but not significantly so, with psychological safety ($r = -.060$, $p = .537$).

Table 4. Correlations between Theory of Planned Behavior Constructs and Psychological Safety

Measures	1	2	3	4	5
1 Intention	1				
2 Attitude	.497**	1			
3 Subject Norms	.488**	.354**	1		
4 Perceived Behavioral Control	.478**	.389**	.352**	1	
5 Psychological Safety	.168 $p = .081$	.132 $p = .172$	.018 $p = .851$	-.060 $p = .537$	1

Note: **Correlation is significant at the 0.01 level (2-tailed); $N = 109$

Internal Consistency

Reliability estimates of all study's scales were computed and examined. Cronbach's alpha values were .76, .80, .75, and .89 for attitude, norms, perceived control behavior, and intention respectively. Cronbach's alpha for the entire scale of 16 items was .861. Removal of the item "I feel under social pressure from my colleagues" would lead to a small improvement in Cronbach's alpha (.879). The findings indicate that removing any other items from the TPB measure could lead to a decrease in Cronbach's alpha. According to Hair et al. (2011), Cronbach's alpha values lower than 0.60 are not reliable. The results show a high level of internal consistency for the TPB measure.

The psychological safety scale's Cronbach's alpha was .612. George and Mallery (2003) provided the following rules: > .9 – Excellent, > .8 – Good, > .7 – Acceptable, > .6 - questionable. The findings demonstrate that removing item 6 from the scale caused an increase in Cronbach's alpha to .636. On the other hand, eliminating any items other than item 6 from the scale would result in a lower Cronbach's alpha. The previous results indicate lower internal consistency of the scale.

Research Questions

RQ1 What is the relationship between attitude towards behavior, subjective norms, and

perceived behavioral control (the three TPB constructs) and the intention to report medication

errors?

Linear regression analysis was used to answer Research Question 1 and address the

corresponding hypotheses. The three TPB constructs (attitude towards behavior, subjective

norms, and perceived behavioral control) were entered into the model in two phases to

understand their separate roles in nurses' intentions to report medication errors. In the first phase,

each construct in the TPB model was tested individually, and in the second phase, all constructs

were tested simultaneously.

Phase 1: Attitude towards behavior explained 24.7% of the variance in the intention

scores, $R^2 = .247$, $R^2_{adj} = .240$, $F (1,107) = 35.051$, $p <. 001$. The results indicate that attitude

towards behavior can predict intention to report medication errors with statistical significance.

The effect of attitude towards behavior on intention is significant (unstandardized coefficients

$\{B\} = .575$, SE $= .097$, $p < .001$ and standardized coefficients $\{β\} = .497$, $t = 5.92$, $p < .001$).

Subjective norms also emerged as a significant predictor that accounts for 23.8% of the variance

in intention scores, $R^2 = .238$, $R^2_{adj} = .231$, $F (1,107) = 33.497$, $p <. 001$. The effect of attitude

towards behavior on intention to report medication errors is significant, $\{B\} = .599$, SE $= .104$, p

$< .001$) and $\{β\} = .488$, $t = 5.78$, $p < .001$). Perceived behavioral control is a significant predictor

that accounts for 22.8% of the variance in intention scores, $R^2 = .228$, $R^2_{adj} = .221$, $F (1,107) =$

31.681, $p <. 001$. The effect of perceived behavioral control on intention to report medication

errors is significant, $\{B\} = .567$, SE $= .101$, $p < .001$) and $\{β\} = .478$, $t = 5.629$, $p < .001$).

Phase 2: When all the variables were entered into the regression equation, they emerged as significant predictors that explained 41.3% of the variance in intention scores ($R^2 = .413$, $R^2_{adj} = .396$, $F(3,105) = 24.594$, $p <. 001$). The effect of attitude towards behavior on intention to report medication errors is significant ($\beta = .291$, $t = 3.472$, $p < .001$). Also, the effects of subjective norms and perceived behavioral control on intention are significant ($\beta =.293$, $t = 3.549$, $p < .001$ and $\beta =.261$, $t = 3118$, $p = .002$, respectively). These findings show that the ranking (highest to lowest) of the contributing predictors to explain nurses' intention to report medication errors are subjective norms ($\beta = .293$), attitude towards behavior ($\beta = .291$), and lastly, perceived behavioral control ($\beta = .261$).

RQ2: What is the relationship between attitude toward behavior, subjective norms, perceived behavioral control, and psychological safety, and the intention to report medication errors?

The impact of psychological safety on nurses' intentions to report medication errors also was investigated in this study. Psychological safety was included in the regression model only to predict intention. The regression model explained a 2.8% variation in intention, and psychological safety was not a significant predictor, $F(1, 107) = 3.112$, $p = .081$. The effect of psychological safety on intention was not significant in the regression model ($\{B\} = .407$, SE = .231, $p = .08$ and $\{\beta\} = .168$, $t = 1.764$, $p = .08$). The addition of psychological safety to the TPB model increased the amount of variance in intention from 41.3% to 43.3% ($R^2_{adj} = .411$). However, the additional 2% variance was not significant (R^2 change $= .020$, $p < .057$). After psychological safety was added to the TPB model, it became a statistically significant predictor (F $(4,104) = 19.851$, $p <. 001$), but its effect on intention was not significant ($\beta = .145$, $t = 1.928$, $p = .057$). The most significant predictor of nurses' intention to report medication errors is

subjective norms (β = .293), followed by perceived behavioral control (β = .280), and then

attitude toward behavior (β = .265).

RQ3: How does psychological safety influence the intention to report medication errors?

Moderation analysis was conducted to investigate the effect of psychological safety on

each of the three TPB constructs while controlling for participant age, level of education, unit of

practice, and years of experience. Hierarchical multiple regression was conducted with mean-

centered predictor variables to test the hypotheses. The steps are as follows:

Step 1: Enter demographic variables to control their effects.

Step 2: Enter the TPB constructs.

Step 3: Add the psychological safety variable.

Step 4: Enter the product terms for the interaction between each of the three TPB

constructs and psychological safety.

The moderation analysis results demonstrate the variance in intention scores with statistical

significance, $R^2 =.483$, $R^2_{adj} = .417$, $F (11,85) = 7.233$, $p <. 001$. The addition of the interaction

terms increased the amount of variance in intention by 5.3% (from 43.1% to 48.3%).

Psychological safety became a statistically significant predictor and its effect on intention was

significant (β = .253, $t = 2.863$, $p = .005$). The effect of the interaction between attitude towards

behavior and psychological safety was both negative and significant (β = -.233, $t = - 2.380$, $p =$

.020). The effect of the interaction between subjective norms and psychological safety was

positive and significant (β = .258, $t = 2.544$, $p = .013$). However, no significant interaction effect

is evident between perceived behavioral control and psychological safety with regard to the

intention to report medication errors (β = -.0.28, $t = -.302$, $p = .764$). The results suggest that

psychological safety is a significant moderator of the effects of subjective norms and attitude

towards behavior on the intention to report medication errors but is not a significant moderator of the effects of perceived behavioral control on the intention to report medication errors.

