Nurses' use of smartphones for work purposes in the Philippines : predictors, outcomes, and issues

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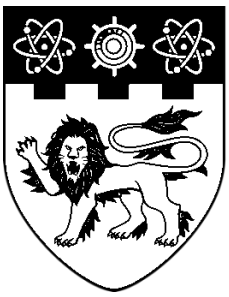

NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE

NURSES' USE OF SMARTPHONES FOR WORK PURPOSES IN THE PHILIPPINES: PREDICTORS, OUTCOMES, AND ISSUES

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Nurses' Use of Smartphones for Work Purposes in the Philippines: Predictors, Outcomes, and Issues

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A thesis submitted to the Nanyang Technological University in partial fulfilment of the requirement for the degree of Doctor of Philosophy

2019

STATEMENT OF ORIGINALITY

I hereby certify that the work embodied in this thesis is the result of original research, is free of plagiarised materials, and has not been submitted for a higher degree to any other University or Institution.

7 May 2019	
Date	John Robert Razote Bautista

SUPERVISOR DECLARATION STATEMENT

I have reviewed the content and presentation style of this thesis and declare it is free of plagiarism and of sufficient grammatical clarity to be examined. To the best of my knowledge, the research and writing are those of the candidate except as acknowledged in the Author Attribution Statement. I confirm that the investigations were conducted in accord with the ethics policies and integrity standards of Nanyang Technological University and that the research data are presented honestly and without prejudice.

7 May 2019	thengyl
Date	Prof. Theng Yin Leng

AUTHORSHIP ATTRIBUTION STATEMENT

This thesis contains materials from 5 papers published in the following peer-reviewed journals where I am the first and corresponding author.

1. **Bautista, J.R.** & Lin, T.T.C. (2016). Sociotechnical analysis of nurses' use of personal mobile phones at work. *International Journal of Medical Informatics, 95*, 71-80. doi: 10.1016/j.ijmedinf.2016.09.002
    - This article is based on interview data collected for Chapter Four.
    - Bautista and Lin contributed to the conception and design of the study.
    - Bautista conducted the interviews.
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    - Bautista wrote the first draft of the manuscript.
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    - Bautista conducted the interviews.
    - Bautista and Lin performed data analysis.
    - Bautista wrote the first draft of the manuscript.
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    - This article is based on survey data collected for Chapter Five.
    - Bautista and Lin conceptualised the study.
    - All authors are responsible for the study design.
    - Bautista collected survey data.
    - Bautista and Rosenthal performed data analysis (i.e., structural equation modelling).
    - Bautista wrote the first draft of the manuscript.
    - All authors discussed the results and contributed to the final manuscript.

4. **Bautista, J.R.**, Rosenthal, S., Lin, T.T.C., & Theng, Y.L. (2018). Psychometric evaluation of the *Smartphone for Clinical Work Scale* to measure nurses' use of smartphones for work purposes. *Journal of the American Medical Informatics Association, 25*(8), 1018-1025. doi: 10.1093/jamia/ocy044
    - This article is based on survey data collected for Chapter Five.
    - Bautista and Lin conceptualised the study.
    - All authors are responsible for the study design.
    - Bautista collected survey data.
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    - Bautista conceived and designed the study.
    - Bautista conducted data collection and data analysis (descriptive analysis, *t*-test, ANOVA).
    - Bautista wrote the first draft and final version of the manuscript.

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ABSTRACT

Although there are studies that highlight how healthcare professionals use smartphones for work purposes, there is a scarcity of knowledge of this phenomenon among nurses – the largest group of healthcare professionals in a hospital. Existing studies are also theoretically and methodologically limited. To address these research gaps, this research aims to determine the factors and issues associated with nurses' use of smartphones for work purposes in the Philippines based on a theoretical framework constructed using the Theory of Planned Behaviour, Organisational Support Theory, and IT Consumerisation Theory. First, an Exploratory Study based on in-depth interviews with 30 nurses in the Philippines was conducted. Results showed that nurses used their smartphones for communication, information seeking, and documentation purposes to facilitate clinical work. It also showed that several behavioural (i.e., instrumental and affective attitudes, injunctive and descriptive norms, perceived behavioural control, and intention) and organisational antecedents (i.e., perceived organisational support) could influence nurses' use of smartphones for work purposes. Moreover, a relevant outcome of its use is enhanced quality of patient care. The study also uncovered some organisational issues that might affect how nurses used smartphones for work purposes. In general, results of the Exploratory Study were used to further develop Study I and Study II. Study I identified the predictors and outcome of nurses' use of smartphones for work purposes. Hypothesis testing used structural equation modelling (SEM) of survey data from 517 staff nurses employed in 19 tertiary-level general hospitals in Metro Manila, Philippines. Exploratory and confirmatory factor analysis results showed that nurses' use

