Error reporting and patient safety grade assignment by nurses: An application of the theory of planned behavior

A dissertation submitted

By

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This dissertation has been accepted for the faculty of Benedictine University.

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Dedication

I dedicate this study to the countless nurses across the world, many known to me and millions unknown, who work tirelessly to provide the safest care to their patients each working day. They are the quiet, yet true heroes of patient safety and I salute every one of them. They make me proud as a fellow-nurse.

I also dedicate this joyful work to my late parents, Celine and Benjamin Morris who instilled in me the values of enthusiasm, passion and perseverance for learning. I am an all-time learner because of them.
Abstract

Background: Prevention of avoidable patient harm through improved error reporting have been the focus of much deliberation, action plans and research studies. Purposes: To examine theory of planned behavior’s (TPB) usefulness in predicting error reporting behavior (ERB) and assigning patient safety grade (PSG) by hospital-based nurses in Indiana. To determine the contribution of Attitude (ATT), injunctive norms (IN), Declarative norms (DN), Perceived behavioral control (PBC) and perceived psychological safety (PPS) in predicting ERB and PSG assignment and to test PPS as a mediator for ERB and PSG assignment by nurses.

Methods: A 31 item TPB construct was developed from the questions on the Hospital Survey on Culture of Patient Safety. Existing 2017 survey data on 4992 nurses working in Indiana Hospitals was used to answer four research questions and test four hypotheses using multiple logistic regression analyses in two groups specifically, nurses working in inpatient hospital units (2593) and all nurses (4992) using a cross-sectional, correlational approach.

Results: 32% of the sample did not report any error and 40% reported only 1-2 incidents for 12 consecutive months validating previous study findings. 74% of all participants assigned an excellent to very good PSG for their work areas, indicating a favorable opinion.

The first set of hypotheses involved ERB. The results were non-significant, therefore could not statistically determine contribution of ATT, IN, SN, PBC and PPS to predict ERB. PPS was hypothesized to mediate the relationship between ATT, IN, SN
and PBC. This wasn’t substantiated either, signifying that TPB did not emerge as an appropriate model for predicting ERB in this study.

Nurses’ assigning PSG for their work unit was the second outcome variable. As hypothesized, ATT, IN, DN, and PBC were statistically significant predictors of nurses’ assigning favorable PSG. PPS significantly mediated the correlation between ATT, IN, DN PBC and PSG but not a predictor for assigning PSG.

Overall, utility of TPB appeared to be more relevant to the behavior of “assigning patient safety grade” than “reporting error events”.

Conclusions: Future studies utilizing appropriate TPB constructs is likely to validate the efficacy of TPB to predict ERB. Favorable PSG assignment is an indicator of positive patient safety culture in healthcare facilities surveyed in this study.

Key words: Theory of planned behavior, error reporting, patient safety culture, patient safety grade, cultural transformation
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Chapter 1: Introduction

In its seminal report *To Err Is Human: Building a Safer Health System*, the Institute of Medicine (IOM) stated, "The experiences of other industries provide valuable insight about how to begin the process of improving the safety of health care by learning how to prevent, detect, recover, and learn from accidents" (Flin, 2007, p. 655; WHO, 2004)

In response to the IOM’s report and the overall growing concerns about patient safety, the Patient Safety and Quality Improvement Act was passed in 2005. The goal of this act was to improve patient safety by encouraging voluntary and confidential reporting of events that adversely affect patients. “The focus of a system-based review of error would be to assess potential flaws to prevent future errors. Similar systems are used in the aviation industry, where a voluntary and confidential incident reporting system has enjoyed considerable success” (Levy, Mareiniss, Iacovelli, & Howard, 2010)

In 2004, five years after the publication of the IOM report, World Health Organization (WHO) developed a plan to address patient safety globally by creating the World Alliance for Patient Safety. The United States is a member along with several other countries. The Agency for Healthcare Research and Quality, part of the U.S. Department of Health and Human Services, issued a clarion call for research on the epidemiology of errors, infrastructure to improve patient safety that includes capacity for analysis and transforming the organizational culture, enhancing
information systems to standardize common definitions of reporting systems, and access for adoption of evidence-based practices to improve patient safety and evaluate its success (World Health Organization, 2004).

Improvement in patient safety involves instituting a systematic process to capture and analyze comprehensive and meaningful data on errors, adverse events, and near-misses. This also requires the development and continuation of a safety culture within healthcare facilities. (Mardon, Khanna, Sorra, Dyer, & Famolaro, 2010, p. 399). According to the Advisory Committee on the Safety of Nuclear Installations Study Group on Human Factors, "The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization’s health and safety management. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measures" (Health & Commission, 1993)

To err is human; therefore, humans are fallible. This truth has not been fully acknowledged, although efforts to face this reality in the late 1990s around the time the IOM’s history-making report was published were masked by the false expectation of perfect medicine and perfect care by clinicians and providers. This expectation was largely responsible for the perception that hospitals cannot make mistakes and the resultant state of underreporting or non-reporting for fear of retaliation or disciplinary action. In addition, many believe that accidents and errors, though often caused by
humans, can be attributed to faulty systems, ill-conceived processes, dysfunctional equipment, and failure to teach end-users how to manage new processes and procedures effectively.

When mistakes occur, it’s important to learn from them. This can only emerge if everyone takes ownership of the error, tries to understand its cause, and makes changes and improvements to mitigate similar potential errors. Errors, their causes, and their management and prevention have been the focus of local, regional, national, and international conferences for decades. The fundamental question is, are we making fewer errors today? In other words, have we made healthcare safer?

By all accounts there has been a significant improvement in safety in many industries, but healthcare has not achieved the same level of success as other high-risk industries like aviation and nuclear power. Why is that? Who is accountable for patient safety? The answer is everyone: leaders, direct care workers, providers, regulatory agencies, and policymakers. For the purposes of this study, the focus will be on what local healthcare facilities can do urgently and more consistently to learn from errors with the goal of decreasing errors resulting in patient harm and improving care practices.

Error in healthcare is also known as medical error. Many different definitions of medical error exist. The most cited one is from the IOM, which defines medical error as “the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim” (Molla S Donaldson, Corrigan, & Kohn, 2000, p. 1). Another definition describes medical error as “a preventable adverse event that
affects a patient by prolonging treatment or causing discomfort, disability, or death” (Kaldjian, 2008). Patient safety incidents are events or circumstances that could have resulted, or did result, in unnecessary harm to patients. A patient safety incident can be a reportable circumstance, a near-miss, a no-harm incident, or a harmful incident, also known as an adverse event (Sherman, 2009).

Fundamentally, a safe organization depends on the willingness of frontline workers to report their errors and near-misses; in other words, the organizational practices support a reporting culture. This willingness of workers to report depends on their belief that management will support and reward reporting and that discipline occurs based on risk-taking; in other words, the organizational practices support a just culture L. L. Leape (2002)

**Causation of Errors**

According to James Reason, there are two types of errors: (1) the action did not go as intended, also known as an error of execution, and (2) the intended action was incorrect, or an error of planning. Both types of errors can occur during any stage of the healthcare delivery process as part of preventive, curative, rehabilitative, restorative, or palliative care. It is important to acknowledge that not all errors result in harm (Sherman, 2009). There are serious safety errors that cause known harm, and there are latent errors that are not obvious yet have the potential to cause harm at a later stage. These latent errors are usually caused by defects in the design and organization of processes and systems. (J. H. Reason, E; Paries, J 2006). The best way to prevent latent errors is to take a systems approach and correct the faulty
processes and systems in place rather than taking punitive actions and blaming individuals. A just culture balanced with the right amount of personal and management accountability is the recipe for patient safety and high reliability.

Whatever their cause, medical errors cannot be ignored. Makary reviewed four studies that analyzed death rate data over an eight-year period and extrapolated that data to conclude that more than 250,000 deaths, or 9.5 percent of all deaths, were due to medical errors. This makes medical error the third-leading cause of death in the United States. (Makary & Daniel, 2016)

According to Gallagher, the biggest hurdle preventing hospitals from improving patient safety is transparency—medical professionals simply do not want to admit mistakes. An estimated 25 percent of patients seeking medical care have been victims of medical errors. (https://www.forbes.com/sites/leahbinder/2018/11/09/). No other industry would tolerate this high percentage of error. The healthcare industry must act swiftly and prevent harm. All Americans should be concerned about patient safety as a critical healthcare issue. This includes patients, caregivers, policymakers, and the community at large.

Medical errors are not only potentially deadly, but also costly. The authors of the Institute of Medicine’s report that for every preventable adverse drug event that occurs at a hospital, about $8,750 is added to the cost of the patient’s stay. (Molla S Donaldson et al., 2000). This conclusion was made more than 10 years ago; today, the cost is even higher.
In the healthcare industry people take care of people and in a people driven industry human errors are likely. While the number of mistakes in healthcare are reported to be staggering it is estimated that more than half of the medical errors are preventable (Croskerry & Sinclair, 2001) “The biggest challenge to moving toward a safer health system is changing the culture from one of blaming individuals for errors to one in which errors are treated not as personal failures, but as opportunities to improve the system and prevent harm” (Committee on Quality of Health Care in America, 2001, p. 79). Data on adverse events shows that voluntary error reporting is notably low in many hospitals and other healthcare settings. (Wolf & Hughes, 2008)

Optimal patient safety can only be realized when caregivers and healthcare systems work jointly to prevent patient harm. One of the approaches to achieving this state is to elevate health care workers’ reporting behavior, which will help determine the frequency, seriousness, and causes of medical errors. This can be done by analyzing data collected through error-reporting systems. These systems may be internal or external to healthcare institutions and may be voluntary or mandatory. Regardless of the type of reporting system, its usefulness is contingent on how much data it collects. This depends on the organization’s culture for reporting errors. All clinical staff and providers must view errors as opportunities for learning and feel accountable for disclosing errors without fear of retribution. Reporting must be recognized and rewarded.

Despite recent professional and legislative efforts to encourage the reporting of medical errors, including the passage of the Patient Safety and Quality
Improvement Act of 2005, error disclosure in healthcare has not changed for the better to levels like those of other high-risk industries. Obstacles to reporting are diverse and daunting, and underreporting of errors is believed to be pervasive (Wachter, 2004). The situation has not changed significantly since the IOM’s 1999 report, and much needs to be done to elevate organizational patient safety improvement through a widespread culture of fearless voluntary reporting of medical mistakes. Most organizations collect data on patient safety incidents through voluntary self-reports. As such, it is critical to understand what factors motivate reporting and what factors hinder it, as well as what cultural and/or environmental dynamics influence the belief that reporting is an essential duty for patient safety.

It is a plain and simple fact that errors happen. The ability to learn from these errors by recognizing and rewarding their reporting is the first step toward innovation and improvement (Cannon & Edmondson, 2001). If every error were reported voluntarily, the resulting data could be used to find out what went wrong with the intended process without blame and a new and better process could be created and taught so the mistake does not happen again. This is how learning organizations succeed. In order to meet this ideal, the error-reporting system should be fully utilized. Most healthcare facilities have an error-reporting system in place, but are they using it to its fullest potential? Do direct care employees in healthcare feel accountable, and are they embracing their duty to prevent errors by reporting major and minor safety events?
There is a gap between verbalized importance of patient safety and the practice of tangible safety behaviors on the part of caregivers and providers. One such behavior is the voluntary reporting of adverse patient events (Amy C Edmondson, Dillon, & Roloff, 2007). The research shows that regardless of the professional background of healthcare providers and clinicians, there are several inexplicable and explicable reasons for the variation between attitude and performance when it comes to reporting medical errors in healthcare. (P. J. Pronovost, Nolan, Zeger, Miller, & Rubin, 2004). Most research on the reasons individuals do not report patient harm primarily focus on the fear of discipline and a culture of blame and shame. (Page, 2004). There seems to be ambiguity and trepidation around reporting. This implies a cultural problem that needs to be addressed. The status quo of compromised patient safety has to be transformed, and to that end, any change is better than no change at all. Despite the resistance, anxiety, real or perceived barriers, high cost of quality improvement, and fear of litigation, healthcare providers must be committed to doing the patient no harm or abiding by the Hippocratic Oath. They must walk the talk. What is needed is a comprehensive, commonsense approach to addressing patient safety with accountability. There is no silver bullet to achieve a state of “zero harm”; it requires a thoughtful and well-researched methodology. The organizational culture theory is useful in understanding patient safety because it describes how socialization in the work environment influences beliefs, values, and feelings about the work and how it should be done (Schein, 2004)

Healthcare providers, including physicians, advanced practice professionals,
nurses, pharmacists, respiratory therapists, dietitians, social workers, and patient care assistants, can report patient safety incidents through their healthcare facility’s confidential incident reporting system. These incidents can be serious in nature and result in temporary or permanent patient harm or near-miss incidents that do not result in patient harm but have the potential to cause injury or permanent damage. Reporting can be done electronically or manually using a structured format, with the reporter choosing anonymity if desired. However, research indicates that most healthcare employees choose not to report. Among pharmacists, for example, the reporting rate for adverse drug events has been found to be as low as 1.5 percent (Gavaza et al., 2011). In a recent culture of safety survey completed by hospital personnel at a midwestern hospital, only 33 percent of the 1,070 staff members reported at least one patient safety incident during the past 12 months (Gavaza et al., 2011).

As the single largest group of primary caregivers in a hospital, nurses are well suited and professionally accountable for advocating for patient safety. Nurses have the unique ability to watch the patient closely by virtue of their scope of work and the length of time they spend at the bedside compared to any other member of the patient’s interdisciplinary care team. They have the necessary educational background and knowledge of reporting systems and are aware of events that directly affect patient safety that may or may not get formally reported. Several factors impact voluntary incident reporting. Some commonly reported reasons for not reporting safety incidents during the caregiving process include a perceived lack of time, fear of
retaliation and punishment, not wanting to report a friend/colleague, fatigue, the idea that “No one reports” or “Nothing will come of it,” lack of knowledge on how to fill out a report, no perceived incentive or reward for reporting, not knowing the importance of reporting, and believing the error was “hypothetical,” meaning the error was caught before reaching the patient. A study of physicians in an academic setting found that the likelihood of reporting an error depended on the outcome of the error (Beus, Bergman, & Payne, 2010). Of the respondents, 92 percent indicated they would report a hypothetical error if it resulted in major harm, 73 percent said they would report it if it resulted in minor harm, and 43 percent said they would report it if resulted in no harm.

The decision by nurses to report or not report errors has been explored in several studies, but literature utilizing the theory of planned behavior to predict incident reporting by registered nurses is scant. In addition, little is known about the real drivers for nurses’ intention to report and their actual reporting behavior. Also, there are no studies utilizing the culture of patient safety survey to link attitudes, social norms, and perceived behavioral control to reporting behavior among nurses or any other professional healthcare employees.

Problem and Study Significance

Professional registered nurses (RNs) are an important pillar of the U.S. healthcare system. Successful implementation of a patient safety program depends on nurses, who often are considered the heart of healthcare. According to the Kaiser
Family Foundation, the total number of professionally active RNs in the United States is 3,381,150 as of October 2018. (Retrieved from https://www.kff.org/state-category/providers-service-use/nurses-and-physician-assistants/)

RNs are the primary caregivers in hospitals, and they work in all hospital-based inpatient and outpatient settings. They also spend the longest amount of time with patients in the process of providing care.

Nurses are expected to recognize and report adverse events even if they did not cause the error. Despite this unwritten rule for nurses to report self-made or committed by others, several studies have demonstrated underreporting among nurses. (Buckley, Short, Rowbottom, & Oh, 1997; Michael Richard Cohen, 1999; De Vries et al., 2008; N. P. Ekayani, Wardhani, & Rachmi, 2017; Elder, Brungs, Nagy, Kudel, & Render, 2008; Espin, 2007; Kingston, 2004; Koehn, Ebright, & Draucker, 2016; Mayo, 2004; Vrbnjak, Denieffe, O'Gorman, & Pajnkihar, 2016; Walker & Lowe, 1998) Failure to report could be impacted by group norms and individual influences, both of which could be latent manifestations of system issues and organizational flaws. Incident-reporting behavior differs among professionals within interdisciplinary teams in both the United States and the rest of the world. Nurses report significantly more often than any other member of the care team, notwithstanding the fact that medical errors are severely underreported across the world in comparison to errors in other high-risk industries like aviation, mining, and nuclear power (Kingston, 2004).
When asked about the importance of speaking up about mistakes and reporting adverse events, almost everyone recognizes their role and responsibility. However, when it comes to reporting errors, the facts do not line up. There is a gap between verbalizing the importance of patient safety and practicing tangible safety behaviors, such as reporting patient events, on the part of caregivers and providers. Because individual behaviors often are critical to the adoption and sustainability of a good practice, it is important to understand what motivates healthcare workers to practice patient safety. More research is needed to improve behavior change interventions targeting patient safety.

This study focuses on the culture of patient safety in healthcare. The overall goal is to identify factors that support or deter voluntary reporting of adverse patient outcomes. The criterion variable is reporting behavior. The predictor variables are individual attitudes toward reporting, social norms influencing reporting, and perceived control over reporting.

There are no studies in the published literature linking Ajzen’s theory of planned behavior (TPB) and nurses’ reporting behavior using the culture of safety survey as the construct for the TPB. Also, there are no available studies on error-reporting behavior that used actual reporting behavior as the outcome variable. There are many related studies on nurses’ perception of safety culture and reasons for not reporting safety occurrences.

**Theoretical Framework**

A theory is a set of propositions consisting of defined and interrelated
constructs (concepts), definitions, and propositions that present a systematic view of phenomena by specifying relations among variables with the purpose of explaining and predicting the phenomena. A theoretical framework provides a model for organizing the research questions or hypotheses, and the data collection provides an explanation for how and why variables are related (Kerlinger, 2000). Therefore, confidence in understanding the relationship between variables is strengthened by a theoretical framework that provides a model for organizing the research questions or hypotheses and data collection (Creswell & Creswell, 2017). In this study, the theoretical framework is centered around behavior. This is based on the TPB, an extension of the 1975 theory of reasoned action. According to Ajzen, (Icek Ajzen, 1991), intention is the antecedent for behavior and develops through a combination of attitude toward the behavior, subjective norms, and perceived behavioral control. The TPB has been applied in many health-related studies and has been found to have high predictive validity.

A methodical examination of the existing literature on the TPB established that the constructs of attitude, social norms, and perceived behavioral control has been successful in explaining behavior change individually or in combination in most of the studies that used the model. It also helped identify the optimal theoretical framework that should be utilized in behavior change interventions ((Conner, 1998; Sheeran, Klein, & Rothman, 2017) This study will use the TPB as its guiding theoretical framework to explore how the constructs in the TPB work uniquely and/or in combination with one another and with the addition psychological safety as a
mediator to understand nurses’ behavior on reporting safety events in hospitals. The decision to study actual reporting behavior in addition to or independent of intention was supported by literature on previous research as in this metanalytic study done by Wallace and others where 797 studies and 1,001 effect sizes were analyzed to study the role of situational constraints in the relationship between attitudes and behavior. This was one of the largest studies that examined the relationship of attitudes to actual behavior (Wallace, Paulson, Lord, & Bond Jr, 2005)

**Purpose**

The purpose of this study is to examine to what extent attitudes, subjective norms, and perceived behavioral control impacts the voluntary reporting of patient safety incidents by nurses working in hospital settings.

**Research Questions and Hypotheses**

- **Research Question 1 (RQ 1):** Do (a) Attitude (ATT) towards reporting safety events, (b) Injunctive Norms about patient safety (IN), (c) Declarative Norms about patient safety (DN), (d) Perceived behavioral control about patient safety (PBC) and (e) Perception of Psychological Safety (PPS) predict patient safety incident reporting behavior (PSI) by nurses?
  
  - **Hypothesis 1a:** ATT, IN, DN, PBC, and PPS scores are significant predictors of patient safety incident reporting behavior by nurses.

- **Research Question 2 (RQ 2):** Does Perception of Psychological Safety (PPS) mediate Attitude (ATT), Injunctive Norms (IN), Declarative Norms (DN) and
Perceived Behavioral Control (PBC) to predict patient safety incident (PSI) reporting by nurses?

- **Hypothesis 2a**: PPS significantly mediates the effect of ATT, IN, DN and PBC to predict patient safety incident reporting behavior by nurses.

- **Research Question 3 (RQ 3)**: Do (a) Attitude towards reporting safety events (ATT), Injunctive Norms about patient safety (IN), (c) Declarative Norms about patient safety (DN), (d) Perceived behavioral control about patient safety (PBC) and (e) Perceived Psychological Safety (PPS) predict nurses’ assignment of patient safety grade (PSG) for the work unit?
  - **Hypothesis 3a**: High ATT, IN, DN, PBC and PPS scores are significant predictors of nurses’ assessment of patient safety grade for the work unit.

- **Research Question 4 (RQ 4)**: Does Psychological Safety (PPS) mediate Attitude (ATT), Injunctive Norms (IN), Declarative Norms (DN) and Perceived Behavioral Control (PBC) to predict nurses’ assignment of a better patient safety grade for the work unit?
  - **Hypothesis 4a**: Psychological safety significantly mediates the effect of ATT, IN, DN and PBC to predict nurses’ assigning a patient safety grade for the hospital.

**Organization of the Chapters**

The rest of this dissertation is divided into five chapters. Chapter 2 provides a
more in-depth discussion on the design features of incident reporting systems and processes; the role of healthcare professionals in reporting patient safety incidents; published literature on reporting behaviors, including barriers to incident reporting by healthcare workers; the TPB model; and the study hypotheses. Chapter 3 provides an overview of the study methods and statistical analyses used to address the research questions and test the hypotheses. Chapter 4 provides an overview of the study results. Chapter 5 provides a discussion and interpretation of the study findings. Finally, chapter 6 provides the conclusions and recommendations for further research and practice.
Chapter 2: Review of Literature

The foundation of this study is based on the ideologies of organizational development and change, the principles of cognitive psychology, and best practices for patient safety. The science of safety and its application in practice is not unique to healthcare. Safety has long been a focus in other high-risk industries like nuclear power, aviation, and oil and gas. In all these work sectors, there are numerous safety risks that potentially impact the lives of workers and recipients of the service provided. In healthcare, it is critically important to focus on safety because the overarching goal of healthcare is the well-being of people, and safety is synonymous with well-being.

According to the IOM’s 1999 report, errors cause between 44,000 and 98,000 deaths every year in US hospitals and more than one million injuries (Molla S Donaldson et al., 2000). When the report was released, this statement sparked widespread interest and caused most healthcare personnel and sponsors, as well as many care recipients and the community at large, to examine safety in healthcare. The IOM declared an overarching goal to reduce errors by 50 percent in five years by adopting comprehensive approaches to improving patient safety.

Healthcare is a high-risk and error-prone industry. It is highly complicated and delivered in a fast-paced environment with multiple variables and personnel, creating the perfect setting for mistakes. Medical errors during the process of care can result in avoidable complications, disability, death, and increased costs (P. Pronovost et al., 2005). Every healthcare institution wants to consistently deliver high-quality, patient-
centered, and fiscally responsible healthcare; however, it is difficult to do so in a sustainable manner. The causes are multifactorial both at the national level and at individual hospitals and healthcare facilities. The situation is compounded by the fact that the healthcare delivery system is extremely complex, fragmented, and expensive despite advances in modern medicine and medical technology that make care more efficient. It has fallen short of all stakeholders’ expectations and industry standards for best patient outcomes. The IOM described the US healthcare system as fractured, prone to errors, and detrimental to patient safety. The organization defined patient safety as freedom from accidental injury and further stated that ensuring patient safety involves the establishment of operating systems and processes that maximize the likelihood of intercepting errors when they occur (Molla S Donaldson et al., 2000). Medical error happens when a planned sequence of mental or physical activities fails to achieve the intended outcome and when this failure cannot be attributed to some chance intervention or occurrence (J. Reason, 1998).

Numerous studies have shown that the US healthcare system is (albeit unintentionally) error prone and high risk for patients. Approximately 2.9 percent of individuals who enter a hospital are harmed by the medical care they receive (Stone, 2009). Patient safety incidents cost the Centers for Medicare & Medicaid Services (CMS) $8.8 billion each year and there were a staggering 238,337 potentially preventable deaths between 2004 and 2006 (HealthGrades, 2008). Hospital-acquired infections alone caused 48,000 deaths and $8.1 billion in care costs. (Eber, Laxminarayan, Perencevich, & Malani, 2010).
According to AHRQ, some of the common contributing causes of medical errors include communication issues during transitions of care, such as inadequate information flow between providers (medical personnel) and other healthcare staff; human behavior factors, such as failure to follow standard policies and procedures; patient- and family-related issues; staffing patterns; technology-related errors; inadequate knowledge and skills; and lack of accountability for safe and evidence-based practices.