Additionally, the product terms for the interaction between each of the three TPB constructs and psychological safety were entered individually into the model to understand the role of interaction on nurses' intentions to report medication errors. The demographic variables were entered to control their effects. Hierarchical linear regression analysis was conducted to test whether or not psychological safety moderates the relationship between subjective norms and the intention to report medication errors. The subjective norms and psychological safety variables account for 27.8% of the variance in intention (adjusted $R^2 = 23\%$) and indicate the significance of the model ($R^2 = .278$, $F(6, 90) = 5.784$, $p < .001$). Next, the interaction term between subjective norms and psychological safety was added to the regression model, which accounts for 28.9% of the variance in intention, $R^2 = .289$, $F(7,89) = 5.180$, $p < .001$. The effect of the interaction between subjective norms and psychological safety on the intention to report medication errors is not significant ($\beta = .006$, SE $= .005$, $p = .240$ and $\beta = .113$, $t = 1.183$, $p = .240$). These results suggest that psychological safety is not a significant moderator of the effects of subjective norms on intention.

A second hierarchical linear regression analysis was conducted to test whether or not psychological safety moderates the relationship between perceived behavioral control and intention to report medication errors. Perceived behavioral control and psychological safety account for 27% of the variance in the intention scores (adjusted $R^2 = .221\%$) and resulted in a significant model ($R^2 = .270$, $F(6,90) = 5.547$, $p < .001$. The interaction term between perceived behavioral control and psychological safety was added to the regression model, which accounted for a significant proportion of the variance in intention, $R^2 = .271$, $F(7, 89) = 4.701$, $p < .001$.

The effect of the interaction between perceived behavioral control and psychological safety on intention is not significant ($\beta = .002$, $t = .018$, $p = .986$). These results suggest that psychological safety is not a significant moderator of the effects of perceived behavioral control on the intention to report medication errors.

A third and final hierarchical linear regression analysis was conducted to assess the relationship between attitude toward behavior and intention to report medication errors. Attitude toward behavior and psychological safety account for 25.9% of the variance in intention scores (adjusted $R^2 = 21\%$) and resulted in a significant model ($R^2 = .210$, $F (6, 90) = 5.241$, $p < .001$. The interaction term accounts for 28.3% of the variance in intention, $R^2 = .283$, $F (7,89) = 5.013$, $p < .001$. The effect of the interaction between attitude and psychological safety on intention is negative and not significant ($\beta = - .161$, $t = -1.721$, $p = .089$). These results suggest that psychological safety is not a significant moderator of the effect of attitude towards behavior on intention to report medication errors. However, after the interaction terms between subjective norms and psychological safety and between perceived behavioral control and psychological safety were added to the model, psychological safety became statistically important ($\beta = .193$, $p = .040$ and $\beta = .205$, $p = .028$, respectively).

Evaluation of the Study Model

Table 5 shows that the best regression model accounts for the variance in intention scores with statistical significance, $R^2 = .483$, $R^2_{adj} = 417$, $F (11,85) = 7.233$, $p < .001$. According to the R^2_{adj} result, all of the independent variables added value to the model. The model explains the greatest amount of variance (48.4%) of the intention to report medication errors. However, 51.6% of the variation was caused by factors other than the predictors included in this model.

The addition of the interaction terms increased the amount of variance in intention by 5.3%

(from 43.1% to 48.3%).

Table 5. Regression Analysis for the Theory of Planned Behavior Constructs and Psychological Safety on Intention

Predictors	R^2	R^2_{Adj}	Standardized coefficient β	t	p-value
	.483	.417			
Attitude* Psychological Safety			-.233	2.380	.020*
Norms* Psychological Safety			.258	2.544	.013*
PBC * Psychological Safety			-.0.28	-.302	.764

Note: Statistical significance: *$p < .05$, **$p < .01$, ***, $p < .001$

PBC is perceived behavioral control.

Summary

This study aimed to identify the impacts of the TPB constructs and psychological safety as predictors on Saudi nurses' intention to report medication errors. Over half of the nurses who participated in this study were aged between 30 and 39 years old and had a bachelor's degree. Most of the nurses had over ten years of experience in their units and the majority of participants worked in medical units. Correlation analysis revealed no relationship between the TPB constructs and psychological safety as predictors. Linear regression analysis revealed that the TPB constructs are significant predictors for Saudi nurses' intention to report medication errors whereas psychological safety is not a significant predictor for Saudi nurses' intention to report medication errors. However, the study shows that psychological safety is a significant moderator

for the effects of attitude towards behavior and subjective norms on the intention to report

medication errors.

CHAPTER FIVE

DISCUSSION

This chapter begins with a review of the major findings of the study, followed by discussion of the predictors of Saudi nurses' intention to report medication errors. The strengths and limitations of the research also are presented. The chapter concludes with discussion of the implications of the study findings for nursing practice and education, as well as recommendations for future research.

Preventing catastrophic events is especially critical in healthcare environments where medication errors may occur in a highly complex environment. Because nurses are responsible for administrating medications, their perceptions, attitudes, and norms regarding reporting behavior need to be examined. Further, understanding nurses' reasons for not reporting medication errors is essential to improving patient safety and providing safe medical practice. This study revealed the utility of the Theory Planned Behavior (TPB) constructs and psychological safety to predict Saudi nurses' intentions to report medication errors. The study is important due to the lack of research (especially as it pertains to Saudi hospitals) into relationships between psychological safety and the TPB constructs. This study is believed to be the first to have identified factors that influence Saudi nurses' intentions to report medication errors in Arar hospitals in the KSA specifically. Saudi healthcare organizations should focus on work conditions where human errors occur and identify factors that affect Saudi nurses'

intentions to report medication errors in order to develop interventions that allow for a safer work environment.

The findings demonstrate that the TPB constructs have predictive efficacy for Saudi nurses' intentions to report medication errors. The study shows that psychological safety is not a significant antecedent to reporting error and that Saudi nurses' norms are the most significant predictor of nurses' intentions to report medication errors.

Theory of Planned Behavior Constructs

Intention to Report Medication Errors

The most important factor that is linked to the actual reporting of medication errors is the intention to do so (Secginli et al. 2021). Intention is crucial for actual behavior, and thus, understanding the concept of intention is necessary before developing interventions to improve medication error reporting (Secginli et al. 2021). Further, understanding the processes involved in volitional behavior, which includes intention, is crucial (Secginli et al. 2021). In this study, Saudi nurses had intentions to report medication errors, which indicates that nurses want to report errors. The higher the level of intention, the greater the behavioral intention to report medication errors. Ekayani et al. (2017) found that nurses with high levels of intention to report medication errors were able to improve their behavior in reporting medication errors. The regression analysis results obtained in this study demonstrate that the combination of all three TPB constructs can be useful in predicting Saudi nurses' intentions to report medication errors.

Attitude Toward Behavior

The survey results show that most nurses who participated in this study had a positive attitude towards reporting medication errors. Nurses responded that medication error reporting was valuable (75.2), pleasant (40.3%), good (78%), enjoyable (37.6), and beneficial (61.4%).