of smartphones for work purposes is operationally defined by its use for communication and information seeking purposes. Next, SEM results showed that injunctive norm and perceived behavioural control were positively associated with intention to use smartphones for work purposes. Moreover, intention was positively associated with nurses' use of smartphones for work purposes. On the other hand, nurses' use of smartphones for work purposes was positively associated with perceived quality of care. Results of the indirect effect analysis showed that perceived organisational support had an indirect effect on nurses' intention to use smartphones for work purposes through injunctive norm and perceived behavioural control. Study II identified organisational issues that influence support to nurses' use of smartphones for work purposes from the perspective of nurse administrators – one of the organisational agents where nurses derive organisational support. Nine focus groups were conducted with 43 nurse-administrators from nine randomly selected tertiary-level general hospitals that were part of Study I. The findings showed that the issues were divided on those that encouraged (i.e., problems with existing workplace technologies, absent or insufficient unit phones, insufficient unit phone credits, and unrealistic policies) or inhibited (i.e., smartphone use for non-work purposes and misinterpretation by patients) nurse administrators to support nurses' use of smartphones for work purposes. Overall, the research findings were used to generate key recommendations on nurses' use of smartphones in hospital settings. These recommendations can be used by hospitals to develop policies on nurses' or healthcare professionals' use of smartphones in hospitals.

CHAPTER ONE INTRODUCTION

Background

The mobile phone is one of the most ubiquitous and adopted devices in the world. As of May 2019, there are more than 8.86 billion mobile phone connections from at least 5.11 billion unique subscribers globally (GSMA Intelligence, 2019). A key reason for its unprecedented adoption is it allows people to overcome time and space barriers in communication and information seeking (Goggin, 2012; Saeb et al., 2015). With a critical mass of users interconnected with each other, mobile phones are inevitably interwoven in the daily routines of our society either for personal or work purposes (Barkhuus & Polichar, 2011; Hampton, Goulet, & Albanesius, 2015).

Scholarly studies on mobile phones show that although it may be used to maintain personal relationships (e.g., calling loved ones, sending a text message to a friend; Donner, 2009; Ling, 2007; 2015), it has also become a necessary tool to facilitate work (Barkhuus & Polichar, 2011; Prasopoulou, Pouloudi, & Panteli, 2006; Stephens & Ford, 2016). For instance, studies on fishermen (Jensen, 2007; Srinivasan & Burrell, 2015), farmers (Muto & Yamano, 2009; Mwakaje, 2010), cloth producers (Jagun, Heeks, & Whalley, 2008), and trishaw operators (Ling, Oreglia, Aricat, Panchapakesan, & Lwin, 2015) show that personally-owned mobile phones were used to enhance the delivery of goods or services. Collectively, these studies provide evidence that such devices are crucial to facilitate work.

Aside from those mentioned above, there is also evidence that nurses– the largest group of healthcare professionals (Kurtzman, Dawson, Johnson, & Sheingold, 2010), are using their mobile phones, particularly their smartphones, for work purposes in hospital settings. For instance, a survey among U.S. nurses showed that 88% use their smartphones for work purposes to access clinical mobile applications and 69% used them for staff communication (Pai, 2015). In the U.K., 80% of nurses and midwives used their smartphones for work purposes (Royal College of Nursing, 2016). Moreover, several studies found that nurses use their smartphones at work to

communicate with members of the healthcare team, search for clinical information, and document several aspects of patient care (e.g., Chiang & Wang, 2016; Flynn, Polivka, & Behr, 2018; McBride, LeVasseur, & Li, 2015a; Mobasheri et al., 2015; Moore & Jayewardene, 2014).

Although nurses' use of smartphones for work purposes provide opportunities to enhance clinical work (McBride et al., 2015a), some hospitals may prohibit its use due to several concerns. These include work distraction (Gill, Kamath, & Gill, 2012; McBride, LeVasseur, & Li, 2015b), increased spread of hospital-acquired infections (Brady, Verran, Damani, & Gibb, 2009; Stein, 2014), and privacy risks (Gill et al. 2012). However, considering that smartphones are increasingly being used by healthcare professionals (Ganasegeran, Renganathan, Rashid, & Al-Dubai, 2017; Mobasheri et al., 2015), some hospitals may opt to allow its use for work purposes (e.g., Elgarico, 2009; Jewish General Hospital, 2013). Whether hospitals become permissive on nurses' use of smartphones for work purposes, it is timely and crucial to examine how and why nurses use them and determine its outcomes in their work. At the same time, it is also crucial to identify issues that can arise from its use and propose solutions geared towards the development of policies on smartphone use that can improve nurses' work conditions and limit potential risks to patients.