In its 2001 report *Crossing the Quality Chasm: A New Health System for the 21st Century*, the IOM identified four components of establishing a high-quality health system: (1) developing the right vision, (2) designing clinical processes that are patient centric, (3) integrating organizations into systems, and (4) getting environmental factors such as regulations and financing right (Committee on Quality of Health Care in America, 2001). The IOM also identified six specific aims for improvement in healthcare, which most healthcare systems and facilities now include in their quality plans or strategic goals. These six aims are for healthcare to be the following:

1. Safe (avoiding injuries to patients from the care that is intended to help them)
2. Effective (providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit)
3. Patient-centered (providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions)
4. Timely (reducing waits and sometimes harmful delays for both those who receive and those who give care)

5. Efficient (avoiding waste, including waste of equipment, supplies, ideas, and energy)

6. Equitable (providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status)

Safety is the foremost aim, which has led to the movement to make patient safety a discipline in healthcare studies and research. There is not a single week where a conference, seminar, or workshop on patient safety is not being held somewhere in the US. The focused attention on and increased interest in improving patient safety is in fact a global trend, as evidenced by the formation of the World Health Organization’s Global Safety Action Campaign.

The National Patient Safety Foundation enunciated the goal of patient safety as “the avoidance, prevention, and amelioration of adverse outcomes or injuries stemming from the process of care” (Agrawal et al., 2009). Many would say the goal of patient safety is the elimination of all harm in healthcare.

Twenty years after the IOM issued its call to reduce medical harm by 50 percent, healthcare professionals and organizations have taken a number of actions to improve patient safety. There are numerous publications and research awards that demonstrate the impact of the IOM report on patient safety improvements. However, the extent to which these actions have truly improved the safety of patients and
decreased harm is debatable. The numbers do not speak to successful outcomes (88,000 deaths in 1999 and 440,000 in 2018). They only speak to the work that remains to be done before patients can be assured that healthcare is safe like other high-risk industries. Now more than ever, it is the time for the healthcare sector to assume individual and collective accountability for safer practices, responsibility for transparency, and authority for innovation, including learning from the success of other industries that have achieved higher rates of consumer safety (Stelfox, Palmisani, Scurlock, Orav, & Bates, 2006).

The evidence that would indicate patient care is safer today is not convincing. In fact, it is disturbing. According to the makers of the documentary To Err Is Human, the third-leading cause of death in the US is its own healthcare system. Medical mistakes lead to as many as 440,000 preventable deaths every year and harm millions more. They are responsible for one in every 10 deaths in the US. It is no wonder that medical errors are often considered a silent epidemic. Few individuals are speaking up, and these errors continue to take a toll on innocent lives as evidenced by the increasing and alarming rates of preventable harm.

The responsibility to report unsafe incidents in the workplace lies with all healthcare personnel, especially those who work directly with patients. Numerous studies on reporting behaviors by hospital staff show that despite the passage of the Patient Safety and Quality Improvement Act of 2005, physicians rarely report adverse events in 85 percent of US hospitals and nearly one in three cases of errors in healthcare go unreported (Van Cott, 2018).
The original intent of the IOM’s 1999 report was to improve the quality of healthcare in America. This objective could not be accomplished without addressing patient safety. The report defined patient safety as “freedom from injury,” and the responsibility for patient safety primarily lies with the organization and its structure, processes, and systems for delivering care and not as much with the individual providers and caregivers and their practices ((Kohn, Corrigan, & Donaldson, 2000). The IOM report offered guidelines and recommendations for safe care for healthcare institutions and staff. This four-part plan was designed to help the medical community create a safer healthcare system by integrating patient safety into the care delivery process to make individual practices predictably safe. The four parts were as follows:

- **Part 1: National Center for Patient Safety:** The IOM recommended the creation of the National Center for Patient Safety. Under the patronage of the Department of Health and Human Services, this center would establish national safety goals, track progress toward these goals, disseminate best practices for preventing patient harm, and promote research on patient safety.

- **Part 2: Mandatory and voluntary reporting systems:** To learn about and prevent future errors, the IOM recommended mandatory reporting with federal legislation protecting the confidentiality of non-sentinel events. Through this recommendation, the IOM sought to encourage more voluntary reporting of less serious patient safety incidents to discover and prevent errors.
• Part 3: Role of consumers, professionals, and regulatory agencies: The intent of this part was to unite all stakeholders, including patients, healthcare accrediting and licensing bodies, suppliers, and purchasers. As a result of this recommendation, the Joint Commission announced new standards on patient safety.

• Part 4: Building a culture of patient safety: While the first three parts were at the national level, this part applied to local hospitals and healthcare organizations. The IOM urged healthcare organizations to create systems and processes for making care delivery safer. Specifically, the IOM urged healthcare organizations to adopt practices that have been successful in decreasing harm in other high-risk industries, including the use of checklists and crew resource management. The IOM also emphasized the role of leadership and boards in addressing the culture of safety, transparency, reliability, and learning in the workplace to make hospitals and healthcare organizations safer for both patients and staff (Michael Richard Cohen, 1999; Molla Sloane Donaldson, 2008; Helmreich, 2000; Kohn et al., 2000; Stelfox et al., 2006; Wachter, 2004).

The IOM's report was the beginning of the modern-day patient safety movement. It inspired the passage of the Patient Safety and Quality Improvement Act of 2005, which provides federal protections in exchange for error disclosures and signifies the government’s commitment to a patient safety culture. The legislation fosters error disclosures using a systems-based approach, seeking to correct and
improve systemic sources of error by encouraging voluntary reporting of near-miss errors. Through this methodology, patient safety standards could constantly be evaluated, revised, and improved to maximize patient safety (Key, 2008; Levy et al., 2010). The recommended model for protected error reporting was through the establishment of federally designated Patient Safety Organizations (PSOs). There are hundreds of PSOs in the country, and some are dedicated to special disciplines and focused initiatives like pharmacy and anesthesiology. PSOs are the channel for external reporting, and adverse events reported through PSOs are considered privileged and protected from discoverability (Kohn et al., 2000). Patient safety incidents reported through PSOs are collected and analyzed, and the results are organized as generalizable strategies and disseminated to all PSOs to help improve patient safety. The data is managed by the National Patient Safety Database (NPSD). Both the PSOs and the NPSD are accountable to the Agency for Healthcare Research and Quality (AHRQ). PSOs help promote confidential external reporting using a structured format that is open to all healthcare staff (Liang, Riley, Rutherford, & Hamman, 2007).

In addition to PSOs, internal reporting systems used by healthcare facilities are an established way to collect similar data for the same purpose of decreasing patient harm and creating safer processes for care delivery. While the external reporting systems are noteworthy and backed by governmental funding, the facility-level reporting systems, also referred to as patient safety reporting systems (PSRS), are most significant to this study. PSRS tools have for several years served
as an important source for data related to patient safety performance improvement on a day-to-day basis.

This remainder of this chapter is divided into three main sections that discuss patient safety culture and error-reporting behavior; patient safety reporting systems and error-reporting behavior in hospitals; and the theory of planned behavior. The purpose of this study is to generate ideas for improving the culture of speaking up, which could engage healthcare professionals in learning from errors and ultimately help healthcare organizations achieve “zero harm.”

**Patient Safety Culture and Error-Reporting Behavior**

For the purposes of this study, the databases PUBMED, SCOPUS, and CINAHL were searched for research on patient safety using the following keywords in combination: patient, safety, culture, error reporting, adverse events, nursing, and healthcare staff. According to Reason, Uttal (1983), defined organizational culture as “shared values and beliefs that interact with an organization’s structure and control systems to produce behavioral norms” (J. Reason, 1998, p. 294). Since the publication of the 1999 IOM report, many hospitals have been grappling with how to improve patient safety. While many promising solutions have been offered and tested, creating and sustaining a culture of safety has been identified as a critical requirement. “In order to improve patient safety, organizational cultures are needed which enable learning to take place at every level, particularly learning which arises from occasions where errors occur or care could be improved” (Firth-Cozens, 2001, p. 26). There must be a culture of openness and transparency where management and
staff are equally accountable for elevating patient safety as a non-negotiable goal. Failure cannot be shamed, and errors cannot be considered a situation in which to cast blame. Instead, healthcare workers must be able to report mistakes routinely without fear of retribution and learning and high reliability must be rewarded and valued. Such a culture is what made air travel safer. The culture that will enable safer care is one that makes it safe to report errors and rewards the reporters. This culture holds everyone accountable for speaking up for patient safety.

In the words of Zohar, who pioneered much of the research on safety climate in organizations and industries, stated that “safety climate is a robust leading indicator of safety outcomes across industries and countries” (Zohar, 2010, p. 1). In that landmark paper, Zohar asserted that leadership is an antecedent of safety climate.

An interesting aspect of the culture of healthcare organizations is the concept of organizational silence and its role in patient safety. To create a safer health system, leaders must understand the socio-technical complexity in the industry and encourage employees to speak up about prevailing challenges to keeping patients safe. They must promote disruptive thinking, discourage conformity, challenge the status quo, and encourage employees to ask them the tough questions that help organizations move away from organizational silence and simple explanations. In addition, they must model this way of thinking and acting and not be afraid of upsetting the apple cart. Divergent thinking and a systems approach are necessary to address problems like patient safety that have yet to see appreciable improvements despite the awareness of the enormity of the problem (Henriksen & Dayton, 2006; Tucker &
Edmondson, 2003).

It is an undisputed fact that safety climate plays a critical role in safety outcomes regardless of the industry. Extensive research has shown that safety climate predicts safety-related outcomes; however, relatively few studies have conducted interventions that attempt to improve safety climate. Several studies have explored the connection between safety climate and various issues, including organizational trust, the role of leadership, the tenure of workers, generational differences in workers, and unionized and non-unionized workers. There is compelling evidence indicating the need for more studies on interventions that target improving safety climate in high-risk industries. Culture determines behavior, and as Schein (2010) stated, culture is shared values. Until and unless there is a shared common value and understanding of safety behavior, guidelines, protocols, and policies will not drive safe outcomes (Huang, Fallah, Sengupta, & Krishnan, 2010).

Most countries have goals regarding safety in high-risk industries. For example, in the United Kingdom, the Health and Safety Executive regulates industrial safety and as such recommends that organizations in high-risk industries measure their safety culture regularly and use the data to design, improve, and monitor safety consistently. In the US, the Occupational Safety and Health Administration (OSHA), the National Institute for Occupational Safety and Health (NIOSH), and the healthcare regulatory agencies recommend safety culture assessments and follow-up action plans to identify and mitigate safety concerns.
There has been much debate on the distinction between safety climate and safety culture. For the purposes of this study the two are indistinguishable. (Clarke, 2006; Flin, 2007; Guldenmund, 2000; Zohar, 2010). In healthcare, many hospitals conduct annual safety climate surveys and report the data to AHRQ. Numerous studies have examined these surveys and their impact on patient safety programs at the individual, regional, and national level (Beus et al., 2010; DeJoy, 1994; Nieva & Sorra, 2003; Sherman, 2009). For the purposes of this study, the objective that applies the most is the relationship between safety climate and safety behavior of caregivers.

A positive safety climate will contribute to decreased numbers of accidents higher motivation and safer behaviors by employees. The potential for employees to voluntarily report errors also is linked to the prevailing safety culture of the organization (Michael R Cohen, 2000; DeJoy, 1994; N. W. Ekayani, V; Rachmi, AT, 2017; L. L. Leape, 2002; Singer & Vogus, 2013; Weick, 1987).

Richter and co-investigators examined data from 515,637 respondents from 1,052 hospitals who completed the Hospital Survey on Patient Safety Culture to determine which organizational factors were perceived by frontline staff and managers to impact error reporting. The authors chose nine organizational factors as predictors of reporting on patient adverse events. They were organized in a conceptual model using the three domains of enabling, enacting, and elaborating. Under enabling, factors included management support, supervisor support, communication openness, non-punitive response to errors, and staffing levels. Under enacting, factors included teamwork within units and teamwork across units. Under
elaborating, factors included organizational learning and error feedback. The results of the analysis indicated that management support, teamwork across units, error feedback, and non-punitive response to errors were positively associated with a perceived high frequency of error reporting, whereas communication openness was negatively associated with a high frequency of error reporting. Surprisingly, when compared to other studies on culture of safety and incidence of error reporting, the study did not demonstrate a correlation between error reporting and non-punitive response to errors among the clinical group. What was strikingly notable was that error reporting by clinical staff was most influenced by error feedback, leaders who demonstrate safety is a priority, and an environment that inspires organizational learning. The recommendations for practice to increase error reporting were to encourage timely feedback to incident reports and create a culture of learning (Richter, McAlearney, & Pennell, 2015).

**Patient Safety Reporting Systems and Error-Reporting Behavior in Hospitals**

Safety reporting systems have been used effectively in non-healthcare industries. They help improve safety by identifying risks. A well-reported incident explains what happened. A deeper dive using the facts of the incident and some structured processes to collect more data from those involved in the incident, including eyewitnesses, provides details on how it happened. This is typically followed up by a root cause analysis to find out what could have been done to prevent the occurrence and what needs to be done to avoid errors in the future (Pronovost et
A significant national cohort study of 2,075 patient safety incidents from 23 intensive care units (ICUs) in the US from 2002 to 2004 used a web-based structured anonymous reporting system to understand the frequency and nature of error reporting and to determine the value of reporting for improving patient safety (J. H. Reason, E; Paries, J 2006). The median number of reports for each ICU per month was five, with the most common event types being medication/therapeutics incidents (42 percent) and incorrect or incomplete care delivery incidents (20 percent). Forty-eight percent of incidents related to lines, drains, and tubes. Among the contributing factors for safety incidents were deficiencies in training and education (49 percent) and issues with teamwork (32 percent). Forty-two percent of incidents had two or more contributing factors. The authors concluded that hospital ICUs need to improve training and teamwork to decrease the number and alignment of “Swiss cheese holes” in the causation of errors (J. H. Reason, E; Paries, J 2006). The study also validated the importance using data gleaned from patient safety reporting systems to identify and learn from mistakes in the hospital (P. J. Pronovost et al., 2006).

The history of adverse events in healthcare is not new. It has been studied and known for decades, but when the number of deaths due to mistakes in healthcare was compared to a jumbo jet crashing every day, it caught the attention of everyone and led to frantic efforts to address it. It is also undisputed that errors are often accidental and the practice of formally sharing mistakes is a voluntary, conscientious obligation that helps prevent future adverse occurrences. Despite this awareness and
acknowledgement of personal accountability, underreporting patient safety events is widely prevalent.

The prevailing voluntary reporting processes collect only a small proportion of adverse events (around 1–10 percent), which are not representative of all adverse events. According to a 2012 Office of Inspector General (OIG) report, Hospital Incident Reporting Systems Do Not Capture Most Patient Harm, hospital reporting systems aren’t doing their job. The OIG surveyed 189 hospitals regarding their use of incident reporting systems and learned that hospital staff did not report 86 percent of events, partly because staff often misinterpret what constitutes patient harm. This and similar reports about the gaps in patient safety incident reporting behavior are a sobering reminder about the actual state of patient harm during the care delivery process and the enormous accountability of healthcare leaders to urgently address this avoidable epidemic.

Several international reviews of patient records estimate that between 4 percent and 17 percent of hospital admissions are associated with an adverse event and one-third to two-thirds of all adverse events are preventable (Rafter et al., 2014). One such systematic global study of retrospective patient chart reviews done across the US, Australia, the United Kingdom, New Zealand, and Canada found a median overall incidence rate of adverse events of 9.2 percent, of which approximately 43 percent were preventable and more than half were related to operations (40 percent) or medication (15 percent). The authors concluded that one in every 10 patients is susceptible to being harmed during hospitalization and the saving factor is that a
considerable proportion of this harm is preventable. The authors also concluded that targeting preventive approaches and training of caregivers and clinicians on medication management and surgical procedures for patients could mitigate adverse events drastically (De Vries et al., 2008; Mayo, 2004).

A study on the pattern of communicating medical errors in the ICU using two different methods of data collection yielded some valuable findings (Elder et al., 2008). The study involved nurses working in four hospitals. Thirty-three nurses attended focus groups, and another 92 nurses completed surveys about reporting behavior. The nurses in the focus groups reported feeling conflicted on reporting errors and quoted time pressures and the absence of actual harm as reasons for underreporting adverse events. They also shared that they did not receive any feedback about the reported incidents. The nurses in the survey group, on the other hand, provided socially desirable answers regarding their reporting behavior, with the majority suggesting they always reported errors and always received feedback. The overall finding was that nurses were not inclined to report their peers and physicians and that they would rather report a witnessed error to their supervisor than put it in writing. It appeared that the nurses in this study were morally distressed about errors yet preferred not to report predominantly because of the lack of feedback from administration, making them conclude that reporting is futile. The study findings reiterated the role of hospital leadership in providing timely and consistent follow-up in order to promote learning.

Ten years after the 1999 IOM report was released, a study was undertaken to
determine evidence-based estimates of patient harm associated with hospital care (James, 2013). The researchers reviewed four studies done between 2008 and 2011 with a different methodology, namely a retrospective review of patients' medical records using the global trigger tool to identify and classify adverse events. They only examined adverse events that may have harmed the patient and excluded potential incidents that were detected before reaching the patient. The researchers found that 210,000 deaths were associated with preventable harm in hospitals. Taking into consideration the incomplete nature of medical records and the limitations of the global trigger tool, the actual number of avoidable harm incidents was determined to be more than 400,000 per year—a five-fold increase over the number of deaths related to medical errors in hospitals reported in the 1999 IOM report. This is indicative of the pandemic nature of patient harm across the globe and must be addressed with urgency. (Molla Sloane Donaldson, 2008)

In a study by (Espin, 2007) on the reporting preferences of perioperative nurses in Canada, 13 nurses participated in a qualitative study in which they were presented with four clinical error-based vignettes to initiate a discussion about errors. Out of a total of 52 possible theoretical errors, the nurses identified 30 and indicated they would formally report only eight and informally report another 10. One of the revealing findings of the study was that the participants were not likely to report errors that were beyond their scope of practice for fear of stepping on others’ toes. This indicates that nurses only report errors that are within the confines of their own professional practice. Research such as this suggests that speaking up to promote
patient safety should be an expectation of all healthcare workers, regardless of the department in which they work.

Okuyama and fellow investigators conducted a qualitative study to determine the relationship between incident reporting by nurses and safety management in hospitals. The researchers surveyed 528 participants from eight hospitals in rural Japan. They found that incidents were reported more frequently when the potential consequences were considered severe for the patient and less frequently when the potential consequences were considered mild for the patient (Okuyama, Sasaki, & Kanda, 2010). This finding corroborates the general observation among hospital managers that staff are more likely to report major adverse patient safety events than near-misses because they think there is no need to report when no harm was done. However, evidence indicates that a single severe incident is generally preceded by approximately 30 incidents with mild potential consequences for the patient. Several studies have shown that serious incidents and near-misses have common root causes. Therefore, it is logical to use data from near-misses to help avert more serious safety events that could cause harm to patients. In the case of potential harm incidents, the study participants indicated they did not report such errors due to lack of feedback from the managers who received the error reports. The employees reported feeling it was a waste of time because there was no feedback on the reports, much less an opportunity to learn from the analysis of the errors. This is illustrative of the predominant reason thought to discourage nurses from reporting patient safety incidents. (Tighe et al., 2006; Vincent, 2007).
By all counts patient safety advocates regard patient safety reporting systems as the foundation for improving patient safety. The IOM recommended that a nationwide mandatory reporting system should be established that provides for the collection of standardized information about adverse events that result in death or serious harm. The IOM further went on to advocate that voluntary reporting efforts should be encouraged. The Joint Commission soon thereafter required that all hospitals have and use a PSRS.

Today, most hospitals and healthcare facilities have an internal system for reporting and monitoring patient safety incidents. That said, the reporting systems may or may not be fully utilized. According to a 2012 study by the Department of Health and Human Services, almost 86 percent of reportable patient safety incidents go unreported. There are five commonly cited reasons why incident reporting has not reached its full potential. These include inadequate report processes, inadequate medical engagement, insufficient action taken on the incident, inadequate funding and institutional support, and failure to capture evolving health information technology developments. (D. R. Levinson & General, 2012)

In a pioneering study on the reporting behavior of physicians, Kaldjian and others surveyed 338 academic and resident physicians in the Midwest, Mid-Atlantic, and Northeast regions of the US to investigate reporting of medical errors that occurred and the potential to report near-misses. The survey also sought to determine the participants’ attitudes toward reporting errors. Most respondents agreed that adverse events should be reported, especially to improve the quality of care (84.3
percent) and indicated that they likely would report a hypothetical error resulting in minor (73 percent) or major (92 percent) harm to a patient. However, only 17.8 percent of respondents had reported an actual minor error (resulting in prolonged treatment or discomfort), and only 3.8 percent had reported an actual major error (resulting in disability or death). The study also found that 16.9 percent of respondents admitted to not reporting an actual minor error and 3.8 percent acknowledged not reporting an actual major error. It is important to note that error reporting is dependent on technical knowledge of the facility’s protocol for filling out an incident report. In this study, only 54.8 percent of respondents knew how to report errors and only 39.5 percent knew the types of reportable mistakes. Hypothetical clinical vignettes involving error-prone patient situations were used to determine the participants’ intent to report patient safety incidents. The responses to these vignettes were examined using multivariate analyses, and the results revealed that willingness to report was positively associated with believing that reporting improves the quality of care, knowing how to report errors, believing in forgiveness, and being a faculty physician. The authors concluded that while both groups of physicians indicated they would report hypothetical errors that had the potential to result in patient harm, very few reported errors. The results of this study validate observations of error-reporting behavior of physicians in most healthcare settings. Until and unless physicians and the rest of the healthcare workforce report all incidents, it will be difficult for the industry to learn from past mistakes and initiate system approaches to increase patient safety practices. The potential of patient safety reporting systems to solve specific
safety issues and improve the process of learning will remain unfulfilled. (Kaldjian, 2008)

A 2008 study evaluated the event reporting systems of more than 1,600 US hospitals using the following criteria: a supportive environment for reporting, reports received from a broad range of staff, timely dissemination of reports, and structured mechanisms to review reports. The authors concluded that according to these standards, most hospitals do not maintain effective event reporting systems. In addition to a lack of physician reporting, most hospitals did not have robust processes for analyzing and acting on aggregated event reports. Failure to receive feedback after reporting an event is a common barrier to event reporting for both physicians and allied health professionals (Farley et al., 2008) (Farley et al., 2008).

One study looked at reasons why physicians are not inclined to self-report patient safety incidents. The authors identified the following five self-perceived barriers to reporting: (Kaldjian, 2008)

1. No feedback on incident follow-up (57.7 percent)
2. Form was too long; lack of time (54.2 percent)
3. Incident seemed trivial (51.2 percent)
4. Unit was busy/forgot to report (47.3 percent)
5. Not sure who is responsible to make report (37.9 percent)

An international systematic review explored perceived barriers to reporting medication errors and near-misses by nurses. The source of the secondary data was 38 empirical studies published between 1981 and 2015 from countries across the globe,
including the US, the United Kingdom, the Middle East, China, Canada, Australia, New Zealand, Malta, Taiwan, Turkey, South Korea, and Israel. The reviewers and authors validated the criteria for inclusion and relevance to the objective of the study and assessed the methodological quality of the studies. The data extracted was assimilated and reported using thematic synthesis. The conclusions were consistent with other similar systematic reviews done in prior years. Common organizational barriers included organizational culture, characteristics of the patient safety reporting system, and management behavior. Personal and individual barriers included fear, accountability, demographics, and educational or experiential background of nurses. The authors recommended establishing a non-punitive, non-fear-based learning culture at both the unit and the organizational level. In addition, the authors concluded that robust, easy-to-use reporting systems, supportive management, effective training on reporting systems, error management, and feedback on reports are crucial to eliminating barriers to reporting medication errors by nurses (Vrbnjak et al., 2016).

Pfeiffer, Manser, and Wehner reviewed the findings of 19 global studies and found 196 mentions of barriers reported by 5,204 nurses, 2,208 physicians, and 424 other healthcare workers from multiple hospitals. Several of the barriers reported by the participants were related to personal attitudes and perceived behavioral control, two constructs in the theory of planned behavior. The authors identified a fear of blame and lack of time as common barriers to reporting. They noted that reporting behavior was influenced by individual attitudes, organizational factors, and patient
safety reporting system-related factors. These motivating or demotivating factors could be the framework for psychological theories on reporting behavior (Pfeiffer, Manser, & Wehner, 2010).

**Theory of Planned Behavior as the Theoretical Framework**

The theory of planned behavior (TPB) was proposed by Icek Ajzen in 1985 and has significantly contributed to the study of human psychosocial behavior as evidenced by the number of citations it has received and by the fact that it ranks as having the “highest scientific impact score among US and Canadian social psychologists” (Icek Ajzen, 2011, p. 1113). The model has been used for understanding and changing human behavior and organizational change. There were 3,386 peer-reviewed studies on the TPB based studies from 1975 to 2018 (Damico, 2014). The TPB is one of the most widely used approaches to research the predictive validity of constructs on health-promotive behaviors and intentions of individuals in the healthcare domain.