However, they also reported that medication error reporting was harmful (29.4%), unenjoyable (52.3%), bad (13.8%), unpleasant (48.6%), and worthless (22%). The findings suggest that, although most Saudi nurses have a favorable attitude toward medication error reporting, some nurses believe that doing so is not beneficial to them or the organization and could even cause harm to them, and that the experience of medication error reporting is unpleasant and unenjoyable. The negative beliefs might discourage Saudi nurses from reporting medication errors.

Subjective Norms

Most of the nurses responded that most people who are important to them (family members, peers, etc.) think that nurses should report medication errors (55.1%) whereas other nurses (35%) responded the opposite. Nurses responded that people they value in their lives would approve of their reporting medication errors (65%) whereas others (27.5%) reported that those people would disapprove. Some nurses responded that reporting medication errors was expected of them (66.1%) while others (70.6 %) felt they were not under any social pressure from their family and peers to report such errors. These findings indicate the importance of subjective norms in developing the intention to report medication errors and that nurses perceive great social influence from their significant others to support their reporting behavior.

Perceived Behavioral Control

Some nurses responded that reporting medication errors was easy to do (62.4%) whereas others (28.5%) found it difficult to do. Some nurses responded that they have complete control over reporting (69.7%) whereas others (18.4%) reported they did not. Nurses responded that they had the ability to report medication errors (81.7%) and that reporting medication errors was completely up to them (60.6%). These findings indicate that nurses perceive themselves to have

some control over reporting practice and that they are responsible for whether or not they report medication errors. In contrast, other TPB studies have found that the perceived behavioral control construct, across a wide range of behaviors, does not contribute in any statistically significant way to the TPB model (Gavaza et al., 2017; Rogers et al., 2017).

Correlation among Constructs of the TPB

This study found that the TPB constructs of attitude towards behavior, subjective norms, and perceived behavioral control had significant correlations of varying intensity with Saudi nurses' intention to report medication errors. For example, the more positive nurses' attitudes are toward reporting medication errors, the stronger their perceived behavioral control to report such errors will be. Also, the greater the strength of the subjective norms, the greater their intention to report medication errors. These results parallel similar findings reported in several studies based on the TPB (Catalano et al., 2021; Ditching et al. 2020; Kim et al., 2021: Lee et al., 2016; Natan et al. 2017; Nelson et al., 2014; Rich et al. 2020; Rogers, 2020; Secginli et al. 2021; Williams et al. 2015; Yami, 2015). However, Lapkin et al. (2015) found a weak negative relationship and non-significance between subjective norms and intention to report errors, and Rogers et al. (2017) reported that perceived behavioral control is not correlated with intent, attitude, and subjective norms.

Correlation between the TPB Constructs and Psychological Safety

This study found that psychological safety does not correlate with all the TPB constructs. Perceived behavior control is correlated negatively, but not significantly, with psychological safety. This finding is inconsistent with that of other studies that found psychological safety to be positively associated with nurses' intention to report errors (Appelbaum et al., 2016; Catalano et

al. 2021; Lee & Dahinten, 2021) and to be correlated with all the TPB constructs (Catalano et al 2021; Lee et al., 2016).

Predicting Nurses' Intention to Report Medication Errors

The results of the regression analysis identified that all three TPB constructs (subjective norms, attitude towards behavior, and perceived behavioral control) are significant predictors for reporting medication errors. This finding is consistent with previous TPB research (Alhamad & Donyai, 2020; Angelis et al., 2017: Ditching et al., 2020; Hagger et al., 2022; Lee et al., 2016; Natan et al., 2017; Rich et al., 2020; Tai et al., 2016; Williams et al., 2015). However, other studies found that only attitude towards behavior and perceived behavioral control are significantly and positively related to intention (Ekayani et al., 2017; Guo et al., 2019: Lapkin et al., 2015; Rogers, 2020; Secginli et al., 2021; Tabak & Fleishman, 2011). Studies also have found that attitude towards behavior and subjective norms are statistically significant TPB constructs and that perceived behavioral control is not a significant predictor (Gavaza et al., 2017; Hung et al., 2016; Rogers et al., 2017; Yami, 2015). The inconsistency in study results may be attributed to differences in cultures and norms. This study's results indicate that Saudi nurses who have a positive attitude toward reporting, who believe that others in their social circle would approve of their behavior, and who perceive themselves as having control over the reporting would have a high level of behavioral intention towards reporting medication errors.

This study found subjective norms to be the strongest predictor of intention. Other studies also found subjective norms to be the strongest predictor of intention (Alhamad & Donyai, 2020; Gavaza et al. 2017; Tai et al., 2016). Thus, encouraging a culture of positive subjective norms toward reporting medication errors among Saudi nurses is needed. Salami and Alhalal (2020) reported that social norms have an important impact on behavior and Lapkin et al. (2015) found

that individuals are more likely to perform a behavior that is encouraged and admissible within their circle of influence. Therefore, when nurses feel that their peers support them and that their own errors will not lead to punishment, they will not fear reporting errors (Natan et al. 2017).

The study's findings show that Saudi nurses are influenced by the opinions of people who are important to them. In this study, Saudi nurses were more likely to report medication errors because the people who are important to them approve or believe that reporting medication errors is important to do. Thus, nurses perceive this to be the norm in their teams. Even if this study focused on nurses' individual perceived levels of social pressure to report errors, their individuals' perceptions consider collective norms. However, nurses may accept their teams' norms, which consider error reporters as whistleblowers. This pressure impacts nurses' willingness to report errors. On the other hand, when nursing teams consider reporting behavior as useful and important, nurses' willingness to report will be high. The negative responses of nurses' peers, managers, or family leads nurses to be concerned about social pressures. Nursing teams may possess common beliefs that accept the risks that are related to reporting behavior. Therefore, Saudi nurses may adjust their behaviors to comply with the preferences of their peers, family, and mangers even if the nurses' own choices and preferences are different.

In Saudi Arabian society, families are a central component and the frame of the identity of individuals. For Saudis, the family has an important role in people's decision-making (Woodman et al., 2022). Saudi culture is known as a collectivistic culture and, as such, Saudis value group membership and are faithful to their group (Salami & Alhalal, 2020), which may lead Saudi nurses to be influenced by others' opinions rather than to make independent decisions. Alanazi et al. (2020) confirmed that the strength of personal relationships and a religiosity factor can significantly impact intention and compliance behaviors. AlBar and Hoque

(2019) found that the opinions of family members and friends impact the decision of nurses to use e-health services in Saudi Arabia. This is consistent with Alluhidan et al. (2020) who found that Saudi nurses appreciated their family life, which pressures them to align nursing work and family commitments.

It seems likely that Saudi nurses comply with their team norms, especially those at a societal level. These social values are influenced by their Islamic values. Some Saudi families may consider reporting errors as incompetent and unacceptable behavior. This can result in an internal conflict of social norms and professional obligations among nurses. Therefore, Saudi nurses may adjust their behaviors to comply with the preferences of their peers, family, and friends even if the nurses' own choices and preferences are different. Salami and Alhalal (2020) suggest that professional counseling and social support are needed to assist nurses in making the right decisions regarding error reporting. This study found that, understanding Saudi nurses' subjective norms at Arar hospitals helps to explain and predict the practice of medication error reporting.