Despite the studies that highlighted several advantages and disadvantages of nurses' use of smartphones for work purposes, most of them were from developed countries (e.g., Flynn et al., 2018; McBride et al., 2015a, 2015b; Mobasheri et al., 2015) and were limited to descriptive findings (e.g., identifying the proportion of nurses using smartphones for work purposes). Also, most of them had not been examined from a theoretical point-of-view (e.g., Chiang & Wang, 2016; Flynn et al., 2018; McBride et al., 2015a, 2015b; Mobasheri et al., 2015; Moore & Jayewardene, 2014). Moreover, relevant works focused mainly on community health workers who were provided by researchers with mobile phones (primarily featurephones) for healthcare work (e.g., Braun et al., 2016; Chib, 2010; Lemay, Sullivan, Jumbe, & Perry, 2012; Little et al., 2013; Lori, Munro, Boyd, & Andreatta, 2012; MacLeod, Phillips, Stone, Walji, & Awoonor-Williams, 2012). These research gaps indicate that there is a need to apply a theoretical perspective to identify specific factors

and organisational issues related to nurses' use of smartphones for work purposes. Overall, this research is novel considering that it provides a different context by focusing on nurses (not community healthcare workers) who are using their smartphones (not featurephones) for work purposes in a hospital setting (not community setting).

To contribute knowledge regarding nurses' use of smartphones for work purposes, a study was conducted to identify the predictors and outcomes of nurses' use of smartphones for work purposes. Another study was also conducted to identify organisational issues are related it. Consequently, the findings of these studies were used to develop recommendations on nurses' use of smartphones in hospital settings.

Overall, this research provides several theoretical and practical contributions on the scholarly discourse of healthcare professionals' use of personal devices for work purposes. Beyond, the healthcare domain, this research contributes to literature on organisational communication by highlighting the implications of IT consumerisation in the workplace. On the practical side, this study is relevant to policymaking in hospitals from developing countries where smartphones are used to compensate for the lack of human and technological resources.

Research Rationale

Among various healthcare professionals (e.g., doctors, nurses, pharmacists, etc.), it is essential to take note that nurses' use of mobile technologies can greatly impact patient care since they provide frontline healthcare services and they form the largest group of healthcare professionals in hospitals (Kurtzman et al., 2010), particularly in the Philippines (World Health Organisation, 2011a). In fact, nurses' work often involves extensive communication with several members of the healthcare team (Westbrook, Duffield, Li, & Creswick, 2011) and their smartphones can play an important role to facilitate work. Therefore, it is interesting to understand what factors and issues that might influence nurses to use their smartphones for work purposes. Although studies have explored nurses' use of smartphones for work (e.g., Mobasheri et al., 2015; Moore & Jayewardene, 2014) and non-work purposes during work hours (e.g., McBride et al., 2015a), this research will

focus on its use *for work purposes during working hours in a hospital setting (*hereafter nurses' use of smartphones for work purposes). Focusing on their use during working hours is interesting since, despite its potential benefits, not all hospitals may be supportive in its use even it is for work-related tasks (Brandt, Katsma, Crayton, & Pingenot, 2016).

Compared with devices like desktop computers, laptops, and tablets, the smartphone is one of the most portable and multifunction tools that can be easily carried by nurses in their pockets. These characteristics make it a suitable companion device for work purposes (Barkhuus & Polichar, 2011). In the context of a nurse's work, smartphones are quite handy for communication and information seeking (Mobasheri et al., 2015; Moore & Jayewardene, 2014). Traditionally, nurses communicate and look for relevant information in the nurses' station since it is where colleagues, landline telephones, and reference materials are situated (Gum, Prideaux, Sweet, & Greenhill, 2012). With their smartphones, they can call a colleague or search for relevant clinical information regardless of their location.