According to the TPB, human behavior is guided by three types of beliefs: behavioral beliefs, normative beliefs, and control beliefs (Icek Ajzen, 1991). Also referred to in the TBP model as attitudes, behavioral beliefs involve the perceived likely outcomes of the behavior in question and the evaluations of those outcomes. Normative beliefs involve the individual’s understanding of the expectations of others and the motivation to fulfill those expectations. Control beliefs involve the existence of influences that may support or impede the enactment of the behavior. To further elaborate on how intentions, lead to behavior, the theory postulates that behavioral
beliefs produce either positive or negative attitudes toward the behavior, normative beliefs cause one to experience social pressure, and control beliefs lead to perceived behavioral control. These three psychosocial constructs are the essential building blocks of behavioral intention. According to the literature on the TPB, the more favorable the attitude, the more positive the subjective norm, and the stronger the perceived behavioral control, the clearer will be the person’s intention to perform the behavior that is being contemplated. The goal of behavioral intention is to engage in the behavior, and in that sense, intention is believed to be the antecedent of behavior. The execution of the behavior is sometimes difficult; therefore, one could conclude that intention alone may not drive the behavior. The strength of volition also is a factor.

![Figure 1. The Theory of Planned Behavior](image)

Several published studies using the TPB involved patients or people needing to adopt healthy behaviors. Other studies focused on the behaviors of healthcare staff. Good healthcare relies on the optimal knowledge, great attitudes, superior skills, and
reliable performance of caregivers, clinicians, and providers. In other words, the healthcare professional’s behavior is critical to ensuring safe and effective care for patients. Individual decisions drive behavior, so to improve caregiver behavior, it is imperative to understand the cognitive mechanisms underlying adult human behavior.

(Gaston Godin, Bélanger-Gravel, Eccles, & Grimshaw, 2008) conducted a systematic survey of studies on factors influencing behavior among healthcare professionals. The authors sought to find out which theory or theoretical construct was most relevant for the study of healthcare professionals’ behaviors. The authors included studies that aimed to predict healthcare professionals’ intentions and behaviors specifically using socio-cognitive theories. Seventy-two of the 78 studies that met the criteria for inclusion provided information on the determinants of intention, and 16 prospective studies provided evidence on the causes of behavior.

The theories most often used in the studies were the theory of reasoned action (TRA) and the TPB. Only one study used the social cognitive theory (SCT), and another one used the operant learning theory (OLT). An overall frequency-weighted mean $R^2$ of 0.31 was observed for the prediction of behavior and 0.59 for the prediction of intention. Several moderators influenced the efficacy of prediction; the frequency-weighted mean $R^2$ varied from 0.001 to 0.58 for behavior and 0.19 to 0.81 for intention. The overall results of the analysis implied that the TPB was an appropriate theory to predict behavior while other theories were better at forecasting the dynamics of intention. The authors investigated clinical-related behaviors of physicians, nurses, pharmacists, psychologists, and other healthcare professionals. Specific behaviors
were researched for the different professional groups; for example, for physicians the authors focused on behaviors involving prescribing, diagnostic workups, patient referrals, compliance with hospital guidelines, and adherence to infection prevention practices. For nurses (significant for this study), the specific clinical behaviors that were measured involved providing nursing care, pain management, compliance with policies and procedures, support of workforce, and documentation. The common clinical behaviors included adherence with recommended practices and patient education/counseling.

The authors found that the prediction of behavior and intention was significantly better when sample sizes were larger (equal to or greater than 150 participants). When the purpose of the study was to predict intention, the most useful theories were TRA/TPB, the technology acceptance model (TAM), the theory of interpersonal behavior (TIB), the OLT, and the attitude, social, and self-efficacy (ASE) model. The TIB was the best predictor model ($Z = 12.461, p < 0.0001; Z = 11.287, p < 0.0001; and Z = 12.389, p < 0.0001$ for the comparison with TPB/TRA, TAM, and the other theories, respectively). The variables that most often predicted behavior were intention and beliefs about capabilities, known as perceived behavioral control in the TPB. The variables that most likely predicted intentions of behavior included beliefs about capabilities; beliefs about consequences; moral norms; social influences; and role and identity.

There were a few limitations of this study. There were very few studies that predicted behavior. Most were able to help understand intention, but not enough of
these were focused on understanding healthcare behaviors. In addition, the study did not control for the number of variables that could have influenced the relative performance of some theories. Finally, this study was the first to systematically investigate the application of socio-cognitive theories for researching clinical behavior and intentions of healthcare employees, and it involved only 16 studies. Additional research would help identify strategic approaches to change healthcare behaviors (Gaston Godin et al., 2008).

In a study on situational factors affecting the weighting of predictor components in the Fishbein model which shows the relationship between attitude and behavior, the researcher used a variation of the Ajzen and Fishbein method to investigate potential limitations of the model. The author found that certain situational factors could alter the nature of the model significantly. The hypothesized association between attitude and behavior appears to be dependent on prior experience with the behavior, while the association between norms and behavior seems to be dependent on consistency between personal motivation and perceived social expectations (Songer-Nocks, 1976).

In his doctoral dissertation on attitudinal versus normative messages, Ajzen predicted that the attitudinal message would change behavior more effectively in a competitive situation while the normative message would be more effective in a cooperative situation. (I Ajzen, 1971). The results of the study supported this hypothesis. This is relevant to this study for practice recommendations. If the goal is to improve reporting behavior through healthy competition among nurses, addressing
attitudes would facilitate the best outcomes. However, when it comes to persuading nurses to report in a cooperative manner, a normative style of persuasion is better.

(Hoffmann et al., 2008b) studied the use of a web-based anonymous incident reporting system in German-speaking countries. The system allowed reports to be fed into a database, classified, and analyzed by an expert team. Some reports were published in journals and on the internet, allowing individuals to review and comment on the reports and learn from the incidents. This reporting system was the first of its kind, and within 17 months, it received 199 reports, 188 of which were classified as errors. Of these, 72.9 percent were classified as process errors and 26 percent were classified as knowledge/skill errors. The main process errors were treatment errors (32.2 percent), communication errors (12.6 percent), and investigation errors (8.5 percent). Of the reports classified as errors, 41.5 percent resulted in patient harm. The authors concluded that the system functioned well and had a growing number of users. The study demonstrated the value of a voluntary, technology-based reporting system that promotes fearless adoption.

A study to determine the impact of attitude, subjective norms, and perceived behavioral control (PBC) on the intention to report patient safety and determine the relationship between PBC and nurses’ behavior in reporting adverse events was conducted in a hospital in Indonesia in 2016. The study took a cross-sectional approach and collected data by surveying 82 nurses. The results were analyzed using multiple linear regression and Spearman correlation. The results of the study suggested that attitude and PBC influenced the intention to report while subjective
norms did not. Interestingly, when it came to actual reporting behavior, attitudes and PBC did not have a significant impact. The authors recommended replicating the study with other healthcare professionals and improving the culture of reporting. (N. W. Ekayani, V; Rachmi, AT, 2017)

Another study by Gavaza and others explored the utility of the TPB model to predict pharmacists’ intention to report serious adverse drug events to the Food and Drug Administration. The authors developed a mail-in questionnaire around the constructs of the TPB to assess pharmacists’ intent to report adverse events. A total of 1,500 surveys were mailed, and the response rate was 26.4 percent. (Gavaza et al., 2011)

The TPB has been applied widely in health-related studies. (Lu et al., 2010) used this model to explore the determinants of precautionary behavior to avoid food containing dairy products in Taiwanese college students. Leandro applied this model to forecast the behavior of speed selection in a sample of young drivers in Costa Rica. (Leandro, 2012). (Wakefield, McLaws, Whitby, & Patton, 2010) applied the TPB to understand factors that guide patient safety behaviors by nurses, physicians, and other healthcare employees at a healthcare facility in Australia. (Hamilton, Daniels, White, Murray, & Walsh, 2011) investigated the applicability of the TPB in assessing the factors impacting the intentions and behaviors of mothers when introducing complementary feeding to their infants (Javadi, Kadkhodaee, Yaghoubi, Maroufi, & Shams, 2013).
(Tenkasi & Zhang, 2018) had a unique methodological approach to TPB while studying the factors that influence consumers' preference for purchasing low-carbon products (LCPs) instead of medium-carbon products (MCPs) or high-carbon product (HCPs) in China. The authors categorized subjective norms into two distinct types, subjective injunctive norms and subjective declarative norms. They conducted a survey as well as a behavioral experiment to observe the actual buying behavior of the study's 873 participants, who had to choose between an LCP and an HCP. The products were labeled so the participants would be able to differentiate the products. The theoretical model was constructed to show the interrelations between the important variables and identify the path chosen by the consumer. There were two sets of hypotheses, one to test the direct effect of attitude, subjective norms, and perceived behavioral control, and the other to test the mediating role of intention in impacting the influence of subjective norms, attitude, and perceived behavioral control on actual behavior. The preliminary findings of the study showed strong evidence that the elements of the TPB except injunctive norms are correlated and explain the variability in the buying behavior of the participants favoring LCPs over MCPs and HCPs. The implications for practice from this study are promising and demonstrate the value of the TPB for behavior change. The findings indicated that this model can be used to understand and implement change management processes. They also revealed a critical use for practice in any change management efforts. According to the authors, when change is being planned, "more activities that are directed toward assessing and influencing whether actors have internalized,
personalized, and contextualized the change message, the more likely that they will develop a positive attitude toward the change” (Tenkasi & Zhang, 2018, p. 149). This is an important consideration in the journey to transform caregiver practices and improve patient safety through error reporting.

Smith explored the relationship between nurse educators’ characteristics, attitude, subjective norms, and perceived behavioral control and their intention to use and actual use of evidence-based critical thinking (EBCT) instructional strategies using a structural equation model with Analysis of Moment Structures. The study involved 244 nurse educators. The analysis that was repeated with a second hypothesized model (the original model did not show a good fit) revealed that the educators’ personal characteristics did not have a significant impact on their decision to use EBCT teaching strategies. Their attitude toward the use of EBCT had a significant direct effect on their intention to use EBCT. Interestingly, their perception of their individual control on whether to use EBCT was not an important determinant of their intention to use or actual use of EBCT. Subjective norms were only weakly significant, perhaps signifying that peer influence did not impact their choice of teaching strategy. The author concluded that nurse educators are likely to adopt EBCT if they are offered a critical thinking instruction course to strengthen their own attitudes positively toward the use of such methods while teaching nursing students (Smith, 2015)

**Conclusion: Why Nurses Should Report Errors**

Nursing is one of the most stressful and risk-prone professions. The ever-
increasing complexity of care management demands to adjust care to meet the individual needs of patients, and multitude of care coordination concerns happening in a shorter length of stay increase the likelihood that errors will occur. The expectation that care will always be high quality, safe, and patient centric places a heavy burden on nurses, leaving no room for failure ((Johnstone & Kanitsaki, 2006; Mulcahy & Rosenthal, 1999). The “do no harm” principle of healthcare only complicates the situation. In such an environment, it is no surprise that nurses are expected to manage the unexpected safely, efficiently, and effectively although such situations may lead to accidental mistakes. These mistakes are not the result of incompetence or maleficence but system issues that leave nurses, physicians, and other healthcare staff vulnerable (Johnstone & Kanitsaki, 2006; Leape et al., 1998; Wu, 2000). In this era of innovative practices and advances in safety science, the healthcare industry should be able to think about error prevention and management in new ways so healthcare professionals are assured of safer health systems that make caregiving a joyful process. In addition, leadership has to create and sustain a culture that sees mistakes as learning opportunities and give staff permission to fail and use errors to improve safety (Nembhard & Edmondson, 2006; Nieva & Sorra, 2003; Stelfox et al., 2006). If true progress is to be made, it is important to design patient safety systems and processes with input from frontline staff for the sole purpose of continuous learning, not accountability (Bagian et al., 2001).
Chapter 3: Research Methods

Overview

The purpose of this chapter is to present the research methodology of this non-experimental, correlational study on what motivates or demotivates nurses to report patient harm and what factors impact the patient safety grade they give their work area/unit. The chapter first discussed the problem statement. It then lists the research questions and hypotheses. This is followed by a discussion on the research design, including the population and study participants; sample, sampling, and selection of participants; instrumentation; and variables. The chapter then addresses data collection and data management before concluding with a brief summary.

Problem Statement

The practice of voluntary reporting of patient safety incidents by nurses is alarmingly low despite the fact that nurses understand the importance of such reporting (Classen et al., 2011; Michael R Cohen, 2000; Molla S Donaldson et al., 2000; Espin, 2007; Hoffmann et al., 2008a; Kaldjian, 2008; Kohn et al., 2000; Tighe et al., 2006; Wachter, 2004; WHO, 2004). Frontline staff like nurses are the first to notice avoidable errors in healthcare environments, and reporting those errors helps medical professionals and the healthcare industry learn about their causation and how to avoid them in the future. When errors are not reported, the opportunity to prevent them from happening again is often lost.
Research Questions and Hypotheses

The purpose of the study was to answer the research questions and test the hypotheses presented below:

- **Research Question 1 (RQ 1):** Do (a) attitude toward reporting safety events (ATT), (b) injunctive norms about patient safety (IN), (c) declarative norms about patient safety (DN), (d) perceived behavioral control about patient safety (PBC), and (e) perception of psychological safety (PPS) predict patient safety incident reporting behavior by nurses?
  - **Hypothesis 1a:** ATT, IN, DN, PBC, and PPS are a significant predictor of patient safety incident reporting behavior by nurses.

- **Research Question 2 (RQ 2):** Does perception of psychological safety (PPS) mediate the effect of attitude (ATT), injunctive norms (IN), declarative norms (DN), and perceived behavioral control (PBC) on patient safety incident reporting behavior by nurses?
  - **Hypothesis 2a:** PPS significantly mediates the effect of ATT, IN, DN, and PBC on patient safety incident reporting behavior by nurses.

- **Research Question 3 (RQ 3):** Do (a) attitude toward reporting safety events (ATT), (b) injunctive norms about patient safety (IN), (c) declarative norms about patient safety (DN), (d) perceived behavioral control about patient safety (PBC), and (e) perceived psychological safety (PPS) predict nurses’ overall patient safety grade (PSG) for their work area/unit?
  - **Hypothesis 3a:** Favorable ATT, IN, DN, PBC, and PPS are a
significant predictor of nurse’s assigning an overall patient safety grade for their work area/unit.

- **Research Question 4 (RQ 4):** Does perceived psychological safety (PPS) mediate the effect of attitude (ATT), injunctive norms (IN), declarative norms (DN), and perceived behavioral control (PBC) on nurse’s assignment of patient safety grade for their work area/unit?
  - **Hypothesis 4a:** PPS significantly mediates the effect of ATT, IN, DN, and PBC on nurses’ overall patient safety grade for their work area/unit.

**Research Design**

The purpose of a research design is to provide answers to the research questions and control variance (Kerlinger, 2000). It is the blueprint that gives direction to the study, helping identify what to look for, how to determine the relationship between variables, what data collection methods to use, and what statistical procedures to use to conduct the analysis. A non-experimental correlational method was chosen to explore the relationship between nurses’ attitude toward patient safety, injunctive and declarative norms about patient safety, perceived control over patient safety, perception of psychological safety, and their reporting of patient safety incidents as well as their assigning of a patient safety grade for their work area/unit. A cross-sectional design was considered appropriate because the data was collected at a point in time from AHRQ’s Hospital Survey on Patient Safety Culture™ (HSOPS) administered in 2017.
Population and Study Participants

The population of interest for this study was registered professional nurses (nurses) in the US. Nurses are the most likely frontline staff to witness or experience unintentional errors at the patient’s bedside (Buckley et al., 1997; Elder et al., 2008; Kingston, 2004). As a professional group of healthcare employees, nurses provide direct care to patients 24 hours a day, seven days a week, 365 days a year. According to the Bureau of Labor Statistics (2016), there were 3.15 million nurses in the US in 2016, with 2.06 M working in hospitals (65.4 percent), followed by 222,433 working in nursing home facilities. In terms of demographics, 89.3 percent of the nurses were women and 76.3 percent were white/Caucasian, followed by 10.8 percent black/African American and 9.3 percent Asian.

The study participants were hospital-based nurses in Indiana. According to the Indiana Center for Nursing (2017), 110,651 nurses were licensed to practice as registered nurses in Indiana in 2017. Sixty-three percent (or 69,685 nurses) self-reported actively practicing in nursing and had a license address in Indiana. Of these, 58.8 percent worked in hospitals. Critical care/intensive care was the leading nurse practice specialty (19.2 percent), followed by medical-surgical nursing (11.4 percent). The practice specialties of the participants in this study showed a similar pattern. This will be discussed further in Chapter 4.
Sample, Sampling, and Selection of Participants

The sample was drawn from the population of all nurses in Indiana who were actively working on a full- or part-time basis as licensed registered nurses in hospitals. Additional inclusion criteria included the following:

- Fluency in English
- Employment as a nurse in an acute care hospital in adult medical and surgical units, emergency departments, all intensive care units, and women’s and children’s units. According to the Center for Medicare and Medicaid Services (CMS) an acute care hospital is defined as a hospital that provides inpatient medical care and other related services for surgery, acute medical conditions or injuries, usually for a short-term illness or condition.
- Participation in the 2017 HSOPSC. Nurses who submitted incomplete surveys were excluded from the study.

An adequate sample size is important for a quantitative study. In order to accomplish this, this study used a single-stage, purposive sampling technique to obtain as many participants who met the criteria for inclusion as possible. The sampling method can be considered “purposive” because it was obtained from one source, the Indiana Hospital Association (IHA). According to Fowler, the sample size depends on the analysis plan for the study. (Fowler Jr & Cosenza, 2009).

A two tailed sample size for power of 0.80 / effect size, for group statistics was done and the sample size for the study was considered adequate to test the
hypotheses. The power test done for this study sample determination is shown in Appendix M.

Research shows that the use of secondary data is an acceptable practice. According to (Fielding, Gilbert, & Gilbert, 2006, p. 98), “Secondary analysis is a well-established practice in quantitative social research. Re-analysis of key data sets informs many academic debates, much policy analysis, and, though largely unpublished, the business decisions of many companies”

The HSOPS tool was developed by Westat, a research group contracted by AHRQ (Nieva & Sorra, 2003). It is useful for research purposes and quality improvement programs, mostly at the hospital level. The survey was designed to help hospitals assess their culture of safety by obtaining the opinions of their staff. It is likely to get the best results when completed by staff who have direct contact with patients, like nurses who work at the bedside. This was a supporting factor when selecting nurses as the population for this study. The survey consists of 42 questions grouped into 12 composite measures. All survey items are on a five-point Likert-type agreement scale ranging from “Strongly disagree” to “Strongly agree” or a five-point frequency scale ranging from “Never” to “Always.” The survey also includes two single-item measures, patient safety grade and number of events reported, which were applied as the dependent variables in this study. Eight of the 12 subcategories include both negatively and positively worded questions.

To determine the internal consistency reliability of the HSOPS tool, Sorra and Dyer analyzed survey data from 331 hospitals and 50,513 individual respondents. The
only subcategory that did not meet the commonly accepted reliability statistic of .70 was perceptions of staffing. The Cronbach’s alpha ranged from .62 to .85. (Sorra, 2010)

The Veterans Health Administration Patient Safety Questionnaire and the Medical Event Reporting System for Transfusion Medicine were applied in the development of the HSOPSC. Before the tool was developed, its validity was established through a thorough review of the literature on healthcare- and non-healthcare-related safety culture and safety climates. (Nieva & Sorra, 2003) Face validity was confirmed through cognitive testing, a review of industry experts, and pilot testing of 1,437 healthcare workers. Construct validity was determined by confirmatory factor analysis and fit testing. The subscales were tested with intercorrelations. It was found to be between 0.23 and 0.66, signifying that the scales measured the construct. The results of the pilot to determine construct validity were consistent with the literature in that individuals who reported the greatest number of events responded more positively in the areas of openness of communication and feedback on error reporting (Nieva & Sorra, 2003).

A copy of the HSOPS survey can be found in Appendix O.

**Instrumentation**

This study uses the theory of planned behavior (TPB) as the model to explore psychosocial factors that predict patient safety-related behaviors among nurses. The TPB has been used to predict and understand behaviors across a wide range of populations, particularly in the healthcare arena (Icek Ajzen, 1985; Armitage &
Conner, 2001; Damico, 2014; N. P. Ekayani et al., 2017; Fogarty & Shaw, 2010; Gavaza et al., 2011; Javadi, Kadkhodaee, Yaghoubi, Maroufi, & Shams, 2013; Lapkin, Levett-Jones, & Gilligan, 2015; Smith, 2015; Tenkasi & Zhang, 2018). The studies referenced here demonstrated the efficacy of the theory to predict the behavior of interest.

According to the theory, human behavior is guided by three kinds of considerations: beliefs about the likely consequences of the behavior (behavioral beliefs), beliefs about the normative expectations of others (normative beliefs), and beliefs about the presence of factors that may facilitate or impede performance of the behavior (control beliefs). In their respective aggregates, behavioral beliefs produce a favorable or unfavorable attitude toward the behavior; normative beliefs result in perceived social pressure or subjective norm; and control beliefs give rise to perceived behavioral control or self-efficacy. (Icek Ajzen, 2006)

The TPB with its original constructs is shown in Figure 2. For the purposes of this study, the model was extended to include additional variables. The modified TPB model is shown in Figures 3 and 4.
Figure 2. The Theory of Planned Behavior
EXTENDED THEORY OF PLANNED BEHAVIOR

Figure 3. Extended Theory of Planned Behavior (Study Model 1)

EXTENDED THEORY OF PLANNED BEHAVIOR

Figure 4. Extended Theory of Planned Behavior (Study Model 2)
Figure 3 and 4 extends the TPB by separating out the subjective norms into injunctive norms and declarative norms and adding perception of psychological safety. Study Model 3 and 4 uses the same variables but illustrates how perception of psychological safety mediates the effect of attitude, injunctive norms, declarative norms, and perceived behavioral control on nurses’ patient safety incident reporting behavior and patient safety grade for their work area/unit. Considering these revisions, these models are referred to as the ‘extended theory of planned behavior’ (ETPB).

In order to develop the ETPB construct for this study, specific questions from the HSOPS that could align with the model were isolated. The research committee chair, and the researcher determined this resulted in content validity. Out of a total of 42 items, 31 were selected and applied to two dependent variables and five independent variables. One independent variable was also transformed into a mediating variable for the purpose of testing two of the hypotheses. In order to ensure reliability and validity of the survey items drawn for the TPB construct, an internal consistency analysis using Cronbach’s alpha and exploratory factor analysis were conducted. This helped further determine the internal validity of the patient safety culture scales on the TPB construct. The model demonstrating the best fit to test the hypotheses consisted of 29 items for five constructs (variables) and is shown in Appendix Q (ETPB Tool). The ETPB was used for the study’s analysis. Figures 5a and 5b lists the HSOPS survey questions for the two ETPB models.
Figure 5a. Extended Theory of Planned Behavior (Model 1) HSOPSC Questions

- **Attitude Toward Patient Safety Reporting** (3 items)
- **Injunctive Norms** (9 items)
- **Declarative Norms** (13 items)
- **Perceived Behavioral Control** (1 item)
- **Psychological Safety** (3 items)

*Items are numbered as in the HSOPSC.*
- Attitude: D1,2,3
- Declarative Norms: A1, 3, 4, 11,13, B1, 2, C1, 2, 3, 4, 5,6
- Injunctive Norms: A2, 15, 18, F8, A10, A17, A7, A14, F9
- Psychological Safety: A8, 12, 16
- Perceived Behavioral Control: F1
- Reporting Behavior: G (Outcome Variable)
- Safety grade assigned: E (Outcome variable)

- **Outcome Variable 1**
- **Reporting Behavior** (1 item)
- **Outcome Variable 2**
- **Safety Grade Assigned** (1 item)
Figure 5b. Extended Theory of Planned Behavior (Model 2) HSOPSC Questions
Variables

The published guidelines for direct measurement of independent variables in studies grounded in the TPB could not be applied in this study because the research design involved the use of secondary data and the ETPB constructs had to be created using the survey questions. There are no published studies using the HSOPS or any other existing survey to develop the TPB construct. The scales were carefully reviewed and delineated to formulate the TPB constructs for this study. Five independent variables were identified.

Perception of psychological safety was a new addition to the traditional construct of the model for the TPB. This addition was made based on the findings of the literature review. Frequently cited reasons for underreporting of errors among nurses and other healthcare personnel in the research included fear of retribution, disciplinary action, blame and shame, and disrepute. (Page, 2004). The research also established absence of trust and lack of psychological safety as significant contributors to not speaking up about errors (D. R. Levinson, & General, I. , 2010; P. J. Pronovost et al., 2003; Stelfox et al., 2006; Tucker, Singer, Hayes, & Falwell, 2008; Walker & Lowe, 1998). Consequently, perception of psychological safety was added as an independent variable and a mediating variable to the model. There are no published TPB studies using perception of psychological safety as an independent or mediating variable.