On the other hand, some studies found that attitude towards behavior, not subjective norms, is the strongest predictor of intention to report medication errors (Dionisi et al., 2020; Lapkin et al., 2015; Secginli et al., 2021). For example, Yami (2015) found that attitude towards behavior is the strongest predictor of nurses' behavioral intentions to comply with a pre-operative skin preparation policy, followed by subjective norms. Williams et al. (2015) and Rogers (2020) found that perceived behavioral control is the strongest predictor of the intention to report medication errors. Similarly, Kim et al. (2021) found that perceived behavioral control is the most influential factor for patient safety management activities, followed by subjective norms and then attitude toward behavior.

Although Saudi hospitals have reporting systems, there is a lack of adherence to these systems, which ultimately impacts safe patient care. All of the TPB constructs can be used as significant contributions to creating effective interventions that aim to improve reporting behaviors. A useful method to increase reporting rates is to assess professionals' attitudes that relate to reporting medical errors, because a negative attitude towards reporting decreases the likelihood of reporting (Archer et al., 2017; Korhan et al., 2017). When nurses have negative attitudes toward reporting, negative norms prevail. That is, nurses will want to avoid the negative consequences of reporting medication errors. Therefore, even if nurses have high levels of perceived control over reporting, they will not be confident in their ability to report medication errors, which will lead to an increase in underreporting. The factors that might obstruct or motivate Saudi nurses in Arar hospitals to report medication errors and the factors that influence their beliefs about reporting medication errors need to be identified in order to predict intention to report such errors.

Psychological Safety

Understanding Saudi nurses' behavior helps to explain and predict the practice of medication error reporting with regard to providing high-quality care. Saudi nurses reported that making a mistake on their team was held against them (65.1%) and that they were not able to bring up problems with their team members (53.2%). Nurses responded that their team rejects others for being different (21.1%) and that it is not safe to take risks (62.3%). Nurses also responded that asking other team members for help is difficult (44.9%) and that the team deliberately acts to undermine their efforts (55.1%). Nurses responded that their skills and talents were not valued and utilized (49.5%).

The study's literature review affirms the importance of psychological safety in healthcare practice. Psychological safety is important in healthcare settings where nurses work in interprofessional and interdisciplinary environments (Hunt et al., 2021). In environments without psychological safety, professionals can be inadequately motivated to report errors that might cause harm to patients (Moureaud et al. 2021). Miao et al. (2020) showed that the lack of psychological safety in a work environment contributes to a decrease in workers' cooperation and organizational harmony. Miao et al. (2020) reported that workers need to feel a sense of safety and build trust in the organization as a prerequisite and warranty for innovative behavior. Healthcare organizations may find it difficult to encourage employees to report medication errors because nurses tend to avoid any actions that could have a negative influence on them or their careers. Lee and Dahinten (2021) confirmed that fear of reporting errors contributes to discouraging nurses to participate in improving patient safety and quality of care. Thus, organizations with low levels of psychological safety cause their employees to be less likely to report or express their safety concerns. Aljabari & Kadhim (2021) argued that, in order to enhance error reporting rates, work environments should provide psychological safety, which is consistent with Gilmartin et al.'s (2018) findings. When the level of psychological safety is low, healthcare providers cannot express themselves freely, and their fear makes them avoid offering suggestions or opinions (Naveh & Katz-Navon, 2014).

Psychological safety impacts nurses' intention to report errors or speak up about safety issues (O'Donovan & McAuliffe, 2020; Remtulla et al., 2021; Scheepers et al. 2018; Soola et al. 2021). In a psychologically safe environment, nurses are more likely to report errors because they do not fear disapproval or blame from others. Promoting a climate of psychological safety helps increase staff willingness to report errors (Naveh & Katz-Navon, 2014). Grailey et al.

(2021b) stated that, when individuals feel psychologically safe, their errors and mistakes will be recognized, raised, and corrected earlier, which in turn leads to a decrease in the risk of serious harm to patients. Stühlinger et al. (2021) found that psychological safety allows individuals to show their true selves.

Several studies have identified psychological safety as a significant predictor of reporting errors in healthcare organizations (Appelbaum et al., 2016; Derickson et al., 2015; Edmondson & Lei, 2014; Lee et al., 2016; Lee & Dahinten, 2021; Munn, 2016; Pfeiffer et al., 2010). However, this study's results show that psychological safety is not a significant factor in predicting Saudi nurses' intentions to report medication errors. Interestingly, after the interaction terms were added to the model (i.e., psychological safety together with all the TPB constructs), psychological safety became a statistically significant predictor of intention to report medication errors. Although psychological safety is not a significant predictor by itself, adding psychological safety to the TPB model nonetheless made it become a statistically significant predictor for reporting medication errors.

Moderation Analysis

The results of the moderation analysis conducted in this study show the effect of psychological safety on each of the three TPB constructs while controlling for demographic variables. Newman et al.'s (2017) systematic review revealed that psychological safety can be a moderator. They mentioned that psychological safety moderated the relationship between team priority of safety and reporting of treatment errors. The relationship is stronger for teams who have high levels of psychological safety. Naveh and Katz-Navon (2014) reported that individuals who have high adherence to procedures will cause more reporting of errors when psychological safety is high. The findings reveal that psychological safety serves to strengthen the effect of

subjective norms. In a psychologically safe environment, shared norms and values influence other team members' willingness to speak up (O'Donovan & McAuliffe, 2020). Nurses do not want to behave differently from other members of their team and may decide not to report medication errors because of their fear of adverse responses from colleagues and managers. Thus, nurses feel greater social pressure to cohere with their team's norms when their behavior does not match their team's norms.

In a safe psychological environment, nurses are willing to change their behavior in order to be accepted in their team, regardless of their attitudes, norms, and controllability. This study also confirms that psychological safety serves to weaken the effect of attitude toward behavior. Saudi nurses in Arar hospitals put less value on their perceptions and evaluations of reporting systems in a safe psychological environment. Also, this study found no significant interaction effect between perceived behavioral control and psychological safety, which indicates that psychological safety is not a significant moderator of the effects of perceived behavioral control on intention to report medication errors.

These results are not consistent with those of other studies. Catalano et al. (2021) reported that the impacts of perceived norms, attitudes, and perceived control on intention can be strengthened by psychological safety. Stühlinger et al. (2021) also reported no significant interaction effect between perceived subjective norms and psychological safety on intention but did find a significant interaction effect between attitude towards behavior and psychological safety on the intention to get vaccinated. Stühlinger et al. (2021) explained that attitude towards behavior and perceived subjective norms are interrelated, so when individuals have a strong positive or negative attitude toward a behavior, they might believe that other people have a similar attitude, which is interpreted as an attitude-congruent perceived norm. Stühlinger et al.

(2021) further explained that when a team has strong positive or negative subjective norms regarding a behavior, a team member might assimilate their personal attitude to be in accord with the perceived norms.

When the product terms for the interaction between each of the three TPB variables and psychological safety were entered into the model individually, the effect of the interaction on the intention to report errors was not significant. This result is consistent with that found by other researchers (Catalano et al., 2021; Rogers, 2020).