Scholars argue that the portability of smartphones often blurs the boundaries between personal and professional use (Barkhuus & Polichar, 2011; Donner, 2009; Ling, 2015; Stephens & Ford, 2016). In the context of nursing work, nurses can send text messages to family members for personal reasons as well as to doctors to convey patient updates within working hours using the same smartphone. As there are instances that smartphones can be used for personal reasons at work, it is ideal for hospitals to provide nurses with mobile phones (e.g., unit phones) that they can use at work (Royal College of Nursing, 2016). Besides, healthcare professionals should be provided by their hospitals with relevant technologies since it is the employer's responsibility to equip their staff with technologies that can facilitate work (Buntin, Burke, Hoaglin, & Blumenthal, 2011).

Unfortunately, it is unfeasible for most hospitals in developing countries, such as the Philippines, to provide mobile technologies to their healthcare staff. Despite the implementation of policies to address the technology needs of healthcare professionals in the Philippines (Aragona, 2012; Department of Health-Philippines, 2014), the provision of mobile technologies in hospitals is still far-fetched. This is due to the priority placed

upon by the government to allocate budget for electronic health records (Department of Health-Philippines, 2014; Ongkeko et al., 2016). Thus, it is likely that most of the hospitals in the Philippines will not consider the provision of mobile phones to their nurses as a priority. Aside from it being a lower priority, the act of providing mobile phones to nurses also presents significant budget constraints for most hospitals. Since nurses in the Philippines cannot expect their hospitals to provide mobile phones (or any other similar technologies), this serves as a cue for nurses to use their smartphones for work purposes.

As there are limited scholarly studies on nurses' use of smartphones in Asia, this research provides insights into this phenomenon in the Philippines. The Philippines is an interesting research context since mobile phones play a significant role in the lives of its citizens (Cabanes & Acedera, 2012). Although the World Bank (2015) classifies the Philippines as a lower-middle income country, its mobile phone penetration is relatively high which was already more than 100% since 2014 (GSMA Intelligence, 2014). Furthermore, smartphone penetration is currently around 61% of the adult population (We Are Social, 2017) and this is expected to reach more than 80% in 2021 (Jiao, 2016). Since most hospitals in the Philippines have inadequate healthcare staff due to healthcare professionals' preferrence to work abroad (Castro-Palaganas et al., 2017; Lorenzo, Galvez-Tan, Icamina, & Javier, 2007), it is not surprising to see that nurses would use their smartphones to compensate for the lack of human and technological resources.

Consequently, the increasing adoption of mobile phones for personal use has a spillover effect for work purposes (Chesley, 2005; Donner, 2009). As mobile phone users are mostly young adults in the Philippines (On Device Research, 2014; We Are Social, 2017), it can be argued that nurses, majority of which are young adults too (Perrin, Hagopian, Sales, & Huang, 2007), are likely adopters of latest mobile phones like smartphones. Considering the smartphone's functionality (e.g., access to mobile apps and mobile Internet) and portability, combined with tech-savvy nurses who are working in hospitals with limited human and technological resources, it is interesting to explore how and why nurses in the Philippines use their smartphones for work purposes. Furthermore, with nurses having justifiable reasons for using their

smartphones for work purposes, it is worthwhile to identify organisational issues that arise from its use and propose relevant recommendations that have policy implications.

Contributions of the Research

This research aims to make several contributions.

First, the results of this research will contribute to scholarly interests on the use of smartphones by nurses in hospital settings. To date, systematic reviews on the utilisation of mobile devices for healthcare delivery suggest that studies are mostly about the use of researcher-provided mobile phones by local healthcare workers (e.g., midwives, traditional birth attendants, community health workers) in community settings (e.g., Agarwal, Perry, Long, & Labrique, 2015; Braun, Catalani, Wimbush, & Israelski, 2013; Chib, van Velthoven, & Carr, 2015; Goel, Bhatnagar, Sharma, & Singh, 2013).

Second, this research will draw from multiple theories to overcome the limitations found in past studies that examined nurses' use of smartphones for work purposes (e.g., McBride et al., 2013, 2015a; Mobasheri et al., 2015). In this research, the Theory of Planned Behaviour (Ajzen, 1991), Organisational Support Theory (Eisenberger, Huntington, Hutchison, & Sowa, 1986), and IT Consumerisation Theory (Niehaves, Köffer, & Ortbach, 2013) were used as theoretical frameworks to explain relevant factors associated with nurses' use of smartphones for work purposes. Overall, this research used multiple theories to form a research model that contributes a holistic and robust explanation of the phenomenon that can be used to generate relevant recommendations on smartphone use for work purposes in hospital settings.