The questions that were applied to create the independent variables were ordinal measures with responses on a Likert agreement scale ranging from “Strongly
disagree” to “Strongly agree” or a frequency scale ranging from “Never” to “Always.” Two dependent variables, reporting patient safety incident (PSI) and assigning patient safety grade (PSG), were determined to be the behaviors of interest and dependent variables for hypothesis testing. PSI was treated as a dichotomous variable by converting the responses to categories as “Yes - reported errors” or “No - zero errors reported.” For the PSG dependent variable, respondents had to rate their work area/unit on a five-point Likert scale ranging from “Excellent” to “Failing.” Both predictor and outcome variables were defined and operationalized as shown in Table 1- “TPB Constructs, Definitions, Study Variables, and Operational Definitions”
<table>
<thead>
<tr>
<th>TPB Construct</th>
<th>Definition</th>
<th>Study Variable</th>
<th>Operational Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>Favorable or unfavorable evaluation of the behavior in question (Icek Ajzen, 2006)</td>
<td>Attitude toward patient safety (ATT)</td>
<td>Attitude toward patient safety refers to the way the nurse thinks or feels about reporting mistakes. This is reflected in how often the nurse reports when a mistake is made and no harm to the patient was involved.</td>
</tr>
<tr>
<td>Subjective Declarative Norms</td>
<td>Social pressures to perform or not perform a behavior. Declarative norms represent the opinions and attitudes of society and institutions toward some behavior (Tenkasi &amp; Zhang, 2018).</td>
<td>Declarative norm toward patient safety (DN)</td>
<td>Subjective declarative norms involve how the nurse identifies with others in the work environment and the desirable patient safety behaviors within the workgroup. In this case the behavior of interest is activities that support and promote patient safety.</td>
</tr>
<tr>
<td>Subjective Injunctive Norms</td>
<td>Social pressures to perform or not perform a behavior. Injunctive norms represent personal opinions and attitudes of familiarity, internalization, and personalization of the declarative norms (Tenkasi &amp; Zhang, 2018).</td>
<td>Injunctive norm toward patient safety (IN)</td>
<td>Subjective injunctive norms involve the nurse’s personal opinions, beliefs, and attitudes about the work and work environment that are internalized and could influence the behavior of interest. In this case the behavior of interest is activities that support and promote patient safety.</td>
</tr>
<tr>
<td>Perceived Behavioral Control</td>
<td>Perception of the ease or difficulty of performing the behavior of interest (Icek Ajzen, 2006)</td>
<td>Perceived behavioral control (PBC)</td>
<td>Perceived behavioral control refers to the environment in which the nurse is working and how open and supportive that environment is to individual patient safety practices.</td>
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<tr>
<td>----------------------------</td>
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<tr>
<td>Perception of Psychological Safety</td>
<td>Psychological safety is a climate in which people feel free to express relevant thoughts and feelings and believe it is safe to take interpersonal risks. It is explicitly created by the actions and behaviors of the leaders (Amy C Edmondson, 2012)</td>
<td>Perception of psychological safety (PPS)</td>
<td>Perception of psychological safety refers to knowing that reporting of errors will not negatively affect the employee or the employee-employer relationship.</td>
</tr>
<tr>
<td>Behavior</td>
<td>The manifest, observable response in a given situation with respect to a given target. (Icek Ajzen, 2006)</td>
<td>Patient safety event reporting behavior (PSR)</td>
<td>For this study, patient safety reporting behavior refers to whether or not the nurse reported an adverse event in the previous 12 months.</td>
</tr>
<tr>
<td>Behavior</td>
<td>The manifest, observable response in a given situation with respect to a given target. (Icek Ajzen, 2006)</td>
<td>Assigning patient safety grade (PSG)</td>
<td>Assigning patient safety grade refers to whether a nurse assigned an overall grade on patient safety for the work area/unit based on individual perception of patient safety culture.</td>
</tr>
</tbody>
</table>
Attitude Toward Patient Safety (Independent Variable)

For this study, attitude toward patient safety refers to the way the nurse thinks or feels about patient safety. This is reflected in how often the nurse reports when a mistake is made and no harm to the patient was involved.

Items selected for this variable include the following:

- When a mistake is made but caught and corrected before affecting the patient, how often is this reported?
- When a mistake is made but has no potential to harm the patient, how often is this reported?
- When a mistake is made that could harm the patient but does not, how often is this reported?

Subjective Norms

For this study, subjective norms were categorized as subjective declarative norms and subjective injunctive norms. Tenkasi and Zhang (2018) assert that subjective norms are not to be considered as a unitary construct but instead characterized and operationalized as subjective declarative norms and subjective injunctive norms.

Subjective Declarative Norms (Independent Variable)

According to (Tenkasi & Zhang, 2018), declarative norms represent the opinions and attitudes of society and institutions toward some behavior. This description has significant relevance when it comes to evaluating factors influencing
the target behavior in this study. For this study, subjective declarative norms involve
how the nurse identifies with others in the work environment and the desirable patient
safety behaviors within the workgroup, which consists of peers and supervisors.

Items selected for this variable include the following:

- People support one another on this unit.
- When a lot of work needs to be done quickly, we work together as a team
to get the work done.
- In this unit, people treat each other with respect.
- When one area in this unit gets busy, others help out.
- After we make changes to improve patient safety, we evaluate their
effectiveness.
- My supervisor/manager says a good word when he/she sees a job done
according to established patient safety procedures.
- My supervisor/manager seriously considers staff suggestions for
improving patient safety.
- We are given feedback about changes put into place based on event
reports.
- Staff will freely speak up if they see something that may negatively affect
patient care.
- We are informed about errors that happen in this unit.
- Staff feel free to question the decisions or actions of those with more
authority.
• In this unit, we discuss ways to prevent errors from happening again.

• Staff are not afraid to ask questions when something does not seem right (C6 recoded).

Subjective Injunctive Norms (Independent Variable)

According to (Tenkasi & Zhang, 2018, p. 132), injunctive norms “represent personal opinions and attitudes of familiarity, internalization, and personalization of the declarative norms.” In other words, declarative norms could be the forerunner of injunctive norms when it comes to the behavior in question. For this study, subjective injunctive norms involve the nurse’s personal opinions, beliefs, and attitudes about the work and work environment that are internalized and could influence enactment of the behavior.

Items selected for this variable include the following:

• We have enough staff to handle the workload.

• Patient safety is never sacrificed to get more work done.

• Our procedures and systems are good at preventing errors from happening.

• The actions of hospital management show that patient safety is a top priority.

• It is not by chance that more serious mistakes don’t happen around here (A10 recoded).

• We do not have patient safety problems in this unit (A17 recoded).

• We do not use more agency/temporary staff than is best for patient care (A7 recoded).
• We do not work in “crisis mode,” trying to do too much, too quickly (A14 recoded).

• Hospital management seems interested in, patient safety all the time, even when adverse events are not happening (F9 recoded).

Perceived Behavioral Control (Independent Variable)

For this study, perceived behavioral control refers to the environment in which the nurse is working and how open and supportive that environment is to individual patient safety practices. (Icek Ajzen, 2006) asserts that while constructing the questionnaire for this metric, a list of accessible factors that may facilitate or impede performance of the behavior can be considered to come up with indirect control belief factors. Although single-item variables are not used in the development of questionnaires for TPB studies, it is reasoned that good single-item measures could be substituted for multiple-item constructs with no negative impact on the results, especially if the measure is a practical behavior-based scale and not an abstract one (Bergkvist & Rossiter, 2007). For the purpose of this study, a single-factor variable that referred to the nurse’s perception of the ease or difficulty of performing the behavior of interest. Admittedly, the use of a single-item construct as a theoretical concept may not yield an accurate, comprehensive, and reliable measurement of the given construct of interest. However, this item was chosen as it met the intent for the measure despite being a single-factor variable.
The item selected for this variable was the following:

- Hospital management provides a work climate that promotes patient safety.

**Perception of Psychological Safety (Independent and Mediating Variable)**

Perception of psychological safety refers to the nurse’s willingness to take a risk without fear of retribution. According to Edmondson, psychological safety is a climate in which people feel free to express relevant thoughts and feelings and believe it is safe to take interpersonal risks. It is explicitly created by the actions and behaviors of the leaders. (Amy C Edmondson, 2012). For this study, perception of psychological safety refers to knowing that reporting errors will not negatively affect the employee or the employee-employer relationship. This variable was explicitly added because healthcare employees often hesitate to report errors due to a fear of retribution and punitive response from supervisors. Previous studies on barriers to error reporting have identified blame and reprisal as common causes of failure to report (Molla S Donaldson et al., 2000; Amy C Edmondson, 2004; Howard et al., 2010; L. L. Leape, 2002; L. L. J. Leape, 2002). Although (Icek Ajzen, 2011, p. 1119) noted that “additional predictors should be proposed and added with caution, and only after careful deliberation and empirical exploration” this variable was added based on the empirical findings by Edmondson that psychological safety was a significant determinant of healthcare workers tendency to speak up about errors. Psychological safety has been studied in multi-disciplinary settings in management, organization development, healthcare and social sciences for over two decades and there is
empirical evidence to support psychological safety as an antecedent of individual and group performance. It has also been studied as a mediator between antecedents of performance and outcomes. (Amy C Edmondson & Lei, 2014). This variable was introduced in this study to determine if psychological safety could predict nurses’ behavior to report and mediate the conventional predictors for the behavior of interest. Perceived psychological safety is behavior specific and therefore meets the principle of compatibility. The behavior is measurable in terms of the target, action, context, and time elements that are required criteria to add as a predictor (Icek Ajzen, 2006). It also meets the condition that lack of psychological safety can be regarded as a potential causal factor for underreporting errors and could be independent of the other predictors.

Items selected for this variable include the following:

- Staff do not feel like their mistakes are held against them (A8 recoded).
- When an event is reported, it does not feel like the person is being written up rather than the problem (A12 recoded).
- Staff do not worry that mistakes they make are kept in their personnel file (A16 recoded).

Intention (Dependent Variable)

For this study, intention was operationally defined as the willingness and likelihood of reporting patient safety incidents voluntarily using the recommended mode of incident notification. This was not operationalized in this study because there were no items in the HSOPS survey that matched this construct.
Patient Safety Reporting Behavior (Dependent Variable)

For this study, patient safety reporting behavior refers to whether the nurse reported an adverse event in the previous 12 months (nominal level variable).

Admittedly, in this study, the reporting behavior is a self-reported acknowledgment of having enacted the behavior of interest in the past. The behavior is not validated, and there is no verifiable evidence of the behavior having been completed.
The item selected for this variable was the following:

- In the past 12 months, how many event reports have you filled out and submitted?

Assigning an Aggregate Patient Safety Grade (Dependent Variable)

For this study, assigning an aggregate patient safety grade refers to whether a nurse assigned an overall grade on patient safety for the work area/unit based on individual perception of patient safety culture. Like patient safety reporting behavior, this is a self-reported acknowledgment of having enacted the behavior of interest in the past. The behavior is not validated, and there is no verifiable evidence of the behavior having been completed. Nonetheless, this item on the HSOPS was found to be a desirable behavior for nurses. It is inferred that the grade assigned is predicted to be the explicit marker of the nurse’s valuation of the aggregate culture of patient safety for his/her work area/unit.

The item selected for this variable was the following:

- Please give your work area/unit in this hospital an overall grade on patient safety.

Data Collection

This study used data from the 2017 HSOPS. The data was de-identified to exclude names or locations of hospitals, unit of practice, or other identifiers that could reveal the identity of the participants or participating hospitals. Authorization to access and utilize the de-identified survey results was sought and granted by IHA’s
vice president of quality and patient safety (see Appendix N). IHA is a professional organization that administered and analyzed the 2017 HSOPS for participating healthcare facilities. Forty-four hospitals, or 37 percent of all hospitals in the state, participated in the 2017 survey. Participation was voluntary, and individual employees at each facility had four weeks to complete the survey.

The data collection process ensured participant confidentiality by not requiring respondents to identify themselves. Hospital employees were invited to participate in the survey via the hospital’s intranet or email. Follow-up emails and leadership encouraged employees to participate. No proof of participation was expected. The survey was administered in English, and employees spent an average of 15-20 minutes completing it. Upon completion, the survey results were emailed directly to IHA. The responses were not logged with a respondent ID or e-mail address.

The method of data collection was uniquely different from previous TPB-based studies in that the development of a questionnaire for the typical TPB constructs was not attempted. Instead, the items from the HSOPS were adapted to match the TPB constructs. Three items from the survey that were representative of perception of psychological safety (PPS) were added to the TPB construct.

**Data Management**

The data was transferred from IHA’s patient safety coordinator through secured encrypted email and stored in a password-protected file. The credibility of the data was verified with IHA staff and reviewed for legitimacy, completeness,
accuracy, and applicability to the survey design before being exported from Microsoft Excel to the Statistical Package for the Social Sciences (SPSS) software platform. The data was normalized and missing or incomplete data was deleted from the sample.

**Plan for Data Analysis**

Appropriate statistical analysis tests were identified to analyze the research questions and hypotheses. The chair of the research committee was consulted to determine the appropriate tests. Statistical analyses were done using SPSS version 22. The demographic variables and sample characteristics were analyzed using descriptive statistics and tabulated as part of the results. The hypotheses were tested using logistic or ordinal regression on the models identified to predict nurses’ reporting behavior and overall patient safety grade for their work area/unit. To infer statistical significance, for all statistical analyses in this study, the ‘P’ value was set at $< 0.05$ which is the normal standard for accepting significance for behavioral research.

All participants selected for the study were nurses. They were divided into two groups to uncover differences between inpatient nurses and non-inpatient nurses regarding the factors predicting patient safety behaviors. The assumption was that nurses caring for hospitalized patients have longer hours of patient contact each day and are more likely to witness errors and cause errors. This could heighten the potential for increased reporting and a better perception of patient safety grade. The two groups were the following:
1. All participants: Nurses working in all areas of the hospital, including hospital-based clinics, operating rooms, quality departments, managerial departments, and inpatient units

2. Inpatient unit nurses: Nurses working with patients admitted for 24/7 care in select hospital units, including medical and surgical units, emergency departments, intensive care units, and women's and children's units

The models were tested using logistic regression independently in the two groups described above. The inferential findings will be discussed in the next chapter.

**Human Subjects**

This study involved secondary data analysis. The topic of the study is sensitive to participating nurses considering their role as patient advocates and the fact that the data could be linked to an individual hospital or unit. However, that was not the case here as obtaining the survey responses in a de-identified form ensured anonymity. The data was treated as one aggregated cohort of registered nurses working in acute care hospitals in a midwestern US state. An application for undertaking the dissertation was submitted to the Institutional Review Board of Benedictine University and included a request to receive exempt status because the study was not within the definition of human subject research given the design and de-identified nature of the data. The IRB approved the request for exempt status in May 2018. (See **Appendix R**- IRB Approval letter)
Summary

This study was designed to answer the following research questions:

1. Do (a) attitude toward reporting safety events (ATT), (b) injunctive norms about patient safety (IN), (c) declarative norms about patient safety (DN), (d) perceived behavioral control about patient safety (PBC), and (e) perception of psychological safety (PPS) predict patient safety incident reporting behavior by nurses?

2. Does perception of psychological safety (PPS) mediate the effect of attitude (ATT), injunctive norms (IN), declarative norms (DN), and perceived behavioral control (PBC) on patient safety incident reporting behavior by nurses?

3. Do (a) attitude toward reporting safety events (ATT), (b) injunctive norms about patient safety (IN), (c) declarative norms about patient safety (DN), (d) perceived behavioral control about patient safety (PBC), and (e) perceived psychological safety (PPS) predict nurses’ overall patient safety grade (PSG) for their work area/unit?

4. Does perceived psychological safety (PPS) mediate the effect of attitude (ATT), injunctive norms (IN), declarative norms (DN), and perceived behavioral control (PBC) on nurses’ patient safety grade for their work area/unit?

The research design was a cross-sectional, non-experimental, correlational study using existing data for analysis and hypotheses testing. The theory of planned
behavior served as the theoretical framework. The procedures and tools used in this study were considered to have met acceptable levels of reliability and validity, and the statistical analyses used to answer the research questions and examine the hypotheses included multiple and ordinal regressions.

The goal of Chapter 4 is to convey the study results and demonstrate that the methodology described in this chapter was supported.
Chapter 4: Results and Findings

Overview

The purpose of this study was to determine if nurses' patient safety event reporting and assignment of a patient safety grade for their work area/unit could be predicted by the identified independent variables (IVs) or mediating variable (MV). The IVs were attitude (A), injunctive norms (IN), declarative norms (DN), perceived behavioral control (PBC), and perception of psychological safety (PPS). PPS also was the MV. The data were analyzed using either logistic or ordinal regression on four models. The theoretical framework underpinning the four models is the extended theory of planned behavior (ETPB), which is a modified version of the original TPB.

The Statistical Package for the Social Sciences (SPSS) version 22 software platform was used to conduct the statistical analysis (CorpIBM, 2013). Descriptive statistics were used to describe the demographics and sample characteristics. Regression analyses (either logistic or ordinal) were used on the four models presented to predict nurses' patient safety event reporting and assignment of a patient safety grade for their work area/unit. The statistical tests were applied to two groups of participants. Group I consisted of inpatient nurses working in medical and surgical units, emergency departments, intensive care units, and women's and children's units (n = 2593), and Group II consisted of all participants (n = 4992). The same statistical analyses were applied to both groups.
The results of this study are presented in four sections in this chapter. The first section provides a summary of the sample description and characteristics. The second section presents the findings for Group I organized by research question and hypothesis. The third section presents the findings for Group II organized by research question and hypothesis. The final section provides an overall summary of the findings.

**Sample Description and Characteristics**

This study is a secondary analysis of data collected by the Indiana Hospital Association (IHA) in 2017. Registered nurses (nurses) at 44 healthcare facilities in the state of Indiana were invited to complete the AHRQ’s Hospital Survey on Patient Safety Culture (HSOPS). IHA administered the questionnaire electronically, and the data collection was completed in December 2017. The number of surveys distributed to all healthcare personnel was 37,027, and the number returned was 15,344. The calculated return rate was 41.44 percent. Of the returned surveys, 5,113 were from RNs, licensed vocational nurses (LVNs), or licensed practical nurses (LPNs). In total, 4,992 nurses completed the survey. As mentioned earlier, statistical tests were applied to two groups. Group I consisted of inpatient nurses, and Group II consisted of all participants.

**Sample Characteristics – Group I**

The sample characteristics were collated from the existing secondary data. The sample characteristics collected from the HSOPS for Group I (inpatient nurses)
were as follows: work area; tenure with hospital; tenure with work area; tenure with profession; hours worked per week; number of patient safety incidents (PSI) reported; and assignment of patient safety grade (PSG).

The distribution of nurses by work area is shown in Table 2. The number of nurses working in medical, surgical, and intensive care units was evenly split. These areas accounted for 66.9 percent of all work areas. Only 3.7 percent of nurses worked in pediatrics. In the state of Indiana, 58.8 percent of all nurses represented in the 2017 workforce survey worked in the hospital as inpatient nurses (ICN, 2017). Of these, 19.2 percent worked in critical care, 2.0 percent in women’s health, 5.1 percent in pediatrics, and 2.4 percent in emergency departments. Another 12.5 percent did not provide direct patient care, and 11.8 percent did not describe their work area (other). In this study, 51 percent of participating nurses worked in inpatient units.

**Table 2. Work Area – Group I**

<table>
<thead>
<tr>
<th>Work Area</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>Medicine (non-surgical)</td>
<td>588</td>
<td>22.7</td>
</tr>
<tr>
<td></td>
<td>Surgery</td>
<td>572</td>
<td>22.1</td>
</tr>
<tr>
<td></td>
<td>Obstetrics</td>
<td>316</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>Pediatrics</td>
<td>97</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>Emergency department</td>
<td>446</td>
<td>17.2</td>
</tr>
<tr>
<td></td>
<td>Intensive care unit (any type)</td>
<td>574</td>
<td>22.1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>2593</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Hospital tenure, work area tenure, and profession tenure are shown in Tables 4, 5 and 6. Nurses who had worked 1–5 years made up the largest percentage in all
three categories (37 percent for hospital tenure, 41.1 percent for work area tenure, and 30.3 percent for professional tenure). Nurses with 6–10 years of experience were the second-largest group in hospital tenure (17.5 percent) and work area tenure (17.6 percent), while nurses with more than 21 years of experience were the second-largest group in profession tenure (23.5 percent).

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>20</td>
<td>.8</td>
<td>.8</td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>268</td>
<td>10.3</td>
<td>11.1</td>
</tr>
<tr>
<td>1 to 5 years</td>
<td>960</td>
<td>37.0</td>
<td>48.1</td>
</tr>
<tr>
<td>6 to 10 years</td>
<td>454</td>
<td>17.5</td>
<td>65.6</td>
</tr>
<tr>
<td>11 to 15 years</td>
<td>298</td>
<td>11.5</td>
<td>77.1</td>
</tr>
<tr>
<td>16 to 20 years</td>
<td>215</td>
<td>8.3</td>
<td>85.4</td>
</tr>
<tr>
<td>21 years or more</td>
<td>378</td>
<td>14.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>2593</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Work Area Tenure – Group I

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>23</td>
<td>.9</td>
<td>.9</td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>364</td>
<td>14.0</td>
<td>14.9</td>
</tr>
<tr>
<td>1 to 5 years</td>
<td>1065</td>
<td>41.1</td>
<td>56.0</td>
</tr>
<tr>
<td>6 to 10 years</td>
<td>456</td>
<td>17.6</td>
<td>73.6</td>
</tr>
<tr>
<td>11 to 15 years</td>
<td>269</td>
<td>10.4</td>
<td>84.0</td>
</tr>
<tr>
<td>16 to 20 years</td>
<td>184</td>
<td>7.1</td>
<td>91.1</td>
</tr>
<tr>
<td>21 years or more</td>
<td>232</td>
<td>8.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>2593</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 5. Profession Tenure – Group I

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>15</td>
<td>.6</td>
<td>.6</td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>163</td>
<td>6.3</td>
<td>6.9</td>
</tr>
<tr>
<td>1 to 5 years</td>
<td>785</td>
<td>30.3</td>
<td>37.1</td>
</tr>
<tr>
<td>6 to 10 years</td>
<td>456</td>
<td>17.6</td>
<td>54.7</td>
</tr>
<tr>
<td>11 to 15 years</td>
<td>303</td>
<td>11.7</td>
<td>66.4</td>
</tr>
<tr>
<td>16 to 20 years</td>
<td>261</td>
<td>10.1</td>
<td>76.5</td>
</tr>
<tr>
<td>21 years or more</td>
<td>610</td>
<td>23.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>2593</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The data for hours worked per week is shown in Table 6. Most nurses worked 20–39 hours per week (66.7 percent), followed by nurses who worked 40–69 hours per week (24.5 percent). These two categories combined accounted for 91.2 percent of the reported number of hours worked for Group I. This is like the statewide statistics for Indiana nurses based on the Indiana nursing workforce survey completed in 2017. In that survey, 73.4 percent of nurses reported working more than 32 hours per week in patient care, and nearly one-fifth (19.4 percent) of nurses reported working 41 or more hours per week in patient care (ICN, 2017).
Table 6. Hours Worked Per Week – Group I

<table>
<thead>
<tr>
<th>Number of Hours Worked</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>2593</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Less than 20 hours per week</td>
<td>124</td>
<td>4.8</td>
<td>5.2</td>
</tr>
<tr>
<td>20 to 39 hours per week</td>
<td>1729</td>
<td>66.7</td>
<td>71.9</td>
</tr>
<tr>
<td>40 to 69 hours per week</td>
<td>634</td>
<td>24.5</td>
<td>96.4</td>
</tr>
<tr>
<td>60 to 79 hours per week</td>
<td>85</td>
<td>3.3</td>
<td>99.7</td>
</tr>
<tr>
<td>80 to 99 hours per week</td>
<td>8</td>
<td>.3</td>
<td>100.0</td>
</tr>
<tr>
<td>100 hours per week or more</td>
<td>1</td>
<td>.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 7 shows how many patient safety incidents the nurses in Group I said they had reported in the last 12 months. The largest percentage (42.2 percent) of nurses said they had reported 1 or 2 events, and 26.8 percent of nurses said they had reported no events. This was a self-reported variable that was not verifiable as the error reports submitted are not publicly available.

Table 7. Patient Safety Incident Reporting – Group I

<table>
<thead>
<tr>
<th>Number of Events Reported</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>2593</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>No event reported</td>
<td>696</td>
<td>26.8</td>
<td>27.5</td>
</tr>
<tr>
<td>1 to 2 events reported</td>
<td>1093</td>
<td>42.2</td>
<td>69.6</td>
</tr>
<tr>
<td>3 to 5 events reported</td>
<td>542</td>
<td>20.9</td>
<td>90.6</td>
</tr>
<tr>
<td>6 to 10 events reported</td>
<td>174</td>
<td>6.7</td>
<td>97.3</td>
</tr>
<tr>
<td>11 to 20 events reported</td>
<td>56</td>
<td>2.2</td>
<td>99.4</td>
</tr>
<tr>
<td>21 event reports or more</td>
<td>15</td>
<td>.6</td>
<td>100.0</td>
</tr>
</tbody>
</table>

85
Table 8 shows how nurses responded when asked to grade their work area/unit. The most common responses were “Very Good” (46.5 percent) and “Excellent” (26.6 percent), which combined accounted for 73.1 percent of responses. This indicates that three-quarters of the nurses in Group I rated the patient safety culture at their workplace highly and believed the patient care practices in their work area/unit are safe.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>2</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>Excellent</td>
<td>689</td>
<td>26.6</td>
<td>26.6</td>
</tr>
<tr>
<td>Very Good</td>
<td>1206</td>
<td>46.5</td>
<td>73.2</td>
</tr>
<tr>
<td>Acceptable</td>
<td>550</td>
<td>21.2</td>
<td>94.4</td>
</tr>
<tr>
<td>Poor</td>
<td>126</td>
<td>4.9</td>
<td>99.2</td>
</tr>
<tr>
<td>Failing</td>
<td>20</td>
<td>.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>2593</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Sample Characteristics – Group II

The sample characteristics collected for Group II (all nurses) were the same as those collected for Group I: work area; tenure with hospital; tenure with work area; tenure with profession; hours worked per week; number of patient safety incidents (PSI) reported; and assignment of patient safety grade (PSG).