Reliability Results

The Cronbach's alpha of the psychological safety scale (.621) was lower than other studies, where their Cronbach's α values ranged from .76. to .82 (Appelbaum et al., 2016; Carmeli, 2007; Carmeli et al., 2009; Edmondson, 1999; Kark and Carmeli, 2009; Lee et al., 2016; Lee & Dahinten, 2021; Mahmoud et al., 2022; Rogers, 2020; Scheepers et al., 2018; Stühlinger et al., 2021).

Previous studies did not validate the psychological safety scale in the Saudi context. Psychological safety literature in Arabic countries, especially in the Saudi context, is lacking. The focus of psychological safety literature is on English-speaking cultures (Mahmoud et al. (2022). Therefore, most researchers suggested more cross-cultural validation of the psychological safety scales (Edmondson & Lei, 2014; Mahmoud et al., 2022). There are also differences between the Western world and developing countries in the cultural aspects. These differences create threats against the appropriateness of adopting constructs (Mahmoud et al., 2022).

In addition, the level of analysis could impact the reliability of the psychological safety scale. This study conceptualized psychological safety as an individual-level construct. Many

researchers argued that there are not clear differences between individual psychological safety and team psychological safety, except in the object of measurement (Abror, 2017; Edmondson, 1999; Edmondson et al., 2016; Frazier et al., 2017). They explained that when individuals feel safe, they will engage with their teams. Zhang et al. (2010) discovered that individual psychological safety is an antecedent of team psychological safety. Abror (2017) found that there is a positive and significant relationship between individual psychological safety and team psychological safety. The literature of psychological safety shows similar findings across levels of analysis (Edmondson & Lei, 2014; Frazier et al., 2017).

The literature review demonstrates that researchers deal with psychological safety as homogeneous concept across different levels of analysis. According to Newman et al.'s (2017) systematic review of the literature and Hunt et al. (2021), many studies that measured individual psychological safety used Edmondson's (1999) measure. The Edmondson scale was designed at the group level. Newman et al.'s (2017) systematic review noted that there are limited examinations of how individual and team levels interacts to impact psychological safety. Cross-level designs were used in all studies to investigate how psychological safety at the team level predicts individual level outcomes. This may cause a limited understanding of psychological safety. O'Donovan and McAuliffe (2020) demonstrate that there is a dearth of research on cross-level and multilevel studies on psychological safety. This may affect the understanding of whether psychological safety differs among teams in the organizations.

Strengths and Limitations

This study is a valuable contribution to Saudi nursing literature because it illustrates the applicability of the TPB to the professional behavior of Saudi nurses. The TPB was employed in this study to understand nurses' reporting behaviors because it is the most common theoretical approach to understanding behaviors and attitudes and has been applied previously to investigate medication safety practices (Secginli et al. 2021). The TPB also has been utilized extensively to predict, explain, and modify health-related behaviors (Ajzen & Schmidt, 2020; Hagger et al. 2022). The questionnaire designed for this study is based on the TPB and was created using published guidelines (Azjen, 2005; Francis et al., 2004) and is reliable and valid.

However, this study had some limitations. First, data were collected using a cross-sectional design, so reporting behavior could not be analyzed over a period of time. Second, data were collected from a convenience sample at only two hospitals in Arar City, so the findings cannot be generalized to all Saudi hospitals. Third, all data were collected using self-report questionnaires, which could lead to self-reporting bias. Fourth, the sample was limited to nurses who were working in medical, surgical, and intensive care units. Fifth, although demographic variables were controlled in the study, unmeasured or unknown factors could contribute to the associations found in this study. Many factors can influence psychological safety, such as leadership and nurses' concerns regarding the negative consequences of reporting errors. Stühlinger et al. (2021) argued that studies that examine psychological safety consequences need to consider possible unintended impacts that might prevent or outweigh the beneficial effects that are the focus of the studies. Finally, no statistically rigorous measurements of psychological safety are available in the context of healthcare, which could hinder investigations into

psychological safety antecedents and implications for healthcare (Ito et al., 2022). For this study, the psychological safety scale has low reliability, which might affect the results.

Implications for Nursing and Future Research

Implications for Nursing Practice

Understanding the factors that influence Saudi nurses' intentions to report medication errors provides insight into strategies that hospitals can implement to increase and reinforce medication error reporting. This study found that all the TPB constructs are important in designing interventions to improve a reporting culture. This study shows that subjective norms as a construct has an especially important role in the intention to report medication errors and should be considered when developing interventions to improve reporting behaviors. Therefore, nursing leaders need to measure and assess if their organizational norms contribute to establishing psychological safety. Hospitals also should pay attention to professional counseling outcomes and social support to reinforce nurses' reporting practices. The findings of this study can help to establish guidelines for developing an understanding of the determinants of nurses' intentions toward reporting medication errors. The findings also can be beneficial for policymakers and healthcare providers in Saudi Arabia to develop strategies and policies to improve reporting errors by applying all the TPB constructs. In short, this study provides an improved understanding of the predictors of error reporting in order to develop interventions for improved reporting practice and ultimately reduce medical errors.

Implications for Nursing Research

This study is the first known study to report factors that influence Saudi nurses' intention to report medication errors in Arar City hospitals using the TPB. No research has been conducted regarding Saudi nurses' intention to report medication errors in hospital settings as well as

whether or not the TPB constructs, and psychological safety can predict Saudi nurses' intentions to report medication errors. The results of this study can encourage other researchers to start examining the TPB constructs and psychological safety in greater depth. The findings also provide a solid foundation for Saudi researchers to develop useful nursing interventions for reporting errors. Future research needs to focus on understanding the lack of association between psychological safety and the TPB constructs.

This psychological safety research focused on the individual level. Therefore, a valuable extension would be to examine psychological safety on an organizational or team level. This study did not find psychological safety to be a significant predictor of reporting medication errors, and therefore using a different measure that focuses on individual level of psychological safety may impact the study result. The results require further investigations before generalizing inferences that were drawn from one level of analysis to other levels.

The proposed theoretical model shows on a very basic level how psychological safety can act as a moderator in the prediction of behavior. Psychological safety in the model might be in the incorrect place, so the proposed model gives other researchers ways to modify the model to accurately predict individual behavior. The literature review demonstrates that psychological safety affects TBP constructs and is a predictor of intention. Future research can use psychological safety as a predictor with (attitudes, subjective norms, and perceived control). Future studies still need to examine whether the model holds in other contexts and with other behaviors. There is a need to examine norms and psychological safety at the team level since this study focused on the individual level. There is also a need to study which factors can influence Saudi nurses' behaviors or norms to report errors.

The relationship between nurses' intentions to report medication errors and their demographic characteristics also needs to be explored further in future research. Future research should replicate this study using a wider national sample of nurses working in different types of hospital units and should extend the TPB model to include additional variables and other healthcare institutions in the KSA. Also, the lack of evidence regarding which constructs in the TPB have the strongest impact on Saudi nurses' intention to report errors must be addressed. More studies are needed to discover how subjective norms and attitude toward behavior can be enhanced among nurses. This study did not find psychological safety to be a significant predictor of reporting medication errors, and therefore, the role of psychological safety in error reporting requires additional consideration and research.