Third, this research will contribute to theory on organisational and mobile communication since it will provide an in-depth theoretical explanation on the predictors, outcome, and issues related to employees' mobile phones use. Instead of using just one theory, this research overcomes limitations of previous works in non-healthcare organisations (e.g., Cousins & Robey, 2015; Hislop & Axtell, 2011; Fujimoto, Ferdous, Sekiguchi, & Sugianto, 2016) by combining three theories that explain technology-related behaviours (i.e., Theory of Planned Behavior, Organisational Support Theory, and IT Consumerisation Theory) in healthcare organisations. Using multiple

theories is advantageous since combining elements from several theories could better explain a phenomenon of interest instead of using one theory. For instance, although the Theory of Planned Behaviour provides psychological antecedents (e.g., attitude, subjective norm) related to technology use, it is also crucial to use organisational theories (i.e., Organisational Support Theory and IT Consumerisation Theory) to account for organisational factors (e.g., perceived organisational support and actual organisational support) related to nurses' use of smartphones for work purposes.

Fourth, the results of this research will inform policies governing nurses' use of smartphones for work purposes. Specifically, the resulting recommendations of this research can be used by relevant stakeholders, such as health policymakers and hospital administrators, to develop context-specific policies on nurses' (or all healthcare professionals') use of smartphones for work purposes. Overall, the recommendations can provide guidance on maximizing the benefits and reducing the risks associated with nurses' use of smartphones in hospital settings.

Finally, since most studies on nurses' use of smartphones for work purposes were conducted in developed countries (e.g., Flynn et al., 2018; McBride et al., 2013, 2015a; Mobasheri et al., 2015), this research will contribute an Asian perspective by making the Philippines as the research context. Such perspective is crucial since several hospitals from developing countries in Asia do not have enough financial resources and technological infrastructure to provide their nurses with relevant health information technologies (Maglogiannis, 2012).

Organisation of the Chapters

Including Chapter One, this research consists of eight chapters and is structured as follows:

Chapter Two provides a literature review of concepts related to nurses' use of smartphones for work purposes. First, studies were reviewed to highlight the role of communication in nursing practice. This is followed by an overview of how the mobile phone is a health information technology that has implications to the work of healthcare professionals. Studies on the use of mobile phones by healthcare professionals in the hospital setting including

relevant policies were also reviewed. This chapter also reviewed studies that focused on nurses' use of smartphones for work purposes.

Chapter Three discusses the research's theoretical framework and the accompanying hypotheses and research questions. It also presents the research design that outlines the studies that will be conducted to address the hypotheses and research questions.

Chapter Four presents the exploratory study that served as the foundation for subsequent studies. It starts with providing justifications on the need to conduct this study in the Philippines. This was followed by a presentation of the study's method and results, and how these can be used to guide subsequent studies.

Chapter Five examines the predictors and outcome of nurses' use of smartphones for work purposes. It starts with the method section by reporting the study's research design, sample selection, survey development and deployment, and data analysis procedures. After the method section, the results section presents the findings of the study. This chapter ends with a thorough discussion of the results.

Chapter Six explores how organisational issues related to nurses' use of smartphone for work purposes influence organisational support for such use. First, a background on the importance of examining organisational issues related to nurses' use of smartphones for work purposes was presented. This is followed by the method section that contains details of the research design, participant selection, data collection, and data analysis procedures. After the method section, the results section presents organisational issues related to nurses' use of smartphones for work purposes. This chapter ends with a thorough discussion of the results.

Chapter Seven provides recommendations regarding nurses' use of smartphones at work. These recommendations were based on the findings generated from Study I and Study II. Finally, Chapter Eight provides a summary and implications of the research. It also discusses future research directions based on the constraints and limitations faced during the research. This chapter ends with some concluding remarks.

CHAPTER TWO LITERATURE REVIEW

This chapter provides a literature review on studies related to nurses' use of smartphones for work purposes. It starts with an overview of the importance of communication in nursing practice and the nature of the mobile phone as a health information technology. Next, studies on healthcare professionals' use of mobile phones in the hospital setting including relevant policies were reviewed. Finally, studies that focus on nurses' use of smartphones for work purposes were examined.

Communication in Nursing Practice

Communication is a fundamental aspect of nursing practice as nurses interdependently work with other healthcare professionals (Kourkouta & Papathanasiou, 2014). Aside from communicating with patients, much of nurses' work involves the communication of relevant information with several members of the healthcare team (Apker, Propp, Ford, & Hofmeister, 2006; Havens, Vasey, Gittell, & Lin, 2010; Westbrook et al., 2011). This is for the fact that timely communication among healthcare professionals is a critical component of ensuring safe and quality patient care (Suter et al., 2009; Williams & Gossett, 2001). Given the importance of timely communication in nursing practice, there is always a need for technologies that can support the communication needs of nurses (Arnold & Boggs, 2016; While, & Dewsbury, 2011).