Table 9 shows the distribution of all nurses by work area. It is important to note that many nurses worked in areas that were not defined (n = 1853, 37 percent). The areas, if specified, were not available for analysis in this study.
Table 9. Work Area – Group II

<table>
<thead>
<tr>
<th>Work Area</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td>.3</td>
<td>.3</td>
</tr>
<tr>
<td>Many different hospital units/no</td>
<td>265</td>
<td>5.3</td>
<td>5.6</td>
</tr>
<tr>
<td>specific unit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicine (non-surgical)</td>
<td>597</td>
<td>12.0</td>
<td>17.6</td>
</tr>
<tr>
<td>Surgery</td>
<td>594</td>
<td>11.9</td>
<td>29.5</td>
</tr>
<tr>
<td>Obstetrics</td>
<td>323</td>
<td>6.5</td>
<td>35.9</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>98</td>
<td>2.0</td>
<td>37.9</td>
</tr>
<tr>
<td>Emergency department</td>
<td>454</td>
<td>9.1</td>
<td>47.0</td>
</tr>
<tr>
<td>Intensive care unit (any type)</td>
<td>581</td>
<td>11.6</td>
<td>58.6</td>
</tr>
<tr>
<td>Psychiatry/mental health</td>
<td>95</td>
<td>1.9</td>
<td>60.5</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>86</td>
<td>1.7</td>
<td>62.3</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>2</td>
<td>.0</td>
<td>62.3</td>
</tr>
<tr>
<td>Laboratory</td>
<td>4</td>
<td>.1</td>
<td>62.4</td>
</tr>
<tr>
<td>Radiology</td>
<td>20</td>
<td>.4</td>
<td>62.8</td>
</tr>
<tr>
<td>Anesthesiology</td>
<td>5</td>
<td>.1</td>
<td>62.9</td>
</tr>
<tr>
<td>Other, please specify</td>
<td>1853</td>
<td>37.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>4992</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Tenure with the hospital, with the work unit, and with the profession are shown in Tables 11, 12, and 13. Nurses who had worked 1–5 years made up the largest percentage in all three categories (33.6 percent for hospital tenure, 41.6 percent for work area tenure, and 28.2 percent for profession tenure). Nurses with more than 21 years of experience were the second-largest group in hospital tenure (17.9 percent) and profession tenure (26.5 percent), while nurses with 6–10 years’ experience were the second-largest group in work area tenure (17.6 percent).
### Table 10. Hospital Tenure – Group II

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>476</td>
<td>9.5</td>
<td>10.7</td>
</tr>
<tr>
<td>1 to 5 years</td>
<td>1676</td>
<td>33.6</td>
<td>44.3</td>
</tr>
<tr>
<td>6 to 10 years</td>
<td>836</td>
<td>16.7</td>
<td>61.0</td>
</tr>
<tr>
<td>11 to 15 years</td>
<td>578</td>
<td>11.6</td>
<td>72.6</td>
</tr>
<tr>
<td>16 to 20 years</td>
<td>473</td>
<td>9.5</td>
<td>82.1</td>
</tr>
<tr>
<td>21 years or more</td>
<td>894</td>
<td>17.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>4992</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

### Table 11. Hospital Tenure Years of Experience – Group II

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>716</td>
<td>14.3</td>
<td>15.6</td>
</tr>
<tr>
<td>1 to 5 years</td>
<td>2075</td>
<td>41.6</td>
<td>57.2</td>
</tr>
<tr>
<td>6 to 10 years</td>
<td>829</td>
<td>16.6</td>
<td>73.8</td>
</tr>
<tr>
<td>11 to 15 years</td>
<td>516</td>
<td>10.3</td>
<td>84.2</td>
</tr>
<tr>
<td>16 to 20 years</td>
<td>360</td>
<td>7.2</td>
<td>91.4</td>
</tr>
<tr>
<td>21 years or more</td>
<td>431</td>
<td>8.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>4992</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 12. Profession Tenure – Group II

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>284</td>
<td>5.7</td>
<td>6.8</td>
</tr>
<tr>
<td>1 to 5 years</td>
<td>1407</td>
<td>28.2</td>
<td>35.0</td>
</tr>
<tr>
<td>6 to 10 years</td>
<td>828</td>
<td>16.6</td>
<td>51.6</td>
</tr>
<tr>
<td>11 to 15 years</td>
<td>572</td>
<td>11.5</td>
<td>63.0</td>
</tr>
<tr>
<td>16 to 20 years</td>
<td>521</td>
<td>10.4</td>
<td>73.5</td>
</tr>
<tr>
<td>21 years or more</td>
<td>1325</td>
<td>26.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>4992</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The data for hours worked per week is shown in Table 13. Most nurses worked 20–39 hours per week (60.8 percent), followed by nurses who worked 40–69 hours per week (29.5 percent). These two categories combined accounted for 90.3 percent of the reported number of hours worked for Group II. Most nurses work full-time hours.

According to Indiana Center for Nursing workforce data, 89.2 percent of nurses work upward of 21 hours per week (ICN, 2017).

Table 13. Hours Worked Per Week – Group II

<table>
<thead>
<tr>
<th>Number of Hours Worked</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 20 hours per week</td>
<td>233</td>
<td>4.7</td>
<td>5.4</td>
</tr>
<tr>
<td>20 to 39 hours per week</td>
<td>3033</td>
<td>60.8</td>
<td>66.2</td>
</tr>
<tr>
<td>40 to 69 hours per week</td>
<td>1471</td>
<td>29.5</td>
<td>95.7</td>
</tr>
<tr>
<td>60 to 79 hours per week</td>
<td>178</td>
<td>3.6</td>
<td>99.2</td>
</tr>
<tr>
<td>80 to 99 hours per week</td>
<td>37</td>
<td>.7</td>
<td>100.0</td>
</tr>
<tr>
<td>100 hours per week or more</td>
<td>2</td>
<td>.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>4992</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 14 shows how many patient safety incidents the nurses in Group II said they had reported in the last 12 months. The largest percentage (39.8 percent) of nurses said they had reported 1 or 2 events, and 31.8 percent of nurses said they had reported no events. It is to be noted that this is indicative of underreporting, especially when 31.8 percent of nurses voluntarily stated they reported no errors.

Table 14. Patient Safety Incidents Reported – Group II

<table>
<thead>
<tr>
<th>Number of Events Reported</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>40</td>
<td>.8</td>
<td>.8</td>
</tr>
<tr>
<td>No event reported</td>
<td>1589</td>
<td>31.8</td>
<td>32.6</td>
</tr>
<tr>
<td>1 to 2 events reported</td>
<td>1986</td>
<td>39.8</td>
<td>72.4</td>
</tr>
<tr>
<td>3 to 5 events reported</td>
<td>967</td>
<td>19.4</td>
<td>91.8</td>
</tr>
<tr>
<td>6 to 10 events reported</td>
<td>289</td>
<td>5.8</td>
<td>97.6</td>
</tr>
<tr>
<td>11 to 20 events reported</td>
<td>92</td>
<td>1.8</td>
<td>99.4</td>
</tr>
<tr>
<td>21 event reports or more</td>
<td>29</td>
<td>.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>4992</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 15 shows how all nurses responded when asked to grade their work area/unit. The most common responses were “Very Good” (45.9 percent) and “Excellent” (28.1 percent), which combined accounted for 74 percent of responses. This indicates that the nurses in Group II believed the level of patient safety in their work area/unit to be very high.
Table 15. Patient Safety Grade Assigned – Group II

<table>
<thead>
<tr>
<th>Grade</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>25</td>
<td>.5</td>
<td>.5</td>
</tr>
<tr>
<td>Excellent</td>
<td>1404</td>
<td>28.1</td>
<td>28.6</td>
</tr>
<tr>
<td>Very Good</td>
<td>2293</td>
<td>45.9</td>
<td>74.6</td>
</tr>
<tr>
<td>Acceptable</td>
<td>986</td>
<td>19.8</td>
<td>94.3</td>
</tr>
<tr>
<td>Poor</td>
<td>241</td>
<td>4.8</td>
<td>99.1</td>
</tr>
<tr>
<td>Failing</td>
<td>43</td>
<td>.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>4992</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Data Analysis of Research Questions and Hypotheses Using Group I (Inpatient Nurses)

- **Research Question 1 (RQ 1):** Does (a) attitude toward reporting safety events (ATT), (b) injunctive norms about patient safety (IN), (c) declarative norms about patient safety (DN), (d) perceived behavioral control about patient safety (PBC), and (e) perception of psychological safety (PPS) predict patient safety incident reporting behavior by nurses?
  - **Hypothesis 1a:** ATT, IN, DN, PBC, and PPS scores are a significant predictor of patient safety incident reporting behavior by nurses.

Model 1: Theory of Planned Behavior (Modified) – Direct Effect Between Independent Variables (ATT, IN, DN, PBC, PPS) to Predict Dependent Variable (PSI) is shown in Appendix A.

To answer RQ 1, logistical regression was used. Logistical regression was chosen because the scale used nominal values ((Kerlinger, 2000). Six scales showing number of errors reported as polytomies in the original HSOPS survey were
transformed as dichotomous variables ("Yes" or "No"). This was done to match the operational definition of reporting behavior for this study. "Reporting behavior refers to whether or not the nurse reported an adverse event in the previous 12 months (nominal level variable)". The number of events reported in its subsets was not relevant for the analysis. Kerlinger argues that it is common practice in behavioral research to convert continuous variables into dichotomous ones to serve conceptual purpose, however it is important to be aware that such conversion does not discard useful information during analysis. (Kerlinger, 2000, p. 41) "Yes" indicated that at least one patient safety incident was reported, and "No" indicated zero reports made. As shown in Table 16, the baseline model (baseline model guesses "Yes") demonstrates that 73.7 percent of the time the prediction would be correct.

**Table 16. Inpatient Nurses – Model 1 – Logistic Regression Output SPSS**

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported an event Yes (1)</td>
<td>.0</td>
</tr>
<tr>
<td>No, have not reported event or No (O)</td>
<td>100.0</td>
</tr>
<tr>
<td>Yes, have reported event(s)</td>
<td></td>
</tr>
<tr>
<td><strong>Overall Percentage</strong></td>
<td><strong>73.7</strong></td>
</tr>
</tbody>
</table>

The baseline model also is a statistically significant predictor of the outcome variable (patient safety incident reporting behavior of nurses) (see Table 17). There is reason to be confident the baseline model has better predictive power than guessing due to the large sample size (n = 2277, excluded in the analysis any missing cases), indicating improvement in the outcome variable is not due to sampling.
Table 17. Inpatient Nurses – Model 1 – Logistic Regression Output SPSS

Variables in the Equation

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 0 Constant</td>
<td>1.032</td>
<td>.048</td>
<td>469.952</td>
<td>1</td>
<td>.000</td>
<td>2.808</td>
</tr>
</tbody>
</table>

The Omnibus Test of Model Coefficients is used to check that the new model, which includes the independent variables (ATT, IN, DN, PBC, PPS), is an improvement over the baseline model. It uses chi-square tests to determine if there is a significant difference between the baseline model and the new model, comparing the log-likelihoods (-2LLs) of the models. As Table 18 shows, the chi-square is highly significant (chi-square = 26.880, df = 5, p = .000), indicating the new model is significantly better.

Table 18. Inpatient Nurses – Model 1 - Logistic Regression Output SPSS

Omnibus Tests of Model Coefficient

<table>
<thead>
<tr>
<th></th>
<th>Chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Step</td>
<td>26.880</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Block</td>
<td>26.880</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Model</td>
<td>26.880</td>
<td>5</td>
</tr>
</tbody>
</table>

The model summary (Table 19) provides the -2 Log Likelihood (-2 LL) and pseudo-R2 values for the new model. The -2LL in the table is what was used in the previous table to compare the new model to the baseline model, which demonstrated the new model is a significantly better fit. The R2 value shows how much variation in the outcome is explained by the new model. Using the Nagelkerke’s R2 suggests that the new model explains 1.7 percent of the variation in the outcome.
Table 19. Inpatient Nurses – Model 1 - Logistic Regression Output SPSS

Model Summary

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2595.249.</td>
<td>.012</td>
<td>.017</td>
</tr>
</tbody>
</table>

In Table 20, all independent variables are included in the model, which predicts the outcome would be correct 73.7 percent of the time. This is the same percentage seen in the baseline prediction (see Table 18). This indicates no improvement over the baseline model and that the independent variables do not change the reporting behavior.

Table 20. Inpatient Nurses – Model 1 - Logistic Regression Output SPSS

Classification Table

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
</tr>
<tr>
<td>Reported an event Yes (1)</td>
<td>.0</td>
</tr>
<tr>
<td>No, have not reported events or No (0)</td>
<td></td>
</tr>
<tr>
<td>Yes, have reported event(s)</td>
<td>100.0</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td>73.7</td>
</tr>
</tbody>
</table>

The most important data provided to answer RQ 1 is in Table 21. In this table the regression coefficient (B) and the Wald statistic (tests the statistical significance) of each independent variable are presented. Only one of the five independent variables (ATT) significant. ATT regression coefficient (B) are positive (B=.051). This indicates that only ATT has a direct effect on the dependent variable “patient safety incident reporting behavior” of nurses. Conceivably the scales for ATT could
have contributed to this significant correlation, in that there were three hypothetical error related questions for this variable. The questions directly asked if the nurse would report an error even if the error did not result in patient harm.

Table 21. Inpatient Nurses – Model 1 - Logistic Regression Output SPSS

Variables in the Equation

<table>
<thead>
<tr>
<th>Step 1a.</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude Toward Behavior</td>
<td>.051</td>
<td>.064</td>
<td>.632</td>
<td>1</td>
<td>.426</td>
</tr>
<tr>
<td>Declarative Norms</td>
<td>-.194</td>
<td>.123</td>
<td>2.477</td>
<td>1</td>
<td>.116</td>
</tr>
<tr>
<td>Injunctive Norms</td>
<td>-.243</td>
<td>.105</td>
<td>5.320</td>
<td>1</td>
<td>.021</td>
</tr>
<tr>
<td>Perceived Behavioral Control</td>
<td>-.043</td>
<td>.066</td>
<td>.433</td>
<td>1</td>
<td>.511</td>
</tr>
<tr>
<td>Psychological Safety</td>
<td>.065</td>
<td>.067</td>
<td>.949</td>
<td>1</td>
<td>.330</td>
</tr>
<tr>
<td>Constant</td>
<td>2.395</td>
<td>.328</td>
<td>53.323</td>
<td>1</td>
<td>.000</td>
</tr>
</tbody>
</table>

Model 1a: Theory of Planned Behavior (Modified) – Direct Effect Between Independent Variables (ATT, IN, DN, PBC, PPS) to Predict Dependent Variable (PSI) – Group I – Inpatient Nurses with regression coefficients is shown in Appendix B. The injunctive norms show a significant negative relationship (p = .021) and the possible contributors to this unexpected result is explained later.

- **Research Question 2 (RQ 2):** Does perception of psychological safety (PPS) mediate the effect of attitude (ATT), injunctive norms (IN), declarative norms (DN), and perceived behavioral control (PBC) on patient safety incident reporting behavior by nurses?
  
  - **Hypothesis 2a:** PPS significantly mediates the effect of ATT, IN, DN, and PBC on patient safety incident reporting behavior by nurses.
To answer RQ 2, the same statistical tests were performed using logistic regression. As Table 22 shows, the baseline model (baseline model guesses “Yes”) demonstrates the prediction would be correct 73.2 percent of the time.

**Table 22. Inpatient Nurses – Model 2 - Logistic Regression Output SPSS**

<table>
<thead>
<tr>
<th>Step 0</th>
<th>Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reported an Event Yes (1) No, have not reported events or No (0) Yes, have reported event(s)</td>
</tr>
<tr>
<td></td>
<td>Overall Percentage</td>
</tr>
<tr>
<td></td>
<td>Predicted</td>
</tr>
<tr>
<td></td>
<td>Percentage Correct</td>
</tr>
<tr>
<td>0</td>
<td>.0</td>
</tr>
</tbody>
</table>

The baseline model also is a statistically significant predictor of the outcome variable (patient safety incident reporting behavior of nurses) (see Table 23). There is reason to be confident the baseline model has better predictive power than guessing due to the large sample size (n = 2513), indicating improvement in the outcome variable is not due to sampling.

**Table 23. Inpatient Nurses – Model 2 - Logistic Regression Output SPSS**

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Step 0 Constant</td>
</tr>
</tbody>
</table>

The Omnibus Test of Model Coefficients is used to check that the new model, which examines the mediating effect of PPS, is an improvement over the baseline model. It uses chi-square tests to determine if there is a significant difference between the baseline model and the new model, comparing log-likelihoods (-2LLs) of the
models. As shown in Table 24, the chi-square is significant at p < .05, (chi-square = 4.594, df = 1, p = .032), indicating the new model is significantly better.

### Table 24. Inpatient Nurses – Model 2 - Logistic Regression Output SPSS

<table>
<thead>
<tr>
<th>Omnibus Tests of Model Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
</tr>
<tr>
<td>Step</td>
</tr>
<tr>
<td>Block</td>
</tr>
<tr>
<td>Model</td>
</tr>
</tbody>
</table>

The model summary (Table 25) provides the -2LL and pseudo-R2 values for the new model. The -2LL in the table is what was used in the previous table to compare the new model to the baseline model, which demonstrated the new model is a significantly better fit. The R2 value shows how much variation in the outcome is explained by the new model. Using the Nagelkerke’s R2 suggests that the new model explains 0.3 percent of the variation in the outcome.

### Table 25. Inpatient Nurses – Model 2 – Logistic Regression Output SPSS

<table>
<thead>
<tr>
<th>Model Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

In Table 26, the mediating variable, PPS, predicts the outcome would be correct 73.2 percent of the time. This mirrors the baseline prediction (Table 22). This indicates there is not a difference from the baseline model.
Table 26. Inpatient Nurses – Model 2 – Logistic Regression Output SPSS
Classification Table a

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
</tr>
<tr>
<td>Reported an event Yes (1)</td>
<td>.0</td>
</tr>
<tr>
<td>No, have not reported events or No (O)</td>
<td></td>
</tr>
<tr>
<td>Yes, have reported event(s)</td>
<td>100.0</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td>73.2</td>
</tr>
</tbody>
</table>

The most important data provided to answer RQ 2 is in Table 27. In this table the regression coefficient (B) and the Wald statistic (tests the statistical significance) are presented. The mediating variable PPS is statistically significant (p = .033) but has a negative regression coefficient (B = -.108), meaning PPS has an inverse correlation on patient safety incident reporting behavior by nurses. This was a surprising finding. In this study, a stronger perception of psychological safety was shown to result in lower reporting rates. In other words, psychological safety does not promote any increase in incident reporting behavior. May be conducting the analyses as dichotomous variables could have shown a different path. Also it is possible that while the person feels safe about reporting, their internalized views of their work environment are overshadowing and influencing more heavily their reporting behavior which in this case is tending to be lesser number of reports submitted. It could also mean that the nurses perceive higher levels of psychological safety to favor lesser error reporting.

Table 27. Inpatient Nurses – Model 2 – Logistic Regression Output SPSS
<table>
<thead>
<tr>
<th>Variables in the Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
</tr>
<tr>
<td>----</td>
</tr>
<tr>
<td>Step 1</td>
</tr>
<tr>
<td>Psychological Safety</td>
</tr>
<tr>
<td>Constant</td>
</tr>
</tbody>
</table>

Model 2a: Theory of Planned Behavior (Modified) – Mediating Effect of PPS to Predict PSI by Nurses – Group I – Inpatient Nurses with regression coefficients is shown in Appendix D.

- **Research Question 3 (RQ 3):** Do (a) attitude toward reporting safety events (ATT), (b) injunctive norms about patient safety (IN), (c) declarative norms about patient safety (DN), (d) perceived behavioral control about patient safety (PBC), and (e) perceived psychological safety (PPS) predict nurses’ overall patient safety grade (PSG) for their work area/unit?

Model 3: Theory of Planned Behavior (Modified) – Direct Effect Between Independent Variables (ATT, IN, DN, PBC, PPS) to Predict Dependent Variable – Nurses’ Assignment of Patient Safety Grade for Work Area/Unit (PSG) is shown in Appendix E.

- **Hypothesis 3a:** Favorable ATT, IN, DN, PBC, and PPS are a significant predictor of nurses’ overall patient safety grade for their work area/unit.

To answer RQ 3, data was analyzed using ordinal regression because the dependent variable scale (PSG) was categorical (“Failing,” “Poor,” “Acceptable,” “Very Good,” “Excellent”). All levels of patient safety grade are represented in the
dependent variable (PSG). Data were examined for model fit, goodness of fit, and parameter estimates.

Model fit is determined prior to looking at individual coefficients. It basically tests the null hypothesis that the location coefficients for all of the variables in the model are 0. See Table 28.

<table>
<thead>
<tr>
<th>Model</th>
<th>-2 Log Likelihood</th>
<th>Chi-Square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept Only</td>
<td>5525.652</td>
<td>2106.603</td>
<td>5</td>
<td>.000</td>
</tr>
<tr>
<td>Final</td>
<td>3419.049</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The null hypothesis that the model without predictors is as good as the model with predictors is rejected (chi-square = 2106.603, p = .000). This means there are some predictors influencing the dependent variable (nurses’ assignment of patient safety grade for the work area/unit).

Goodness-of-fit (GOF) measures are used to examine if the model fits well, if the observed and expected cell counts are similar, if the value of each statistic is small, and if the observed significance level is large. This is determined from the observed and expected frequencies. The two GOF measures are the Pearson GOF and the deviance GOF. Both are used with large expected values in each cell. GOF is used only for models that have reasonably large expected values in each cell. In this study,
SPSS provided a warning that too many cells were empty (zero frequencies); thus, neither statistic provides a dependable GOF test.

Parameter estimates are coefficients that relate to the predictor variables. A value that is negative means it is associated with a poorer effect on the outcome variable. The Wald statistic is the square of the ratio of the coefficient to its standard error. Table 29 shows the parameter estimates of the independent variables (ATT, IN, DN, PBC, PBS). For the independent variables ATT (estimate = .202, Wald statistic = Sig. .001), IN (estimate = 2.403, Wald statistic = Sig. .000), DN (estimate = 1.454, Wald statistic = Sig. .000), and PBC (estimate = .230, Wald statistic = Sig. .000), the null can be rejected because all four independent variables are positive predictors of nurses’ assignment of patient safety grade for the work area/unit. However, the independent variable PPS shows no significance, so the null cannot be rejected for this variable. Psychological safety has not been found to be a predictor for nurses to assign a favorable patient safety grade for the work area/unit. In fact, PPS has a negative parameter estimate. Based on this result, an inference could be made that perception of psychological safety does not influence a nurse’s decision to assign a higher patient safety grade for the work area/unit. It is conceivable that assigning a favorable safety grade is not necessarily a bad thing and therefore does not have a bearing on feeling safe.
Table 29. Inpatient Nurses – Model 3 – Ordinal Regression Output SPSS

Parameter Estimates

<table>
<thead>
<tr>
<th>Threshold/Location</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Safety Grade Recoded_2 = 1.00</td>
<td>6.845</td>
<td>.403</td>
<td>288.427</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Patient Safety Grade Recoded_2 = 2.00</td>
<td>10.072</td>
<td>.381</td>
<td>699.450</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Patient Safety Grade Recoded_2 = 3.00</td>
<td>13.565</td>
<td>.440</td>
<td>950.660</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Patient Safety Grade Recoded_2 = 4.00</td>
<td>17.439</td>
<td>.507</td>
<td>1181.411</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Psychological Safety</td>
<td>-.069</td>
<td>.063</td>
<td>1.216</td>
<td>1</td>
<td>.270</td>
</tr>
<tr>
<td>Attitude Toward</td>
<td>.202</td>
<td>.059</td>
<td>11.740</td>
<td>1</td>
<td>.001</td>
</tr>
<tr>
<td>Behavior Declarative</td>
<td>1.454</td>
<td>.115</td>
<td>158.950</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Norms</td>
<td>2.403</td>
<td>.111</td>
<td>465.028</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Injunctive Norms</td>
<td>.230</td>
<td>.060</td>
<td>14.686</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Perceived Behavioral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model 3a: Theory of Planned Behavior (Modified) – Direct Effect Between Independent Variables (ATT, IN, DN, PBC, PPS) to Predict Dependent Variable – Nurses’ Assignment of Patient Safety Grade for Work Area/Unit (PSG) – Group I – Inpatient Nurses with regression coefficients is shown in Appendix F.