Implications for Nursing Education

The findings of this study can help the stakeholders of higher education institutions understand Saudi nurses' subjective norms and attitudes toward reporting medication errors in order to assist in designing and providing continuing nursing education courses that can improve reporting practice by focusing on nurses' subjective norms, attitude toward behavior, and perceived behavioral control. Also, the KSA education system needs to build and promote psychological safety among nursing students. Nursing schools should develop simulation activities to foster nursing students' intention to report errors by highlighting factors that nursing students perceive as impacting their intention to report errors. The subjective norms construct was found to be the most significant predictor of Saudi nurses' intentions to report medication errors. Therefore, nursing education administrators and leaders should target nurses' perceived norms to achieve effective learning outcomes. The training programs should target other healthcare providers, too, because they influence nursing students' norms.

Summary

The TPB is a theoretical framework that has been used to explain and predict behavior across different fields. The findings of this study show that attitude toward behavior, subjective norms, and perceived behavioral control are predictors of Saudi nurses' behavioral intention to report medication errors, with subjective norms being the strongest of the three TPB constructs, and that the addition of the psychological safety construct did not contribute in any statistically significant way to the TPB model. The effects of the interactions between psychological safety and subject norms were found to be positive and significant, but negative between psychological safety and attitude toward behavior. No significant interaction effect was found between perceived behavioral control and psychological safety. The magnitude of each construct on nurses' intention to report medication errors varies because behavioral beliefs can vary from one population to another, and the conceptualization of behavioral outcomes varies across populations for the same behavior. The results also indicate that nurses with positive subjective norms are more inclined to report their errors when they work in a team in which they feel psychologically safe.

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APPENDIX A

PARTICIPANT INVITATION LETTER

Letter of Invitation to Participate in Research

You are invited to participate in a research study. The purpose of this study is to explore factors that affect the intentions of Saudi nurses to report medication errors in two hospitals in Arar City. You are eligible to participate in this study if you have been working in medical, surgical, or intensive care units for more than six months. Participation is completely voluntary, and you may withdraw from the study at any time. The study is completely anonymous; therefore, it does not require you to provide your name or any other identifying information.

No individual's responses will be shared with hospital administration or staff. Thus, your responses will not impact your job. Participating in this study does not involve anticipated risks. The information collected may not benefit you directly, but your participation in the research will be of great importance to assist in understanding the impact of attitudes, subjective norms, perceived behavioral control, and psychological safety on nurses' intention to report patient safety incidents. If you would like to participate in the study, please click the survey link at the end. The survey will take approximately 10 to 15 minutes to complete. Feel free to contact me at oaldughmi@luc.edu or 0501531523 if you have questions.

Statement of Consent:

Clicking on the link below indicates that you have read the information provided above, have had an opportunity to ask questions, and agree to participate in this research study.

Sincerely,

Ohoud Aldughmi, RN, MSN, Doctoral Student, Loyola University of Chicago

APPENDIX B

THEORY OF PLANNED BEHAVIOR QUESTIONNAIRE

Theory of Planned Behavior Questionnaire

The following questions ask about your experience with reporting medication errors. Reporting medication errors refers to making a formal report that follows your hospital's protocol. Please answer the following questions to the best of your knowledge about medication error reporting.

A. Please check the appropriate response**.**

1. How many years have you been practicing nursing?
_____ 2-5 years
_____ 6-10 years
_____ More than 10 years

2. What is your highest level of nursing education?
_____ Diploma
_____ BSN
_____ MSN
_____ Doctorate

3. What is your age?
_____Under 30 years old
_____30- 39 years old
_____40-49 years old
_____Over 50 years old

4. What is your area of practice or unit?
_____ Medical unit
_____ Surgical unit
_____ Intensive care unit

B. Please choose the number that corresponds to your level of agreement with the following statements.

1. I intend to report medication errors that I may encounter.

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

2. I will try to report medication errors that I may encounter.

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

3. I plan to report medication errors that I may encounter.

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

C. We would like to know how you feel about reporting medication errors. Please complete the following statement based on your level of agreement with each of the five pairs of adjectives.

4. I feel that reporting medication errors each time I encounter them is:

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree
Worthless	1	2	3	4	5	6	7	Valuable
Unpleasant	1	2	3	4	5	6	7	Pleasant
Bad	1	2	3	4	5	6	7	Good
Unenjoyable	1	2	3	4	5	6	7	Enjoyable

Harmful   1   2   3   4   5   6   7   Beneficial

D. We are interested in the groups or individuals that would influence your willingness to report medication errors. Please choose the number that corresponds to your level of agreement with each statement.

5. Most people who are important to me think that . . .

I should not report medication errors.	1	2	3	4	5	6	7	I should report medication errors.

6. The people in my life whose opinions I value would . . .

disapprove of my reporting medication errors.	1	2	3	4	5	6	7	approve of my reporting medication errors.

7. It is expected of me that I should report medication errors.

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

8. I feel under social pressure from my professional colleagues.

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

E. Please respond to the following statements by choosing the number that corresponds to your level of agreement.

9. For me to report medication errors is . . .

| extremely difficult. | 1 | 2 | 3 | 4 | 5 | 5 | 7 | extremely easy. |

10. How much control do you believe you have over reporting medication errors that you encounter?

| No control | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Complete control |

11. I am capable of reporting medication errors.

| Strongly Disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly Agree |

12. Whether or not I report medication errors is completely up to me.

| Strongly Disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly Agree |

APPENDIX C

PSYCHOLOGICAL SAFETY SCALE

Psychological Safety Scale

Please circle a number from 1 to 5 to indicate the extent to which you disagree or agree with each statement.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
If you make a mistake on this team, it is often held against you.	1	2	3	4	5
Members of this team are able to bring up problems and tough issues.	1	2	3	4	5
People on this team sometimes reject others for being different.	1	2	3	4	5
It is safe to take a risk on this team.	1	2	3	4	5
It is difficult to ask other members of this team for help.	1	2	3	4	5
No one on this team would deliberately act in a way that undermines my efforts.	1	2	3	4	5
Working with members of this team, my unique skills and talents are valued and utilized.	1	2	3	4	5

APPENDIX D

NORMALITY ASSUMPTIONS

Figure 4. Normality Assumptions
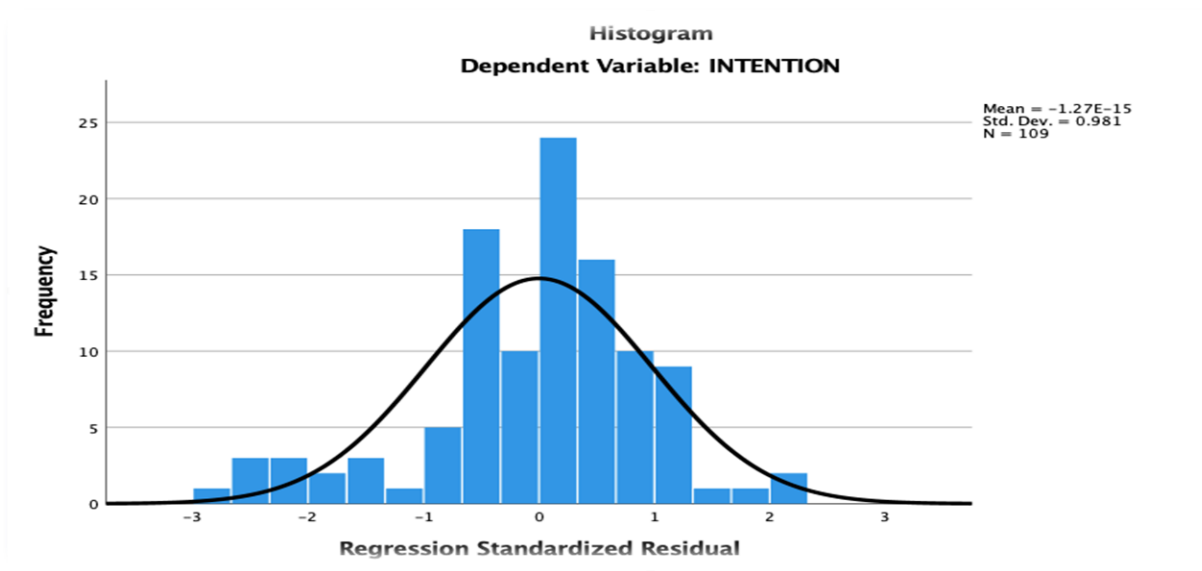
Normal P-P Plot of Regression Standardized Residuals
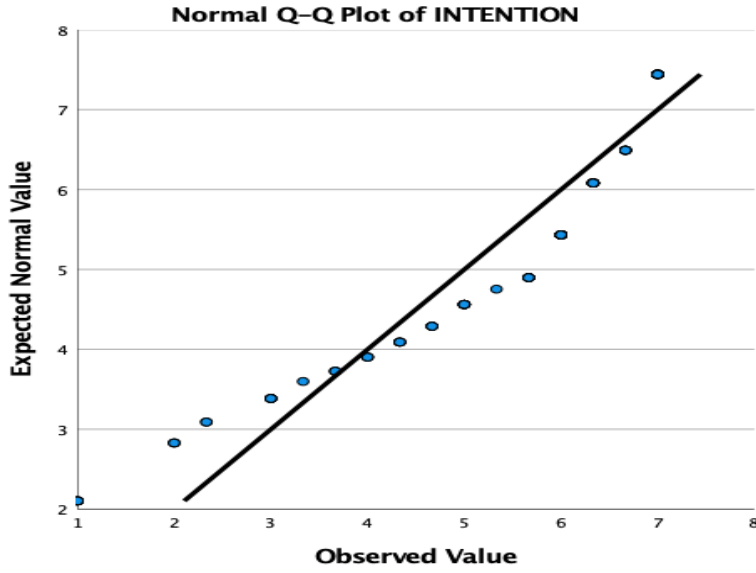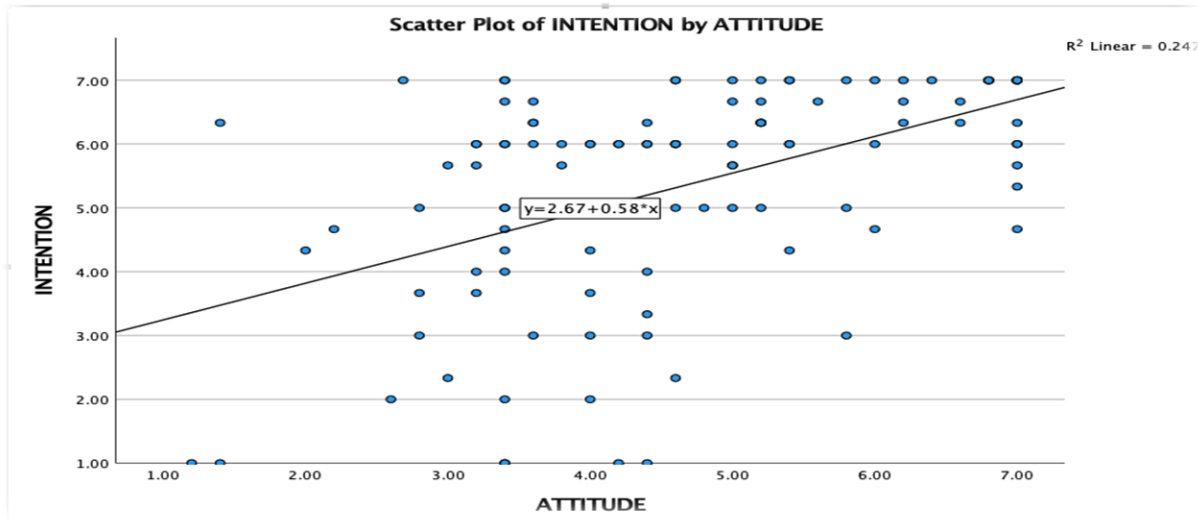
Q-Q plot

Normal Q–Q Plot of INTENTION
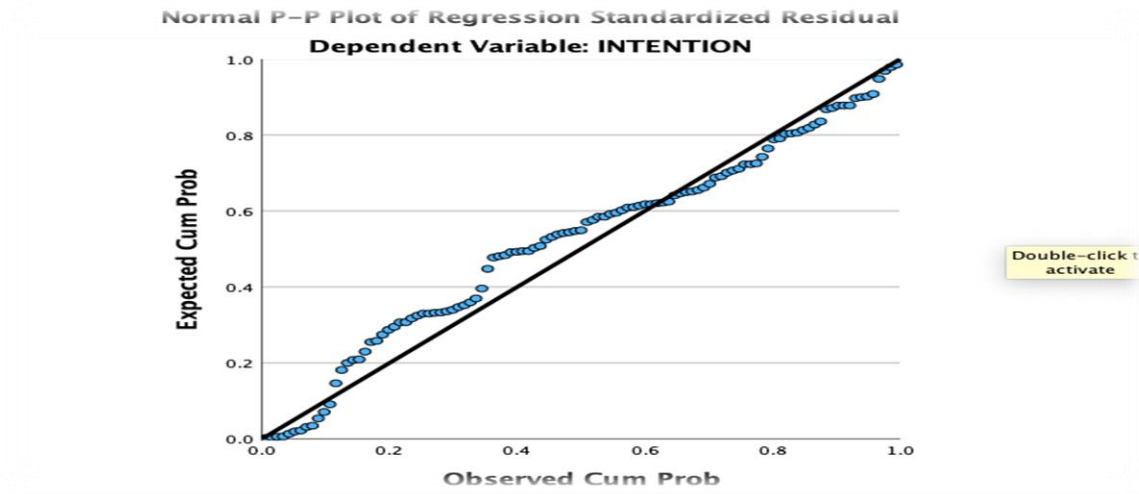
Figure 5. Scatterplots for Intention versus TPB Constructs and Psychological Safety