- **Research Question 4 (RQ 4):** Does perceived psychological safety (PPS) mediate the effect of attitude (ATT), injunctive norms (IN), declarative norms (DN), and perceived behavioral control (PBC) on nurses’ patient safety grade for their work area/unit?

Model 4: Theory of Planned Behavior (Modified) – Mediating Effect of PPS to Predict Better PSG by Inpatient Nurses is shown in Appendix G.

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- **Hypothesis 4a**: PPS significantly mediates the effect of ATT, IN, DN, and PBC on nurses’ overall patient safety grade for their work area/unit.

Model 4a: Theory of Planned Behavior (Modified) – Mediating Effect of PPS to Predict PSG by Nurses – Group I – Inpatient Nurses with regression coefficients is shown in Appendix H.

Ordinal regression was used to answer RQ 4 because the scale was categorical ("Failing," "Poor," "Acceptable," "Very Good," "Excellent"). All levels of patient safety grade are represented in the dependent variable (PSG). Data were examined for model fit, goodness of fit, and parameter estimates.

Model fit is determined prior to looking at individual coefficients. It basically tests the null hypothesis that the location coefficients for all of the variables in the model are 0. See Table 30.

**Table 30. Inpatient Nurses – Model 4 – Ordinal Regression Output SPSS**

<table>
<thead>
<tr>
<th>Model</th>
<th>-2 Log Likelihood</th>
<th>Chi-Square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept Only</td>
<td>822.007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final</td>
<td>287.087</td>
<td>534.920</td>
<td>1</td>
<td>.000</td>
</tr>
</tbody>
</table>

The null hypothesis that the model without predictors is as good as the model with predictors is rejected (chi-square = 534.920, df = 1, p = .000). This means that there are some predictors influencing the dependent variable (nurses’ assignment of patient safety grade for the work area/unit).
Goodness-of-fit (GOF) measures are used to examine if the model fits well, if the observed and expected cell counts are similar, if the value of each statistic is small, and if the observed significance level is large. This is determined from the observed and expected frequencies. The two GOF measures are the Pearson GOF and the deviance GOF. Both are used with large expected values in each cell. GOF is used only for models that have reasonably large expected values in each cell. In this study, SPSS provided a warning that too many cells were empty (zero frequencies); thus, neither statistic provides a dependable GOF test.

Parameter estimates are coefficients that relate to the predictor variables. A value that is negative means it is associated with a poorer effect on the outcome variable. The Wald statistic is the square of the ratio of the coefficient to its standard error. Table 31 shows the parameter estimate of the mediating variable PPS. PPS has a positive parameter estimate of 1.048 and a Wald statistic of 500.626. Based on the small observed significance level, the null hypothesis is rejected. There appears to be a positive relationship between the mediating variable PPS and the dependent variable (nurses’ assignment of patient safety grade for the work area/unit).
Table 31. Inpatient Nurses – Model 4a – Ordinal Regression Output SPSS

<table>
<thead>
<tr>
<th>Parameter Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Threshold</td>
</tr>
<tr>
<td>[Patient Safety Grade Recoded_2 = 1.00]</td>
</tr>
<tr>
<td>[Patient Safety Grade Recoded_2 = 2.00]</td>
</tr>
<tr>
<td>[Patient Safety Grade Recoded_2 = 3.00]</td>
</tr>
<tr>
<td>[Patient Safety Grade Recoded_2 = 4.00]</td>
</tr>
<tr>
<td>Location</td>
</tr>
<tr>
<td>Psychological Safety</td>
</tr>
</tbody>
</table>

Model 4a: Theory of Planned Behavior (Modified) – Mediating Effect of PPS to Predict PSG by Nurses – Group I – Inpatient Nurses with regression coefficients is shown in Appendix H.

Data Analysis of Research Questions and Hypotheses Using Group II (All Nurses)

- **Research Question 1 (RQ 1):** Does (a) attitude toward reporting safety events (ATT), (b) injunctive norms about patient safety (IN), (c) declarative norms about patient safety (DN), (d) perceived behavioral control about patient safety (PBC), and (e) perception of psychological safety (PPS) predict patient safety incident reporting behavior by nurses?
  - **Hypothesis 1b:** ATT, IN, DN, PBC, and PPS scores are significant predictors of patient safety incident reporting behavior by nurses.

To answer RQ 1, logistical regression was used. Logistical regression was chosen because the scale used nominal values (Kerlinger, 2000). Six scales showing
number of errors reported were transformed as dichotomous variables ("Yes" or "No"). "Yes" indicated that at least one patient safety incident was reported, and "No" indicated zero reports made. As shown in Table 32, the baseline model (baseline model guesses "Yes") demonstrates that 70.1 percent of the time the prediction would be correct.

**Table 32. All Nurses – Model I – Logistic Regression Output SPSS**

<table>
<thead>
<tr>
<th>Classification Table a, b</th>
<th>Predicted Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed</td>
<td></td>
</tr>
<tr>
<td>Reported an event Yes (1)</td>
<td>.0</td>
</tr>
<tr>
<td>No, have not reported event or No (0)</td>
<td>100.0</td>
</tr>
<tr>
<td>Yes, have reported event(s)</td>
<td></td>
</tr>
<tr>
<td><strong>Overall Percentage</strong></td>
<td><strong>70.1</strong></td>
</tr>
</tbody>
</table>

The baseline model also is a statistically significant predictor of the dependent variable (patient safety incident reporting behavior of nurses) (see Table 33). There is reason to be confident the baseline model has better predictive power than guessing due to the large sample size (n = 4229, excluded any missing cases), indicating improvement in the outcome variable is not due to sampling.
Table 33. All Nurses – Model I – Logistic Regression Output SPSS

Variables in the Equation

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>. Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 0</td>
<td>.850</td>
<td>.034</td>
<td>641.376</td>
<td>1</td>
<td>.000</td>
<td>2.340</td>
</tr>
</tbody>
</table>

The Omnibus Test of Model Coefficients is used to check that the new model, which includes the independent variables (ATT, IN, DN, PBC, PPS), is an improvement over the baseline model. It uses chi-square tests to determine if there is a significant difference between the baseline model and the new model, comparing the log-likelihoods (-2LLs) of the models. As Table 34 shows, the chi-square is highly significant (chi-square = 92.975, df = 5, p = .000), indicating the new model is significantly better.

Table 34. All Nurses – Model I – Logistic Regression Output SPSS

Omnibus Tests of Model Coefficients

<table>
<thead>
<tr>
<th></th>
<th>Chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Step</td>
<td>92.875</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Block</td>
<td>92.875</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Model</td>
<td>92.875</td>
<td>5</td>
</tr>
</tbody>
</table>

The model summary (Table 35) provides the -2LL and pseudo-R2 values for the new model. The -2LL in the table is what was used in the previous table to compare the new model to the baseline model, which demonstrated the new model is a significantly better fit. The R2 value shows how much variation in the outcome is explained by the new model. Using the Nagelkerke’s R2 suggests that the new model explains 3.1 percent of the variation in the outcome.
Table 35. All Nurses – Model I – Logistic Regression Output SPSS

Model Summary

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5069.232a</td>
<td>.022</td>
<td>.031</td>
</tr>
</tbody>
</table>

In Table 36, all independent variables are included in the model, which predicts the outcome would be correct 70% of the time. This is very close to the baseline prediction of 70.1 percent (see Table 32). It can be concluded there is not much improvement over the baseline model.

Table 36. All Nurses – Model I – Logistic Regression Output SPSS

Classification Table

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
</tr>
<tr>
<td>Reported an event Yes (1)</td>
<td>.0</td>
</tr>
<tr>
<td>No, have not reported event or No (0) (s)</td>
<td>100.0</td>
</tr>
<tr>
<td>Yes, have reported event(s)</td>
<td></td>
</tr>
<tr>
<td><strong>Overall Percentage</strong></td>
<td>70.0</td>
</tr>
</tbody>
</table>

The most important data provided to answer RQ 1 is in Table 37. In this table the regression coefficient (B) and the Wald statistic (tests the statistical significance) of each independent variable are presented. Two of five independent variables are significant, IN is (Wald = 29.768, df = 1, p < .000) and PPS (Wald=5.894, df=1, p=.015). IN demonstrates an inverse effect (B = -.412) on patient safety incident reporting behavior by nurses, indicating that favorable injunctive norms do not increase nurses’ patient safety incident reporting behavior, perhaps a more positive opinion of the work environment is associated with lower reporting. PPS has a
positive regression coefficient ($B = .117$) and is statistically significant ($p = 0.015$). In other words, psychological safety impacts higher reporting connoting that the nurses felt safe to disclose mistakes.

**Table 37. All Nurses – Model I – Logistic Regression**

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude Toward Behavior</td>
<td>-.053</td>
<td>.045</td>
<td>1.387</td>
<td>1</td>
<td>.239</td>
</tr>
<tr>
<td>Declarative Norms</td>
<td>-.060</td>
<td>.085</td>
<td>.496</td>
<td>1</td>
<td>.481</td>
</tr>
<tr>
<td>Injunctive Norms</td>
<td>-.412</td>
<td>.076</td>
<td>29.768</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Perceived Behavioral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>-.047</td>
<td>.046</td>
<td>1.052</td>
<td>1</td>
<td>.305</td>
</tr>
<tr>
<td>Psychological Safety</td>
<td>.117</td>
<td>.048</td>
<td>5.894</td>
<td>1</td>
<td>.015</td>
</tr>
<tr>
<td>Constant</td>
<td>2.530</td>
<td>.233</td>
<td>117.932</td>
<td>1</td>
<td>.000</td>
</tr>
</tbody>
</table>

**Model 1b:** Theory of Planned Behavior (Modified) – Direct Effect Between Independent Variables (ATT, IN, DN, PBC, PPS) to Predict Dependent Variable (PSI) – Group II – All Nurses with regression coefficients is shown in **Appendix I**.

- **Research Question 2 (RQ 2):** Does perception of psychological safety (PPS) mediate the effect of attitude (ATT), injunctive norms (IN), declarative norms (DN), and perceived behavioral control (PBC) on patient safety incident reporting behavior by nurses?
  - **Hypothesis 2b (Ho2b):** PPS significantly mediates the effect of ATT, IN, DN, and PBC on patient safety incident reporting behavior by all participant nurses.
To answer RQ 2, the same statistical tests were performed using logistic regression. As Table 38 shows, the baseline model (baseline model guesses “Yes”) demonstrates the prediction would be correct 68.4 percent of the time.

Table 38. All Nurses – Model 2 – Logistic Regression Output SPSS

<table>
<thead>
<tr>
<th>Classification Table a, b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Step 0</td>
</tr>
<tr>
<td>Reported an event Yes (1)</td>
</tr>
<tr>
<td>No, have not reported event or No (0) (s)</td>
</tr>
<tr>
<td>Yes, have reported event(s)</td>
</tr>
<tr>
<td>Overall Percentage</td>
</tr>
</tbody>
</table>

The baseline model also is a statistically significant predictor of the outcome variable (patient safety incident reporting behavior of nurses) (see Table 39). There is reason to be confident the baseline model has better predictive power than guessing due to the large sample size (n = 4788), indicating improvement in the outcome variable is not due to sampling.

Table 39. All Nurses – Model 2 – Logistic Regression Output SPSS

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
</tr>
<tr>
<td>Step 0 Constant</td>
</tr>
</tbody>
</table>

The Omnibus Test of Model Coefficients is used to check that the new model, which examines the mediating effect of PPS, is an improvement over the baseline model. It uses chi-square tests to determine if there is a significant difference between
the baseline model and the new model, comparing log-likelihoods (-2LLs) of the models. As shown in Table 40, the chi-square is significant \( p < .05 \) (chi-square = 8.921, \( df = 1, p = .003 \)), indicating the new model is significantly better.

**Table 40. All Nurses – Model 2 – Logistic Regression Output SPSS**

<table>
<thead>
<tr>
<th>Omnibus Tests of Model Coefficients</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>8.921</td>
<td>1</td>
<td>.003</td>
</tr>
<tr>
<td>Block</td>
<td>8.921</td>
<td>1</td>
<td>.003</td>
</tr>
<tr>
<td>Model</td>
<td>8.921</td>
<td>1</td>
<td>.003</td>
</tr>
</tbody>
</table>

The model summary (Table 41) provides the -2LL and pseudo-R2 values for the new model. The -2LL in the table is what was used in the previous table to compare the new model to the baseline model, which demonstrated the new model is not a significantly better fit. The R2 value shows how much variation in the outcome is explained by the new model. Using the Nagelkerke's R2 suggests that the new model explains 0.3 percent of the positive variation in the outcome.

**Table 41. All Nurses – Model 2 – Logistic Regression Output SPSS**

<table>
<thead>
<tr>
<th>Model Summary</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Step</td>
<td>-2 Log likelihood</td>
<td>Cox &amp; Snell R Square</td>
<td>Nagelkerke R Square</td>
</tr>
<tr>
<td>1</td>
<td>5964.743</td>
<td>.002</td>
<td>.003</td>
</tr>
</tbody>
</table>

In Table 42, the mediating variable, PPS, predicts the outcome would be correct 68.4% of the time. This mirrors the baseline prediction (Table 38). This indicates there is not a difference from the baseline model.
Table 42. All Nurses – Model 2 – Logistic Regression Output SPSS
Classification Table

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
</tr>
<tr>
<td>Reported an event Yes (1)</td>
<td>0.0</td>
</tr>
<tr>
<td>No, have not reported event or No (0) (s)</td>
<td></td>
</tr>
<tr>
<td>Yes, have reported event(s)</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Overall Percentage</strong></td>
<td><strong>68.4</strong></td>
</tr>
</tbody>
</table>

The most important data provided to answer RQ 2 is in Table 43. In this table the regression coefficient (B) and the Wald statistic (tests the statistical significance) are presented. The mediating variable PPS is statistically significant (p = .003) and has a negative regression coefficient (B = -.104), meaning PPS has an inverse correlation on patient safety incident reporting behavior by nurses. This finding is similar to that of Group I, indicating increased psychological safety did not predict increased reporting by nurses as expected, perhaps suggesting higher levels of psychological safety contributed to positive feelings about the hospital and lesser predisposition to report against the hospital.

Table 43. All Nurses – Model 2 – Logistic Regression Output SPSS
Variables in the Equation

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Psychological</th>
<th>S.E.</th>
<th>Wald</th>
<th>di</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>-.104</td>
<td>.035</td>
<td>8.866</td>
<td>1</td>
<td>.003</td>
<td>.901</td>
</tr>
<tr>
<td>Safety Constant</td>
<td>1.121</td>
<td>.122</td>
<td>84.750</td>
<td>1</td>
<td>.000</td>
<td>3.069</td>
</tr>
</tbody>
</table>
Model 2b: Theory of Planned Behavior (Modified) – Mediating Effect of
PPS to Predict PSI by Nurses – Group II – All Nurses with regression coefficients
is shown in Appendix J.

- **Research Question 3 (RQ 3):** Do (a) attitude toward reporting safety events
  (ATT), (b) injunctive norms about patient safety (IN), (c) declarative norms
  about patient safety (DN), (d) perceived behavioral control about patient
  safety (PBC), and (e) perceived psychological safety (PPS) predict nurses’
  overall patient safety grade (PSG) for their work area/unit?

  - **Hypothesis 3b:** Favorable A, IN, DN, PBC, and PPS are a significant
    predictor of nurses’ overall patient safety grade for their work
    area/unit.

Ordinal regression was used answer to RQ 3. Ordinal regression was chosen
because the scale was categorical (“Failing,” “Poor,” “Acceptable,” “Very Good,”
“Excellent”). All levels of patient safety grade are represented in the dependent
variable (PSG). Data were examined for model fit, goodness of fit, and parameter
estimates.

Model fit is determined prior to looking at individual coefficients. It basically
tests the null hypothesis that the location coefficients for all the variables in the model
are 0. (See Table 44).
Table 44. All Nurses – Model 3 – Ordinal Regression Output SPSS

Model Fitting Information

<table>
<thead>
<tr>
<th>Model</th>
<th>-2 Log Likelihood</th>
<th>Chi-Square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept Only</td>
<td>10251.503</td>
<td>3973.953</td>
<td>5</td>
<td>.000</td>
</tr>
<tr>
<td>Final</td>
<td>6277.550</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The null hypothesis that the model without predictors is as good as the model with predictors is rejected (chi-square = 3973.953, df = 5, p = .000). This means there are some predictors influencing the dependent variable (nurses’ assignment of patient safety grade for the work area/unit).

Goodness-of-fit (GOF) measures are used to examine if the model fits well, if the observed and expected cell counts are similar, if the value of each statistic is small, and if the observed significance level is large. This is determined from the observed and expected frequencies. The two GOF measures are the Pearson GOF and the deviance GOF. Both are used with large expected values in each cell. GOF is used only for models that have reasonably large expected values in each cell. In this study, SPSS provided a warning that too many cells were empty (zero frequencies); thus, neither statistic provides a dependable GOF test.

Parameter estimates are coefficients that relate to the predictor variables. A value that is negative means it is associated with a poorer effect on the outcome variable. The Wald statistic is the square of the ratio of the coefficient to its standard error. Table 45 shows the parameter estimates of the independent variables (ATT, IN, DC, PBC, PBS). Four of the IVs have a Wald statistic = Sig. 000. PPS has a negative parameter estimate of -.035 and a Wald statistic of .561. Attitude toward behavior
(ATT) has a positive parameter estimate of .215 and a Wald statistic of 25.610. IN has a positive parameter estimate of 2.318 and a Wald statistic of 810.019. PBC has a positive parameter estimate of .163 and a Wald statistic of 14.387. The null is rejected for these four IVs. Four of the five independent variables appear to be positive predictors of nurses’ assignment of a patient safety grade for the work area/unit. PPS has an inverse prediction, and P value is not significant suggesting that psychological safety did not influence the nurses to assign a better safety grade for their work area/unit.

Table 45. All Nurses – Model 3 – Ordinal Regression Output SPSS

<table>
<thead>
<tr>
<th>Parameter Estimates</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold [Patient Safety Grade Recoded_2 = 1.00]</td>
<td>7.430</td>
<td>.294</td>
<td>636.831</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>[Patient Safety Grade Recoded_2 = 2.00]</td>
<td>10.565</td>
<td>.285</td>
<td>1373.825</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>[Patient Safety Grade Recoded_2 = 3.00]</td>
<td>13.938</td>
<td>.327</td>
<td>1817.858</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>[Patient Safety Grade Recoded_2 = 4.00]</td>
<td>17.813</td>
<td>.377</td>
<td>2228.345</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Location Psychological Safety</td>
<td>-.035</td>
<td>.047</td>
<td>.561</td>
<td>1</td>
<td>.454</td>
</tr>
<tr>
<td>Attitude Toward Behavior Declarative Norms</td>
<td>.215</td>
<td>.043</td>
<td>25.610</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Injunctive Norms</td>
<td>1.668</td>
<td>.084</td>
<td>392.323</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Perceived Behavioral Control</td>
<td>2.318</td>
<td>.081</td>
<td>810.019</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>.163</td>
<td>.043</td>
<td>14.387</td>
<td>1</td>
<td>.000</td>
</tr>
</tbody>
</table>
Model 3b: Theory of Planned Behavior (Modified) – Direct Effect Between Independent Variables (ATT, IN, DN, PBC, PPS) to Predict Dependent Variable – Nurses’ Assignment of Patient Safety Grade for Work Area/Unit (PSG) – Group II – All Nurses with regression coefficients is shown in Appendix K.

- **Research Question 4 (RQ 4):** Does perceived psychological safety (PPS) mediate the effect of attitude (ATT), injunctive norms (IN), declarative norms (DN), and perceived behavioral control (PBC) on nurses’ patient safety grade for their work area/unit?
  
  - **Hypothesis 4b:** PPS significantly mediates the effect of ATT, IN, DN, and PBC on nurses’ overall patient safety grade for their work area/unit.

  Ordinal regression was used to answer RQ 4 because the scale was categorical ("Failing," "Poor," "Acceptable," "Very Good," "Excellent"). All levels of patient safety grade are represented in the dependent variable (PSG). Data were examined for model fit, goodness of fit, and parameter estimates.

  Model fit is determined prior to looking at individual coefficients. It basically tests the null hypothesis that the location coefficients for all of the variables in the model are 0. See Table 46.

**Table 46. All Nurses – Model 4 – Ordinal Regression Output SPSS**

<table>
<thead>
<tr>
<th>Model</th>
<th>-2 Log Likelihood</th>
<th>Chi-Square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept Only</td>
<td>1454.761</td>
<td>1123.405</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Final</td>
<td>331.355</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The null hypothesis that the model without predictors is as good as the model with predictors is rejected (chi-square = 1123.405, p = .000). This suggests there are some predictors influencing the dependent variable (nurses’ assignment of patient safety grade for the work area/unit).

Goodness-of-fit (GOF) measures are used to examine if the model fits well, if the observed and expected cell counts are similar, if the value of each statistic is small, and if the observed significance level is large. This is determined from the observed and expected frequencies. The two GOF measures are the Pearson GOF and the deviance GOF. Both are used with large expected values in each cell. GOF is used only for models that have reasonably large expected values in each cell. In this study, SPSS provided a warning that too many cells were empty (zero frequencies); thus, neither statistic provides a dependable GOF test.

Parameter estimates are coefficients that relate to the predictor variables. A value that is negative means it is associated with a poorer effect on the outcome variable. The Wald statistic is the square of the ratio of the coefficient to its standard error. Table 47 shows the parameter estimate of the mediating variable PPS. PPS has a positive parameter estimate of 1.111 and a Wald statistic of 1036.401. Based on the small observed significance level, the null hypothesis is rejected. There appears to be a positive relationship between the independent variables and the dependent variable because of the mediating effect of psychological safety. (nurses’ assignment of patient safety grade for the work area/unit).
Table 47. All Nurses – Model 4 – Ordinal Regression Output SPSS

<table>
<thead>
<tr>
<th>Parameter Estimates</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Patient Safety Grade Recoded_2 = 1.00]</td>
<td>-1.524</td>
<td>.179</td>
<td>72.387</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>[Patient Safety Grade Recoded_2 = 2.00]</td>
<td>.502</td>
<td>.113</td>
<td>19.642</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>[Patient Safety Grade Recoded_2 = 3.00]</td>
<td>2.472</td>
<td>.111</td>
<td>493.015</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>[Patient Safety Grade Recoded_2 = 4.00]</td>
<td>4.850</td>
<td>.128</td>
<td>1432.493</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological Safety</td>
<td>1.111</td>
<td>.034</td>
<td>1036.401</td>
<td>1</td>
<td>.000</td>
</tr>
</tbody>
</table>

Model 4b: Theory of Planned Behavior (Modified) – Mediating Effect of PPS to Predict PSG by Nurses – Group II – All Nurses with regression coefficients is shown in Appendix L.

Table 48 below is a summary of the key findings that depicts the results of the regression analysis on the hypotheses.
### Table 48. Summary of Findings

<table>
<thead>
<tr>
<th>Summary of Findings</th>
<th>Level of Significance (LOS): Significant (S) p&lt;.05</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group I = Inpatient Nurses</strong></td>
<td><strong>Group II = All Nurse Participants</strong></td>
</tr>
<tr>
<td><strong>IV/MV</strong></td>
<td>+/-</td>
</tr>
<tr>
<td>RQ1 H1a</td>
<td>In.</td>
</tr>
<tr>
<td>Variable</td>
<td>ATT</td>
</tr>
<tr>
<td>IN</td>
<td>-</td>
</tr>
<tr>
<td>DN</td>
<td>-</td>
</tr>
<tr>
<td>PBC</td>
<td>+</td>
</tr>
<tr>
<td>PPS</td>
<td></td>
</tr>
<tr>
<td>RQ2 H2a</td>
<td>Mediating V</td>
</tr>
<tr>
<td>PPS</td>
<td></td>
</tr>
<tr>
<td>RQ3 H3a</td>
<td>In.</td>
</tr>
<tr>
<td>Variable</td>
<td>ATT</td>
</tr>
<tr>
<td>IN</td>
<td>+</td>
</tr>
<tr>
<td>DN</td>
<td>+</td>
</tr>
<tr>
<td>PBC</td>
<td>-</td>
</tr>
<tr>
<td>PPS</td>
<td></td>
</tr>
<tr>
<td>RQ4 H4a</td>
<td>Mediating V</td>
</tr>
<tr>
<td>PPS</td>
<td></td>
</tr>
</tbody>
</table>

**Legend for Research Questions (RQ) and Hypotheses (H):**

- **RQ1**: Does (a) Nurses' Attitude (ATT), (b) Injunctive Norms (IN), (c) Declarative Norms (DN), (d) Perceived Behavioral Control (PBC) and (e) Perception of Psychological Safety (PPS) predict patient safety incident reporting (PSI) behavior by nurses?

- **H1a / H1b**: ATT, IN, DN, PBC, and PPS scores are significant predictors of patient safety incident reporting behavior by nurses.

- **RQ2**: Does PPS mediate the impact of ATT, IN, DN and PBC to predict patient safety incident reporting behavior by nurses?

- **H2a / H2b**: PPS significantly mediates the effect of ATT, IN, DN and PBC to predict patient safety incidence reporting behavior by nurses.

- **RQ3**: Does ATT, IN, DN, PPC and PPS predict nurse’s assignment of a patient safety grade for the work unit?

- **H3a / H3b**: ATT, IN, DN, PBC and PPS are significant predictors of nurses’ assigning a patient safety grade for the work unit.

- **RQ4**: Does PPS mediate the effect of ATT, IN, DN and PBC to predict nurses’ assigning a favorable patient safety grade for the work unit?

- **H4a / H4b**: PPS significantly mediates the effect of ATT, IN, DN and PBC to predict nurses’ assigning a patient safety grade for the work unit.
Summary of Findings and Conclusion

Table 48 above shows a summary of the findings of the study.

This chapter provided the results and findings of this quantitative, correlational, cross-sectional study. The statistical analyses were presented in detail. The study used secondary data from the HSOPS tool to explore if selected patient safety culture scales were correlated to nurses’ patient safety incident reporting behavior and assignment of patient safety grade. The statistical analyses were conducted for the sample in two groups. Group I consisted of nurses who worked in hospital-based inpatient units, and Group II consisted of all nurses in the sample, including inpatient nurses. Descriptive statistics were used to portray the reporting behavior and assignment of patient safety grade for both groups. Correlational analyses were conducted to uncover if there was a relationship between the independent variables (attitude toward patient safety incident reporting, injunctive norms regarding patient safety culture, declarative norms regarding patient safety, perceived behavioral control related to patient safety, and perception of psychological safety about patient safety incident reporting and two dependent variables -incident reporting behavior and assignment of patient safety grade.

Logistic and ordinal regression analyses indicated that attitude toward reporting, subjective injunctive norms, subjective declarative norms, perceived behavioral control, and perception of psychological safety were not significant predictors of nurses’ reporting behavior in either group, except psychological safety was significant for the ‘all participants group’. (P=0.015). Psychological safety as a
mediating variable did not appear to impact improved reporting behavior for this group of nurses. In the case of the second dependent variable, namely, nurses assigning a safety grade for their work area, the findings indicated that attitude, injunctive norms, declarative norms, and perceived behavioral control significantly influenced nurses’ assignment of patient safety grade. As a mediator, psychological safety demonstrated a positive significant effect on nurses’ assignment of patient safety grade and appeared to enhance the effect of attitude, injunctive and declarative norms and perceived behavioral control on the patient safety grade assignment.

Chapter 5 will include a discussion of the findings, theoretical and practical implications of the study results, limitations of the study, and recommendations for further research.
Chapter 5: Discussion of Results

This study was an endeavor to apply the theory of planned behavior (TPB) to address the culture of patient safety in hospitals. The overall aim was to identify reasons adverse events go unreported or underreported by nurses. In order to make advances in patient safety, it is essential to first understand why there is a failure to report errors and what beliefs, values, and motivations influence frontline staff to report or not report. When reported, errors could be used as learning opportunities to make improvements and reduce patient harm. In addition, the study sought to identify psychosocial factors that determine how nurses assign a patient safety grade for their work area/unit.

The study used secondary data from the Hospital Survey on Patient Safety Culture (HSOPS) administered in 2017. A review of the literature on error reporting and culture of patient safety identified studies that used the TPB as their conceptual model to understand psychosocial factors associated with the studies’ respective behaviors of interest (Angelis et al., 2017; Armitage & Conner, 2001; Damico, 2014; N. P. Ekayani et al., 2017; Fogarty & Shaw, 2010; Gavaza et al., 2011; Javadi et al., 2013; Ren, Chung, Stoel, & Xu, 2011; Sejwacz, Ajzen, Fishbein, & behavior, 1980; Smith, 2015; Tenkasi & Zhang, 2018). Two behaviors of interest were identified for this study: number of event reports filled out (a proxy for actual event reporting behavior) and assignment of patient safety grade. Both behaviors were self-reported hence not verifiable.
Notwithstanding the TPB’s empirical claim that intention is the antecedent of behavior, this study was not designed to test intention to report or intention to assign a patient safety grade as there were no measures in the HSOPS tool indicative of behavioral intention (Icek Ajzen, 1985). Hence, two actual behaviors were considered the outcomes (dependent variables) for the investigation. It is important to note that the HSOPS was chosen to develop the TPB construct in order to determine if the tool reflected the elements of attitude, subjective norms, and perceived behavioral control and to validate its efficacy. The researcher and two expert scholars who previously conducted studies had using the TPB model coordinated to construct the tool, selecting 31 items from the list of 42 questions in the HSOPSC that best aligned with the variables for the study.

The original TPB was extended by separating subjective norms into injunctive norms and declarative norms. This supported the assertion of Tenkasi and Zhang that “declarative norms represent the opinions and attitudes of society and institutions toward some behavior, and personal injunctive norms represent personal opinions and attitudes of familiarity, internalization, and personalization of the declarative norms.” More importantly, the authors stated, “Declarative norms and injunctive norms do not demonstrate the same effects” (Tenkasi & Zhang, 2018, p. 132).

Another modification to the TPB in this study was the introduction of a new variable, perception of psychological safety, in addition to attitude, subjective norms (declarative and injunctive), and perceived behavioral control. It was assumed that perception of psychological safety had the potential to impact the behaviors of
interest for this study. The modified model is referred to as the extended theory of planned behavior (ETPB). Addition of other variables to the TPB has been supported by Ajzen “if it can be shown that they capture a significant proportion of the variance in intention and behavior after the theory’s current variables have been taken into account” (Icek Ajzen, 1991). The review of the literature found 12 studies that referred to the model as “extended” or “modified.” A classic study by Godin for example, studied “habit” as a past behavior in addition to the usual TPB variables. (Gaston Godin, 1993).

**Summary of Key Findings**

Key findings are summarized in Table 48 in Chapter 4.

The results for Group I (inpatient nurses) and Group II (all nurses) were similar. This is largely due to the fact that Group I is a subgroup and constituted 51 percent of Group II. The total sample consisted of 4,992 nurses. The sample was distributed into these distinct groups to uncover any differences between inpatient nurses and non-inpatient nurses regarding the factors predicting the patient safety behaviors. The assumption was that inpatient nurses spend more time with patients and are more likely to witness or make errors. As a result, they might be more likely to report errors and might have a better perception of the appropriate patient safety grade.

After reviewing the descriptive statistics on the characteristics of the study variables for both groups, what stood out was the data on reporting events. It is noteworthy that 26.8 percent of the inpatient nurses did not voluntarily report any
errors during the past 12 months and 42.2 percent reported only 1–2 errors during the same timeframe. In a recent culture of safety survey completed by hospital personnel at a midwestern hospital, only 33 percent of the 1,070 staff members reported at least one patient safety incident during the past 12 months (Gavaza et al., 2011). This low reporting of errors was further supported by an unpublished doctoral study that found 40.2 percent of participants reported no errors and 37.5 percent reported 1–2 errors in a 12-month period (Drake, 2015). Although much work has been done locally, regionally, and nationally to improve error reporting in hospitals, high rates of underreporting are still prevalent.

Many errors in health care go unreported for a variety of reasons, including fear of disciplinary actions, embarrassment, and the fact that reporting may not result in actual change (VanGeest & Cummins, 2003). According to Lucian Leape, nurses intercept 86 percent of errors and these errors mostly do not get reported. (L. L. Leape, 2002). In the current study, almost 27 percent of nurses did not report any errors. It can be inferred that this group might have caught or prevented the error from occurring and therefore “did not report” it (P. J. Pronovost et al., 2006; Vrbnjak et al., 2016). Verbal responses in the researcher’s personal communication with nurses in patient care areas attest to this practice.

Regarding the assignment of patient safety grade, it was remarkable to note that 73.5 percent of both groups combined graded their work areas/units as “Very Good” or “Excellent.” This is significantly representative of a favorable perception of the prevailing culture of patient safety. It is postulated that healthcare workers’
perception of patient safety, the number of adverse events they report, their ability to speak up without fear of retribution, and their assignment of a favorable patient safety grade to their work area/unit place are key components of a strong patient safety culture (El-Jardali, Dimassi, Jamal, Jaafar, & Hemadeh, 2011). While the study found that almost three-quarters of nurses thought favorably of the safety culture of their work area/unit, this was not reflected in their error reporting rates. The low rate of reported errors could be directly be related to a generalized low error rates in the survey population, it could also mean that the participants did not want to report errors caused by others and the misconception that “there is nothing to report because there was no harm done to the patient”.

**Reporting Patient Safety Incidents**

The first dependent variable was nurses’ reporting of patient safety incidents. The study found that the combination of attitude, injunctive norms, declarative norms, perceived behavioral control, and perception of psychological safety did not predict the likelihood of nurses reporting patient safety incidents. Injunctive norms had a significant inverse relationship to the reporting behavior. It is seemingly odd that Injunctive Norms had such a strong, but negative influence on reporting behavior. Thus, a higher injunctive norm score is associated with a lower frequency of reporting behavior. Perhaps a more positive opinion of the work environment is associated with lower reporting. It is conceivable that, if people have a positive opinion of the environment, they are inclined to report less, because the opinion of the environment overshadows the need to report. The TPB model did not demonstrate
statistical significance for the expected predictability for nurses’ error reporting behavior. It could not account for any significant degree of variation in reporting from the base model unlike similar studies that were done on nurses and other healthcare personnel in different settings and locations that did show overall high predictability for intention to report. One study on nurse anesthetists using logistic regression found that the combination of attitude toward reporting and social pressure to report best predicted the likelihood that a nurse anesthetist will use an incident reporting system (Damico, 2014). There was no increase in the predictive value of the model with the addition of perceived control over reporting. Another study on pharmacists using the TPB as the empirical model found that perceived behavioral control did not predict intent to report but attitude and subjective norm did contribute positively (Gavaza et al., 2011). Attitude, perceived behavioral control, and subjective norms combined accounted for 34 percent of the variation in reporting. It was interesting to note that the study added past reporting behavior and perceived moral obligation to the constructs, which significantly added to the variance in reporting. The study bears resemblance to the current study in that the researchers also tested new constructs.

The finding that perception of psychological safety did not have a significant relationship with reporting patient safety incidents and assigning of patient safety grade in Group I and had only a very weak level of significance in Group II was unexpected. The hypothesis therefore was rejected. While this is contrary to expectations, a conceivable reason for this finding could be that psychological safety was not perceived to be significant for reporting and assigning a grade. The questions
in the survey measured participants’ perception of patient safety, but they did not
directly address specific factors associated with reporting or not reporting errors. It is
conceivable that favorable attitude to report errors even when the error did not harm
the patient did not correlate with participants’ verbalized reporting behavior.

Similarly, injunctive norms, which were operationalized as personal opinions,
beliefs, and attitudes about work and the work environment, did not show a positive
relationship with reporting behavior. Likewise, declarative norms, which referred to
identification with the opinions and desirable behaviors of peers and managers in the
environment, did not predict a positive relationship with reporting errors. Lastly,
perceived behavioral control was operationally defined to be an external determinant
of an individual’s perception of ability to perform the behavior. This also was not
determined to be a predictor for reporting behavior. One possible explanation for this
is that positive attitude toward patient safety, favorable disposition about work, and
supportive managers and peers lead to few or no errors to report. It also is possible
that there are other factors that impacted how and why the nurses in this study
reported errors. It is conceivable that the nurses in this study did not have anything to
report because in order to report, an error has to occur. It is important to mention that
only one item measured perceived behavioral control as a variable and that, too, was
an indirect variable operationalized as how open and supportive the environment is to
the nurse’s practice of patient safety. The classical items denoting self-efficacy and
perceived competence were not measured. It would be interesting to further explore
this construct and its role in patient safety incident reporting behavior. The study by (Gavaza et al., 2011) cited a similar challenge.

The logistic regression test of mediation analysis was done to decide whether perception of psychological safety created the effect it was designed to change in the model. The results revealed that there was no increase in the predictive value of the model after adding psychological safety as a mediator. While it was believed that the mediating effects of perceived psychological safety would strengthen the effect of attitudes, injunctive norms, declarative norms, and perceived behavioral control to forecast an increased variation in reporting behavior for the better, the results demonstrated an inverse relationship, suggesting psychological safety did not change reporting behavior in this group. One reason for this finding could be that the observed reporting pattern could not be improved with enhanced psychological safety. Psychological safety was supposed to act as the surrogate or proxy for the ultimate outcome, nurses’ reporting behavior. It is possible that a mediating effect may exist even though the overall relationship may not be statistically significant (MacKinnon, Fairchild, & Fritz, 2007; VanderWeele, 2016). There is no literature to support or refute the role of psychological safety in the model; hence, this variable merit further exploration.

**Assigning Patient Safety Grade**

The second dependent variable in the study was nurses’ assignment of patient safety grade for work unit/area. The five patient safety grade options ranged from “Excellent” to “Poor.” The independent variables for hypotheses testing were the
same as for the first dependent variable (attitude toward patient safety, injunctive norms, declarative norms, perceived behavioral control, and perception of psychological safety).

As hypothesized, nurses’ attitudes, injunctive norms, declarative norms, and perceived behavioral control were significant predictors of nurses’ assignment of patient safety grade in both groups. However, perception of psychological safety was not a predictor when treated as an independent variable. The combination of attitude, injunctive norms, declarative norms, and perceived behavioral control explained a statistically significant amount of variance in assigning a patient safety grade for the work area/unit. This is a meaningful variation as similar studies on other behaviors like reporting adverse drug events, using an event reporting system, purchasing low carbon products, or patronizing sustainable restaurants found the variance in intention or actual behavior of interest increased significantly and in some cases ranged from 18–46 percent (Angelis et al., 2017; Lapkin et al., 2015; Smith, 2015; Tommasetti, Singer, Troisi, & Maione, 2018).

When perception of psychological safety was added as a mediating variable, as projected it was successful in increasing the strength of the relationship between the predictor variables and patient safety grade over and above the direct effect of the indirect variables. Thus, it appears there was evidence for the proposed mediating role of perceived patient safety. It is possible that the strength of the independent variables also could have contributed; in other words, the change in the indirect variables could have contributed to the change in the mediating variable. This was not tested in the
study. Previous studies have reported mixed results with mediation tests, particularly with intention as the mediating variable. In an interesting study on condom use and negotiation with new partners, the researchers did not find any mediation effect (White, Terry, & Hogg, 1994). However, in a study on the adoption and maintenance of physical exercise, three factors (planning, maintenance self-efficacy, and action control) were the mediators between exercise intentions and physical activity (Sniehotta, Scholz, & Schwarzer, 2005). All three were found to be positive mediators between earlier exercise intentions and later physical activity. It is intriguing to discover that the mediating effect of perception of psychological safety was significant in the current study.

In conclusion, it appears that the TPB is a better model for understanding and predicting nurses’ assignment of patient safety grade than for understanding and predicting patient incident reporting behavior. This requires further exploration possibly by repeating the study using the classical TPB questionnaire for all the variables in the study, including perception of psychological safety as a mediating variable for nurses’ error reporting behavior.

**Implications for Theory**

This study potentially proposes an extension of the pivotal TPB model by introducing one new variable, perception of psychological safety. However, this needs to be explored in greater detail. Past studies have added variables to supplement the basic TPB model and enriched its value without taking away its fundamental
tenets. In doing so, research builds on the foundational concepts of the TPB to include emerging influences on behaviors that vary according to the industry and culture.

**Implications for Practice**

This study was conducted to help unravel the complex problem of patient harm due to accidental mistakes that do not get reported and fixed by changing systems, processes, and practices. The TPB model with its modifications is suited to address this provided the design of the research is tweaked appropriately. There is empirical evidence to show the predictive validity of the model to understand the relationship between intention and behavior. This is relevant in healthcare because caregiving is a human process despite advances in technology. TPB-based research can be undertaken to implement theory-based interventions in hospitals (Tenkasi & Zhang, 2018). These have been applied successfully in several change management processes in healthcare settings. In the context of human behavior, change involves attitudes, which can be influenced by personal values and beliefs, and subjective norms, which were operationalized as injunctive and declarative norms in this study. The concept of perceived behavioral control also can be applied to change management by empowering caregivers to give them the self-efficacy and autonomy to make patient-centered and safety-centered decisions and by creating shared governance structures and processes that will engage all employees in creating and managing safety goals. Training to support the empowerment of all levels of staff and management to advocate for patient safety is indicated based on the evidence that reporting behavior is lagging, and staff may not understand why they need to report
errors. These are practical implications that can be tried and tested in an iterative manner with the help of the TPB model.

**Limitations**

This study had several limitations. The chief limitations are explained here with possible recommendations to resolve them.

Because this was a nonexperimental cross-sectional study, the results cannot be interpreted to have causal inferences because the study did not control for all appropriate confounding variables. However, by using a theory-centered approach, it may be possible to make inferences. This issue also can be addressed by conducting a longitudinal study to establish the causality. A cross-sectional study design using existing data does not lend itself to testing behaviors because the data is past behavior. The way to overcome this limitation is to conduct a prospective study preferably with a longitudinal design. It is being recommended to test the TPB model on actual reporting behavior as opposed to self-reported behavior and to conduct experimental studies to test the effect of interventions based on the predictability of the model for actual improved behavior.

The data used for the study was existing secondary data gathered from the HSOPS. The primary study design and data collection survey tool did not have demographic data that would explain the sample fully. For example, there was no data on age, gender, education, and length of shift worked, which may have facilitated a deeper analysis. In addition, data gathered from a single source is susceptible to confounding effects of common method bias.
Although the survey was done anonymously, there still exists the potential that the results could be biased due to social desirability, or participants giving what they believe to be socially desirable responses.

The study was done on one group of nurses in one state and only on nurses. This may limit the generalizability of the results to all nurses in other states and regions and to other members of the healthcare team. This can be addressed by testing the model on nurses in other settings and on other healthcare staff and performing a comparative analysis.

The responses to the questions for the dependent variables were self-reports and therefore do not necessarily reflect actual behavior. There was no way to validate actual patient safety incident reports. The researcher attempted to obtain data on error reports for one or more hospitals but was not successful because the data is not publicly available and because it is considered protected information. In addition, reporting is confidential, and anonymity is offered as an option. In order to strengthen the integrity of outcomes data, it is essential to find enhanced data collection methods that offer secure reliability.

Summary

Guided by the empirical and proven theoretical model of the TPB, a non-experimental, correlational, cross-sectional study employing secondary data was conducted to explore psychosocial factors that might predict nurses’ error reporting behavior and assignment of patient safety grade for the work unit/area.
Contrary to expectations and the results of similar studies (Damico, 2014; N. P. Ekayani et al., 2017; Javadi et al., 2013; Walker & Lowe, 1998), this study did not find support for the first set of hypotheses related to the first behavior of interest, specifically, nurses’ error reporting behavior. In this study, the TPB model did not seem to be a good fit for predicting reporting behavior as evidenced by the results. in Psychological safety was a weakly positive predictor for error reporting behaviors, and influence of desirable behaviors from peers (DN), personal internalized beliefs about safety-related work (IN), support for patient safety at the workplace (PBC), did not predict higher patient safety incident reporting among nurses in this study. It is conceivable that a more positive opinion of the work environment was associated with lower reporting. It also is plausible that nurses believed they did not need to report errors that were intercepted before a patient was harmed. This finding requires further exploration.

The second set of hypotheses tested the correlation between the same predictor variables and the second behavior of interest, nurses’ assignment of a patient safety grade for the work unit/area. All the predictors were found to be significantly correlated with a higher patient safety grade. In the mediation analysis, perception of psychological safety had a significant positive effect on attitude, injunctive norms, declarative norms, and perceived behavioral control to predict higher patient safety grade assignment by nurses.
In summary, based on the results of the analysis for both dependent variables, the applicability of TPB is more relevant to the behavior of "assigning a patient safety grade" than "reporting error events".

Chapter 6 will detail recommendations for further research and discuss contributions to the field of organization development.
Chapter 6: Conclusion

Mistakes in work practices are ubiquitous and permeate most industries and occupations. Healthcare is no exception. Medical errors can be fatal, serious, potentially serious, or near-misses, meaning they do not result in any harm. Errors can kill—but silence about errors can kill, too. While it is important to acknowledge that “to err is human,” it is equally important to acknowledge that something good can come out of errors if we seek to learn from them. Learning can happen if errors are divulged. Mistakes in healthcare happen every day, and they tend to go unreported. Even when they are reported, there are far more errors than error reports. Several reasons for the failing to report or under-reporting of errors have been cited in the literature. Regardless of the reason, when errors are not reported, it limits the healthcare industry’s opportunity to learn and improve in order to reduce harm.

This study tested the applicability of the TPB, a proven empirical model, to examine nurses’ patient safety incident reporting behavior and assignment of patient safety grade to the work unit/area using secondary data. The analyses of the data revealed two distinct findings. The first related to the behavior of reporting adverse events and near-misses. Contrary to expectations, the study found that error reporting is a complex behavior and there are several factors that impact it. That perhaps explains why the study results did not support the model of the TPB. The model did not predict that attitude, injunctive norms, declarative norms, perceived behavioral control, and perception of psychological safety were factors that explain error reporting by nurses. This suggests that the questions on the HSOPS must be tested in
a future study to see if they align with the constructs of the theory. There are several reasons why nurses underreport errors and identifying what motivates or demotivates nurses to report still remains to be explored.

The second finding related to nurses’ assignment of patient safety grade for the work area/unit. The hypotheses for this model were supported. Attitude, injunctive norms, declarative norms, perceived behavioral control, and perception of psychological safety were found to significantly predict the grade the nurse would assign. It was hypothesized that perception of psychological safety would mediate the relationship between attitudes, injunctive norms, declarative norms, and perceived behavioral control and the nurses’ assignment of patient safety grade. Regression analyses concluded that perception of psychological safety significantly mediated the correlation.

The results of this study affirmed that the culture of patient safety determines the behavior of nurses. The factors that influenced nurses’ valuation of patient safety grade for the work area/unit were attitude about patient safety, positive experience of work and a supportive environment, desirable safety behaviors among peers and managers, and the perception of psychological safety. Because the hypotheses regarding nurses’ error reporting behavior were not substantiated, this area requires further exploration with a more accurate conceptualization of the predictor variables and a qualitative methodology to gain a deeper understanding of contributing causes for underreporting adverse events in hospitals.
**Research Implications and Recommendations for Research**

This study advances the value of quantitative research using a theory-oriented model to understand the culture of patient safety regarding error reporting and the assignment of patient safety grade for the work area/unit. It also pointed to the possibility of theory-based interventions to address discrepancies in error reporting.

A longitudinal investigation on the effect of the TPB-based intervention on future error reporting behaviors would offer additional insight. The current study demonstrated that conducting tests prospectively rather than retrospectively would provide stronger and more realistic predictions of behavior. It also demonstrated that it is possible to include not only patient safety behaviors, but also behaviors like caring and compassionate behaviors and perform comparative analyses to find the interrelatedness of essential therapeutic nursing behaviors.

The limitations of the study sample demonstrated the value of adding age as a variable in future studies because behavior could vary according to the age of the participants. There are generational differences in behavior traits, and it would be interesting to evaluate error reporting behavior in Generation X, millennials, and Generation Z.

Finally, the study can be replicated with other professional groups in healthcare to compare the predictors of target behaviors.

The study provided a basic understanding of the values, beliefs, and cultural concepts that contributed to the formation of the behaviors of interest. It also provided a foundation for future research involving an exploratory factor analysis followed by
a confirmatory factor analysis to better operationalize the items for the variables. This is being recommended for future research. The study should be replicated using prospective data and verifiable actual incident reporting behavior preceded by a survey to assess intent to report.

**Contributions to the Field of Organization Development**

The theory and practice of Organization Development (OD) as applied to healthcare is most impactful in the areas of change management, cultural transformation, and strategy deployment for organizational effectiveness. This exploratory study on the psychosocial factors that determine reporting behavior among nurses is a direct application of the systems theory of charge management preceded by the understanding of the cultural context of human behavior.

The choice of the TPB as the study’s theoretical framework supports the famous words of Lewin, who stated, “There is nothing so practical as a good theory” (Lewin, 1951, p. 169). In the words of Burke, Lake, and Paine (2009), “OD has become the standard-bearer for Kurt Lewin’s pioneering work on behavioral science in general, and approach to planned change in particular” (Burnes, 2004). This study is an affirmation of the truth in that statement. The purpose of the study was to understand the factors contributing to an organizational problem, and the results can be used to promote the change through action research, which contributes to OD.