Scatter Plot of INTENTION by ATTITUDE

R^2 Linear = 0.247

y=2.67+0.58*x

Scatter Plot of INTENTION by NORMS

R^2 Linear = 0.238

$y = 2.75 + 0.6*x$

Scatter Plot of INTENTION by CONTROL
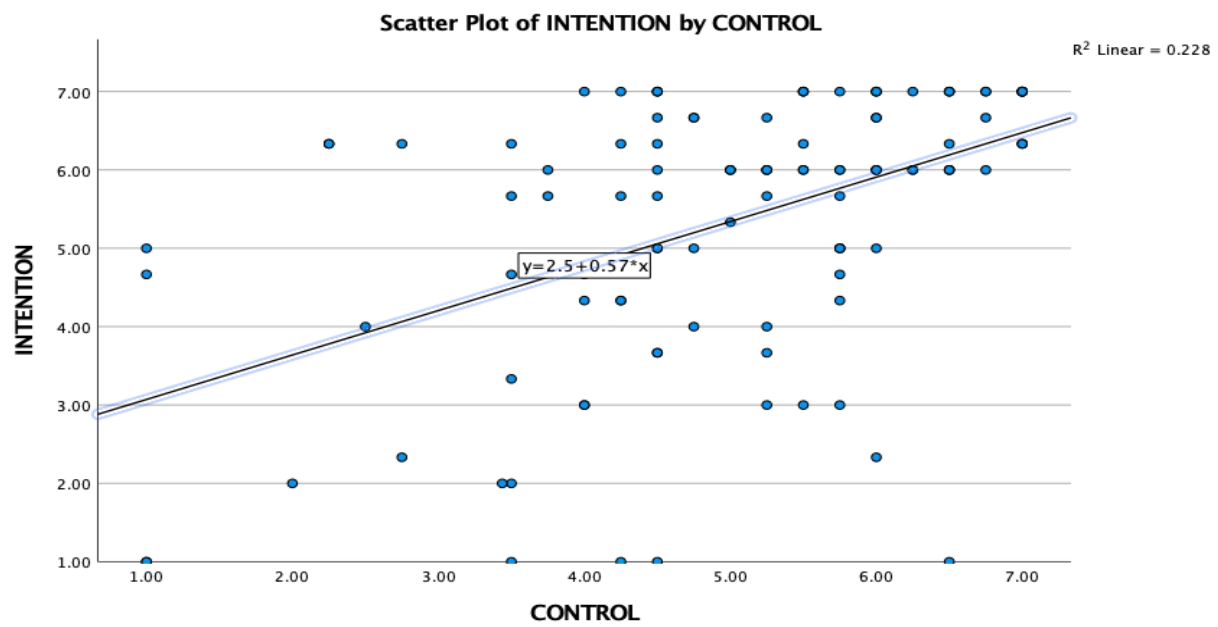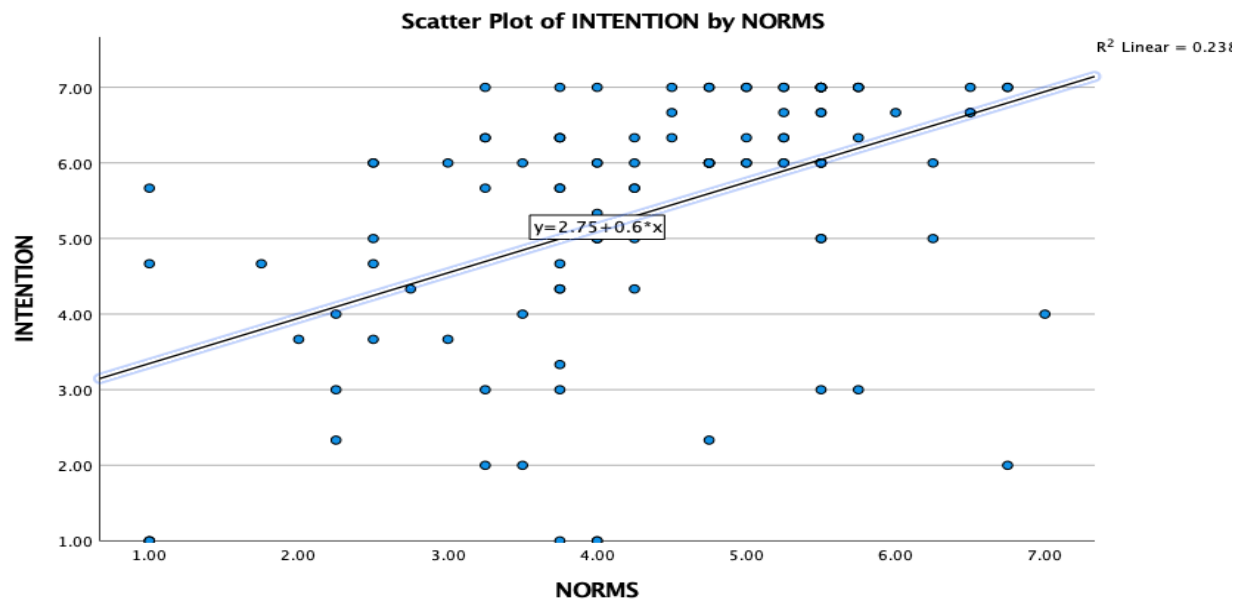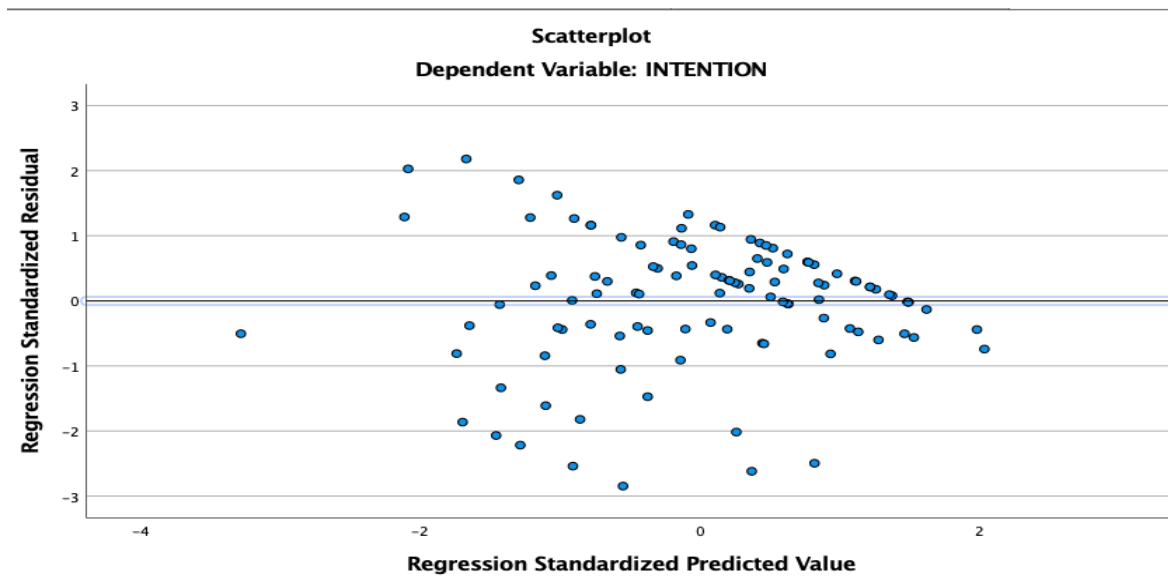
R^2 Linear = 0.228

$y = 2.5 + 0.57*x$

112

Figure 6. Residual Scatter Plot for Homoscedasticity Assumption

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