The theory of planned behavior could advance as a theory-based change management approach in OD. The model of the TPB has been empirically tested and
is accepted as a leading research tool with broad-based applicability for behavior management interventions. The advancement of this theory-based change management approach for research in Organization Development would effectively add to the body of knowledge with significant scope for integrating theory and practice.
Appendix A: Model 1: Theory of Planned Behavior (Modified) – Direct Effect Between Independent Variables (ATT, IN, DN, PBC, PPS) to Predict Dependent Variable (PSI)
Appendix B: Model 1a: Theory of Planned Behavior (Modified) – Direct Effect Between Independent Variables (ATT, IN, DN, PBC, PPS) to Predict Dependent Variable (PSI) – Group I – Inpatient Nurses with Regression Coefficients

![Diagram of the Theory of Planned Behavior Model](attachment:image.png)
Appendix C: Model 2: Theory of Planned Behavior (Modified) – Mediating Effect of PPS to Predict PSI by Nurses in Group I
Appendix D: Model 2a: Theory of Planned Behavior (Modified) – Mediating Effect of PPS to Predict PSI by Nurses – Group I – Inpatient Nurses with Regression Coefficients
Appendix E: Model 3: Theory of Planned Behavior (Modified) – Direct Effect Between Independent Variables (ATT, IN, DN, PBC, PPS) to Predict Dependent Variable – Nurses’ Assignment of Patient Safety Grade for Work Area/Unit (PSG) Group I
Appendix F: Model 3a: Theory of Planned Behavior (Modified) – Direct Effect Between Independent Variables (ATT, IN, DN, PBC, PPS) to Predict Dependent Variable – Nurses’ Assignment of Patient Safety Grade for Work Area/Unit (PSG) – Group I – Inpatient Nurses with Regression Coefficients
Appendix G: Model 4: Theory of Planned Behavior (Modified) – Mediating Effect of PPS to Predict PSG by Inpatient Nurses
Appendix H: Model 4a: Theory of Planned Behavior (Modified) – Mediating Effect of PPS to Predict PSG by Nurses – Group I – Inpatient Nurses with Regression Coefficients

ATTITUDE

INJUNCTIVE NORMS

DECLARATIVE NORMS

PERCEIVED PSYCHOLOGICAL SAFETY (SCALE Y/N)

PERCEIVED BEHAVIORAL CONTROL

\[ b=1.048 \quad (P<0.001) \]

PATIENT SAFETY GRADE (PSG)
Appendix I: Model 1b: Theory of Planned Behavior (Modified) – Direct Effect Between Independent Variables (ATT, IN, DN, PBC, PPS) to Predict Dependent Variable (PSI) – Group II – All Nurses with Regression Coefficients
Appendix J: Model 2b: Theory of Planned Behavior (Modified) – Mediating Effect of PPS to Predict PSI by Nurses – Group II – All Nurses with Regression Coefficients

![Diagram showing the relationship between attitude, injunctive norms, declarative norms, perceived psychological safety, and reporting behavior.]

- ATTITUDE
- INJUNCTIVE NORMS
- DECLARATIVE NORMS
- PERCEIVED BEHAVIORAL CONTROL
- PERCEIVED PSYCHOLOGICAL SAFETY
- REPORTING BEHAVIOR (PSI) (SCALE AS Y/N)

B = .34
(p = .033)
Appendix K: Model 3b: Theory of Planned Behavior (Modified) – Direct Effect Between Independent Variables (ATT, IN, DN, PBC, PPS) to Predict Dependent Variable – Nurses' Assignment of Patient Safety Grade for Work Area/Unit (PSG) – Group II – All Nurses with Regression Coefficients
Appendix L: Model 4b: Theory of Planned Behavior (Modified) – Mediating Effect of PPS to Predict PSG by Nurses – Group II – All Nurses with Regression Coefficient
## Appendix M: Power Statistics

[U:\ADAA\Agnes Therady\Indiana Data Set for Analysis.sav]

Two Tailed Sample size for power of .80/Effect size

<table>
<thead>
<tr>
<th>Group Statistics</th>
<th>Reported an Event</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Pooled SD</th>
</tr>
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<tbody>
<tr>
<td>Attitude Toward Behavior 1286/0.17</td>
<td>No, have not</td>
<td>1422</td>
<td>3.8748</td>
<td>0.92360</td>
<td>0.84552</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>Yes, have not</td>
<td>3248</td>
<td>3.7228</td>
<td>0.86653</td>
<td></td>
</tr>
<tr>
<td></td>
<td>reported event</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Declarative Norms 762/0.22</td>
<td>No, have not</td>
<td>1449</td>
<td>3.9410</td>
<td>0.60403</td>
<td>0.610944</td>
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<td>reported events</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes, have not</td>
<td>3187</td>
<td>3.8071</td>
<td>0.61779</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Inductive norms 362/0.32</td>
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<td>3.6753</td>
<td>0.68418</td>
<td>0.719361</td>
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<td>reported events</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes, have not</td>
<td>3158</td>
<td>3.4454</td>
<td>0.75290</td>
<td></td>
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<tr>
<td></td>
<td>reported event</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Behavioral Control 652/0.24</td>
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<td>1563</td>
<td>3.8663</td>
<td>0.92934</td>
<td>0.967852</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes, have not</td>
<td>3337</td>
<td>3.6380</td>
<td>1.00489</td>
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<td></td>
<td>reported event</td>
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<td>Psychological Safety 4130/0.09</td>
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<td>1513</td>
<td>3.3891</td>
<td>0.85581</td>
<td>0.884171</td>
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<td></td>
<td>reported events</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes, have not</td>
<td>3275</td>
<td>3.3062</td>
<td>0.91165</td>
<td></td>
</tr>
<tr>
<td></td>
<td>reported event</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix N: IRB Letter

January 2, 2019

Alandra Devall, PhD
Benedictine University
IRB Chair and Professor, College of Education and Health Services
Benedictine University
5700 College Road
Lisle, IL 60532

RE: Agnes Therady—Patient Safety Theory of Planned Behavior —Data Use Approval

Dear Dr. Deval and Benedictine Institutional Review Board:

Agnes Therady is approved to utilize existing data on the Hospital Survey on Patient Safety Culture™ owned by The Indiana Hospital Association (IHA) for the purposes of her dissertation.

One data subset of nurse responses is provided to Ms. Therady for the purpose of investigating the relationship between select safety culture scales and nurses’ error reporting behavior and assignment of hospital patient safety grade utilizing a modified theory of planned behavior.

Description of data set: AHRQ Hospital Survey on Patient Safety Culture data for 2017

Data that is archived with the IHA will be de-identified and made available through the formal processes of the organization for the purposes of a dissertation at Benedictine University. The student researcher is supported to proceed.

Sincerely,

Rebecca Hancock, PhD, CNS, RN
Patient Safety & Quality Advisor
Indiana Hospital Association
500 North Meridian Street, Suite 250
Indianapolis, Indiana 46204

cc. Dr. Ramkrishnan Tenkasi, PhD., Benedictine University Dissertation Chair
<table>
<thead>
<tr>
<th>Rotated Factor Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>F7Recode F7 Reoded</td>
</tr>
<tr>
<td>F3Recode F3 Reoded</td>
</tr>
<tr>
<td>F2Recode F2 Reoded</td>
</tr>
<tr>
<td>F4</td>
</tr>
<tr>
<td>F10</td>
</tr>
<tr>
<td>F6Recode F6 Reoded</td>
</tr>
<tr>
<td>F5Recode F5 Reoded</td>
</tr>
<tr>
<td>F11Recode F11 Reoded</td>
</tr>
<tr>
<td>A14Recode A14 Reoded</td>
</tr>
<tr>
<td>A17Recode A17 Reoded</td>
</tr>
<tr>
<td>A2</td>
</tr>
<tr>
<td>A15</td>
</tr>
<tr>
<td>A5Recode A5 Reoded</td>
</tr>
<tr>
<td>A18</td>
</tr>
<tr>
<td>A7Recode A7 Reoded</td>
</tr>
<tr>
<td>F1</td>
</tr>
<tr>
<td>A6</td>
</tr>
<tr>
<td>F9Recode F9 Reoded</td>
</tr>
<tr>
<td>C5</td>
</tr>
<tr>
<td>C3</td>
</tr>
<tr>
<td>C1</td>
</tr>
<tr>
<td>A13</td>
</tr>
<tr>
<td>C2</td>
</tr>
<tr>
<td>C4 S</td>
</tr>
<tr>
<td>A9</td>
</tr>
<tr>
<td>A1</td>
</tr>
<tr>
<td>A3</td>
</tr>
<tr>
<td>A4</td>
</tr>
<tr>
<td>A11</td>
</tr>
<tr>
<td>B2</td>
</tr>
<tr>
<td>B1</td>
</tr>
<tr>
<td>B3Recode B3 Reoded</td>
</tr>
<tr>
<td>B4Recode B4 Reoded</td>
</tr>
<tr>
<td>D2</td>
</tr>
<tr>
<td>D3</td>
</tr>
<tr>
<td>D1</td>
</tr>
<tr>
<td>A8Recode A8 Reoded</td>
</tr>
<tr>
<td>A12Recode A12 Reoded</td>
</tr>
<tr>
<td>A16Recode A16 Reoded</td>
</tr>
<tr>
<td>F8</td>
</tr>
</tbody>
</table>

**Hospital factor - ignore - remove and re-factor**

**ATTITUDE**
Established - removed and re-factored

**PSYCHOLOGICAL SAFETY**
Established - removed and re-factored

**Perceived behavioral control**

<table>
<thead>
<tr>
<th>Attitude Toward Behavior</th>
<th>D1, D2, D3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjective Declarative Norms</td>
<td>A1, A3, A4, A11, A13, B1, B2, C1, C2, C3, C4, C5, C6</td>
</tr>
<tr>
<td>Subjective Injunctive Norms</td>
<td>A2, A7, A10, A14, A15, A17, A18, F8, F9</td>
</tr>
<tr>
<td>Perception of Psychological Safety</td>
<td>A8, A12, A16</td>
</tr>
<tr>
<td>Perceived Behavioral Control towards patient safety</td>
<td>F1</td>
</tr>
</tbody>
</table>

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Appendix O: AHRQ Hospital Survey on Culture of Patient Safety

SOPS™ Hospital Survey

Version: 1.0
Language: English

Note

- For more information on getting started, selecting a sample, determining data collection methods, establishing data collection procedures, conducting a Web-based survey, and preparing and analyzing data, and producing reports, please read the Survey User's Guide.

- For the survey items grouped according to the safety culture composites they are intended to measure, please read the Items and Composites document.

- To participate in the AHRQ Hospital Survey on Patient Safety Culture Comparative Database, the survey must have been administered in its entirety without significant modifications or deletions:
  - No changes to any of the survey item text and response options.
  - No reordering of survey items.
  - Questions added only at the end of the survey after Section G, before the demographic questions in Section H.

For assistance with this survey, please contact the SOPS Help Line at 1-888-324-9749 or SafetyCultureSurveys@westat.com.
Hospital Survey on Patient Safety

Instructions

This survey asks for your opinions about patient safety issues, medical error, and event reporting in your hospital and will take about 10 to 15 minutes to complete.

If you do not wish to answer a question, or if a question does not apply to you, you may leave your answer blank.

- An "event" is defined as any type of error, mistake, incident, accident, or deviation, regardless of whether or not it results in patient harm.
- "Patient safety" is defined as the avoidance and prevention of patient injuries or adverse events resulting from the processes of health care delivery.

SECTION A: Your Work Area/Unit

In this survey, think of your "unit" as the work area, department, or clinical area of the hospital where you spend most of your work time or provide most of your clinical services.

What is your primary work area or unit in this hospital? Select ONE answer.

☐ a. Many different hospital units/No specific unit
☐ b. Medicine (non-surgical) ☐ h. Psychiatry/mental health
☐ c. Surgery ☐ i. Rehabilitation
☐ d. Obstetrics ☐ j. Pharmacy
☐ e. Pediatrics ☐ k. Laboratory
☐ f. Emergency department ☐ l. Radiology
☐ g. Intensive care unit (any type) ☐ m. Anesthesiology

☐ n. Other, please specify: ________________________________

Please indicate your agreement or disagreement with the following statements about your work area/unit.

Think about your hospital work area/unit...

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. People support one another in this unit</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>2. We have enough staff to handle the workload</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>3. When a lot of work needs to be done quickly, we work together as a</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>team to get the work done</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. In this unit, people treat each other with respect</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>5. Staff in this unit work longer hours than is best for patient care</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
</tbody>
</table>
**SECTION A: Your Work Area/Unit (continued)**

Think about your hospital work area/unit...

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>We are actively doing things to improve patient safety</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>7.</td>
<td>We use more agency/temporary staff than is best for patient care</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>8.</td>
<td>Staff feel like their mistakes are held against them</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>9.</td>
<td>Mistakes have led to positive changes here</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>10.</td>
<td>It is just by chance that more serious mistakes don't happen around here</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>11.</td>
<td>When one area in this unit gets really busy, others help out</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>12.</td>
<td>When an event is reported, it feels like the person is being written up, not the problem</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>13.</td>
<td>After we make changes to improve patient safety, we evaluate their effectiveness</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>14.</td>
<td>We work in 'crisis mode' trying to do too much, too quickly</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>15.</td>
<td>Patient safety is never sacrificed to get more work done</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>16.</td>
<td>Staff worry that mistakes they make are kept in their personnel file</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
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<tr>
<td>17.</td>
<td>We have patient safety problems in this unit</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>18.</td>
<td>Our procedures and systems are good at preventing errors from happening</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

**SECTION B: Your Supervisor/Manager**

Please indicate your agreement or disagreement with the following statements about your immediate supervisor/manager or person to whom you directly report.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>My supervisor/manager says a good word when he/she sees a job done according to established patient safety procedures</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>2.</td>
<td>My supervisor/manager seriously considers staff suggestions for improving patient safety</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>3.</td>
<td>Whenever pressure builds up, my supervisor/manager wants us to work faster, even if it means taking shortcuts</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>4.</td>
<td>My supervisor/manager overlooks patient safety problems that happen over and over</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
SECTION A: Communications

How often do the following things happen in your work area/unit?

| 1. We are given feedback about changes put into place based on event reports. |
| 2. Staff freely speak up if they see something that may negatively affect patient care. |
| 3. We are/are not informed about errors that happen in this unit. |
| 4. Staff feel free to question the decisions or actions of those with more authority. |
| 5. In this unit, we discuss ways to prevent errors from happening again. |
| 6. Staff are afraid to ask questions when something does not seem right. |

SECTION B: Frequency of Events Reported

In your hospital work area/unit, when the following mistakes happen, how often are they reported?

| 1. When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported? |
| 2. When a mistake is made, but has no potential to harm the patient, how often is this reported? |
| 3. When a mistake is made that could harm the patient, but does not, how often is this reported? |

SECTION C: Patient Safety Grade

Please give your work area/unit in this hospital an overall grade on patient safety.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>Very Good</td>
<td>Acceptable</td>
<td>Poor</td>
<td>Failing</td>
</tr>
</tbody>
</table>

SECTION D: Your Hospital

Please indicate your agreement or disagreement with the following statements about your hospital.

| 1. Hospital management provides a work climate that promotes patient safety. |
| 2. Hospital units do not coordinate well with each other. |
| 3. Things "fall between the cracks" when transferring patients from one unit to another. |
| 4. There is good cooperation among hospital units that need to work together. |
SECTION F: Your Hospital (continued)

Think about your hospital...

5. Important patient care information is often lost during shift changes
   □ Strongly Disagree □ Disagree □ Neither □ Agree □ Strongly Agree

6. It is often unpleasant to work with staff from other hospital units
   □ Strongly Disagree □ Disagree □ Neither □ Agree □ Strongly Agree

7. Problems often occur in the exchange of information across hospital units
   □ Strongly Disagree □ Disagree □ Neither □ Agree □ Strongly Agree

8. The actions of hospital management show that patient safety is a top priority
   □ Strongly Disagree □ Disagree □ Neither □ Agree □ Strongly Agree

9. Hospital management seems interested in patient safety only after an adverse event happens
   □ Strongly Disagree □ Disagree □ Neither □ Agree □ Strongly Agree

10. Hospital units work well together to provide the best care for patients
    □ Strongly Disagree □ Disagree □ Neither □ Agree □ Strongly Agree

11. Shift changes are problematic for patients in this hospital
    □ Strongly Disagree □ Disagree □ Neither □ Agree □ Strongly Agree

SECTION G: Number of Event Reports

In the past 12 months, how many event reports have you filled out and submitted?
   □ a. 0 event reports □ d. 6 to 10 event reports
   □ b. 1 to 2 event reports □ e. 11 to 20 event reports
   □ c. 3 to 5 event reports □ f. 21 event reports or more

SECTION H: Background Information

This information will help in the analysis of the survey results.

1. How long have you worked in this hospital?
   □ a. Less than 1 year □ d. 11 to 15 years
   □ b. 1 to 5 years □ e. 16 to 20 years
   □ c. 6 to 10 years □ f. 21 years or more

2. How long have you worked in your current hospital work area/units?
   □ a. Less than 1 year □ d. 11 to 15 years
   □ b. 1 to 5 years □ e. 16 to 20 years
   □ c. 6 to 10 years □ f. 21 years or more

3. Typically, how many hours per week do you work in this hospital?
   □ a. Less than 20 hours per week □ d. 50 to 70 hours per week
   □ b. 20 to 30 hours per week □ e. 30 to 40 hours per week
   □ c. 40 to 50 hours per week □ f. 100 hours per week or more
SECTION III: Background Information (continued)

4. What is your staff position in this hospital? Select ONE answer that best describes your staff position.
   a. Registered Nurse
   b. Physician Assistant/Nurse Practitioner
   c. LVN/LPN
   d. Patient Care-Hospital Aide/Care Partner
   e. Attending/Staff Physician
   f. Resident Physician/Physician in Training
   g. Pharmacist
   h. Dietitian
   i. Unit Assistant/Clerk/Secretary
   j. Respiratory Therapist
   k. Physical, Occupational, or Speech Therapist
   l. Technician (e.g., EKG, Lab, Radiology)
   m. Administration/Management
   n. Other, please specify: ____________________________

5. In your staff position, do you typically have direct interaction or contact with patients?
   a. YES, typically have direct interaction or contact with patients.
   b. NO, typically do NOT have direct interaction or contact with patients.

6. How long have you worked in your current specialty or profession?
   a. Less than 1 year
   b. 1 to 5 years
   c. 6 to 10 years
   d. 11 to 15 years
   e. 16 to 20 years
   f. 21 years or more

SECTION IV: Your Comments:

Please feel free to write any comments about patient safety, error, or event reporting in your hospital.

THANK YOU FOR COMPLETING THIS SURVEY.
Appendix P: Extended theory of Planned Behavior

EXTENDED THEORY OF PLANNED BEHAVIOR

ATTITUDE

INJUNCTIVE NORMS

DECLARATIVE NORMS

PERCEIVED BEHAVIORAL CONTROL

PSYCHOLOGICAL SAFETY

REPORTING
BEHAVIOR
DEPENDENT VARIABLE I

PATIENT SAFETY
GRADE
DEPENDENT VARIABLE II

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## Appendix Q: ETPB Tool

<table>
<thead>
<tr>
<th>TPB Variables</th>
<th>Survey Item #</th>
<th>Culture of patient safety survey statement</th>
<th>Response Options</th>
</tr>
</thead>
</table>
| **Attitude towards patient safety (IV # 1)** | D1            | When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported? |Never
|                                            |               |                                            |Rarely
|                                            |               |                                            |Sometimes
|                                            |               |                                            |Most of the times
|                                            |               |                                            |Always         |
|                                            | D2            | When a mistake is made, but has no potential to harm the patient, how often is this reported? |Never
|                                            |               |                                            |Rarely
|                                            |               |                                            |Sometimes
|                                            |               |                                            |Most of the times
|                                            |               |                                            |Always |
|                                            | D3            | When a mistake is made that could harm the patient, but does not, how often is this reported |Never
|                                            |               |                                            |Rarely
|                                            |               |                                            |Sometimes
|                                            |               |                                            |Most of the times
|                                            |               |                                            |Always |
| **Declarative norms towards patient safety (IV # 2)** | A1            | People support one another in the unit. |Strongly Disagree
|                                            |               |                                            |Disagree
|                                            |               |                                            |Neither Agree or Disagree
|                                            |               |                                            |Agree
|                                            |               |                                            |Strongly Agree |
|                                            | A3            | When a lot of work needs to be done quickly, we work together as a team to get the work done. |Strongly Disagree
|                                            |               |                                            |Disagree
<p>|                                            |               |                                            |Neither Agree or Disagree |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| A4 | In this unit, people treat each other with respect. | - Agree  
- Strongly Agree  
- Strongly Disagree  
- Disagree  
- Neither Agree or Disagree  
- Agree  
- Strongly Agree |
| A11 | When one area in this unit gets really busy, others help out. | - Strongly Disagree  
- Disagree  
- Neither Agree or Disagree  
- Agree  
- Strongly Agree |
| A13 | After we make changes to improve patient safety, we evaluate their effectiveness. | - Strongly Disagree  
- Disagree  
- Neither Agree or Disagree  
- Agree  
- Strongly Agree |
| B1 | My supervisor/manager says good word when he/she sees a job done according to established patient safety procedures. | - Strongly Disagree  
- Disagree  
- Neither Agree or Disagree  
- Agree  
- Strongly Agree |
| B2 | My supervisor/manager seriously considers staff suggestions for improving patient safety | - Strongly Disagree  
- Disagree  
- Neither Agree or Disagree  
- Agree  
- Strongly Agree |
<table>
<thead>
<tr>
<th></th>
<th>C1</th>
<th>We are given feedback about changes put in to place based on event reports.</th>
</tr>
</thead>
</table>
|   |   | - Never  
|   |   | - Rarely  
|   |   | - Sometimes  
|   |   | - Most of the times  
|   |   | - Always |
|   | C2 | Staff will freely speak up if they are seeing something that may negatively affect patient care. |
|   |   | - Never  
|   |   | - Rarely  
|   |   | - Sometimes  
|   |   | - Most of the times  
|   |   | - Always |
|   | C3 | We are informed about errors that happen in this unit. |
|   |   | - Never  
|   |   | - Rarely  
|   |   | - Sometimes  
|   |   | - Most of the times  
|   |   | - Always |
|   | C4 | Staff feels free to questions on the decisions or actions of those with more authority. |
|   |   | - Never  
|   |   | - Rarely  
|   |   | - Sometimes  
|   |   | - Most of the times  
|   |   | - Always |
|   | C5 | In this unit, we discuss ways to prevent errors happening again. |
|   |   | - Never  
|   |   | - Rarely  
|   |   | - Sometimes  
|   |   | - Most of the times  
|   |   | - Always |
|   | C6 | Staff is afraid to ask questions when something does not seem right. (negatively worded) |
|   |   | - Never  
|   |   | - Rarely  
<p>|   |   | - Sometimes |</p>
<table>
<thead>
<tr>
<th>Injunctive Norms towards patient safety (IV # 3)</th>
<th>A2</th>
<th>We have enough staff to handle the workload.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A15</td>
<td></td>
<td>Patient safety is never sacrificed to get more work done</td>
</tr>
<tr>
<td>A18</td>
<td></td>
<td>Our procedures and systems are good at preventing errors from happening.</td>
</tr>
<tr>
<td>F8</td>
<td></td>
<td>The actions of hospital management show that patient safety is a top priority.</td>
</tr>
<tr>
<td>A10</td>
<td></td>
<td>It is just by chance that more serious mistakes don’t happen here (negatively worded)</td>
</tr>
</tbody>
</table>

- Most of the times
- Always
- Strongly Disagree
- Disagree
- Neither Agree or Disagree
- Agree
- Strongly Agree
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A7</td>
<td>We have patient safety problems in this unit. (negatively worded)</td>
<td>Strongly Disagree  Disagree  Neither Agree or Disagree  Agree  Strongly Agree</td>
</tr>
<tr>
<td>A7</td>
<td>We use more agency/temporary staff than is best for patient care (negatively worded)</td>
<td>Strongly Disagree  Disagree  Neither Agree or Disagree  Agree  Strongly Agree</td>
</tr>
<tr>
<td>A14</td>
<td>We work in “crisis mode” trying to do too much, too quickly (negatively worded)</td>
<td>Strongly Disagree  Disagree  Neither Agree or Disagree  Agree  Strongly Agree</td>
</tr>
<tr>
<td>F9</td>
<td>Hospital management seems interested in patient safety only after an adverse event happens (negatively worded)</td>
<td>Strongly Disagree  Disagree  Neither Agree or Disagree  Agree  Strongly Agree</td>
</tr>
<tr>
<td>Perception of psychological Safety (IV # 4 &amp; Mediating variable - MV)</td>
<td>A8</td>
<td>Staff feels like their mistakes are held against them.</td>
</tr>
<tr>
<td></td>
<td>A12</td>
<td>When an event is reported, it feels like the person is being written up, not the problem (negatively worded)</td>
</tr>
<tr>
<td>---</td>
<td>-----</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>A16</td>
<td>Staff worry that mistakes they make are kept in their personal file. (negatively worded)</td>
</tr>
<tr>
<td>Perceived Behavioral Control towards patient safety (IV # 5)</td>
<td>F1</td>
<td>Hospital management provides a work climate that promotes patient safety.</td>
</tr>
<tr>
<td>Reporting safety event (DV #1)</td>
<td>G1</td>
<td>Actual events reported Item: In the past 12 months, how many event reports have you filled out and submitted</td>
</tr>
<tr>
<td>Assigning patient safety grade (DV #2)</td>
<td>E1</td>
<td>Safety grade assigned to the unit/hospital Item: Please give your work area/unit in this hospital an overall grade on patient safety</td>
</tr>
</tbody>
</table>
Appendix R: Benedictine University Institutional
Review Board Approval Letter

Devall, Alandra <adevall@ben.edu>
to Peter, me, Ramkrishnan

Approved #20180501c.

Alandra Devall, PhD
Professor, Educational Psychologist, IRB Chair, Acting Department Chair
School of Education
Benedictine University
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