One key technology that has a significant implication to how nurses communicate is the mobile phone. Parker (2014) argued that communication in nursing practice is undergoing a revolution since nurses' ownership of smartphones enables them to easily communicate with other healthcare professionals, access clinical information, and perform other tasks for work purposes. Various surveys suggest that nurses used their smartphones to facilitate communication (e.g., Flynn et al., 2018; Mobasheri et al., 2015; Pai, 2015; Royal College of Nursing, 2016). Although some scholars have examined the use of mobile phones as a key technology for communication

among healthcare workers (e.g., midwives, community health workers, and traditional birth attendants) in the community setting (Agarwal et al., 2015; Braun et al., 2013; Chib et al., 2015; Goel et al., 2013), nurses' use of smartphones for work purposes in the hospital settings is still under scrutiny due to various issues such as work distraction and privacy concerns (Gill et al. 2012). Nonetheless, several scholars suggest that hospitals should revisit their policies to find ways on how to integrate nurses' use of smartphones for work purposes whilst limiting the risks involved in its use (Brandt et al., 2016; Broussard & Broussard, 2013; Mobasheri et al., 2015).

The Mobile Phone as a Health Information Technology

Scholars have used the term "health information technology" to describe communication and information technologies used in healthcare (Buntin et al., 2011; Chaudhry et al., 2006). The U.S. Health Information Technology for Economic and Clinical Health Act (HITECH Act) defines health information technology as any *"hardware, software, integrated technologies or related licenses, intellectual property, upgrades, or packaged solutions sold as services that are designed for or support the use by health care entities or patients for the electronic creation, maintenance, access, or exchange of health information"* (Zeng, 2009, p.1). Health information technology is an umbrella term that denotes various healthcare-related technologies including (but not limited to) electronic health records, personal health records, e-prescribing, health information exchange, analytics/decision support, patient health tools, and mobile health technologies (Deloitte Center for Health Solutions, 2013; HealthIT, 2013; Zeng, 2009). However, among these technologies, the term health information technology has been mostly associated with electronic health records since most hospitals were initially interested in using desktop-based computers as alternative repositories of paper-based health records (Adler-Milstein et al., 2015; Haux, 2006; Hillestad et al., 2005).

Aside from desktop-based health information technologies such as electronic health records, scholars within the health information technology field have also developed an interest in the use of mobile technologies for healthcare. Collectively, most scholars and practitioners refer to it in literature

as mHealth (Agarwal et al., 2015; Chib, 2010; Chib, van Velthoven, & Car, 2015). According to the World Health Organisation, mHealth is defined as the *"medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices"* (2011b, p. 6).

Although there are several mobile technologies associated with mHealth (e.g., wearables, mobile phones, personal digital assistants), the mobile phone has largest potential to influence healthcare as it is widely adopted by all segments of the population due to its increasing affordability, functionality, and portability (Hampshire et al., 2017; Patrick, Griswold, Raab, & Intille, 2008). Systematic reviews on the use of mobile phones for healthcare indicate that such technology could assist healthcare workers in community settings by facilitating immediate access to information, improved communication with patients and other healthcare workers, and enhanced data collection and reporting (Agarwal et al., 2015; Chib et al., 2015; Goel et al., 2013). Similarly, in the context of healthcare professionals within hospitals, a growing adoption of mobile phones for clinical practice is of great value for the fact that it can potentially enhance the flow of clinical communication and information among members of the healthcare team that can result in faster delivery of safe and quality healthcare services (Wu et al., 2011, 2013). Considering the role of mobile phones in the overall domain of mHealth research, this research will focus on mobile phones, most notably the smartphone, as this is likely the most adopted form of mHealth technology by nurses in the Philippines.

In scholarly literature, research on mHealth was initially concerned to understand how mobile technologies, particularly the mobile phone, could help bridge the delivery of healthcare services to remote and low-resource communities (Chib, van Velthoven, & Car 2015; Goel et al., 2013). Systematic reviews showed that mHealth interventions in developing countries were conducted in community settings and often involved interventions that provided mobile phones to community health workers, rural health workers, midwives, or traditional birth attendants (Agarwal et al., 2015; Chib, van Velthoven, & Car 2015; Goel, Bhatnagar, Sharma, & Singh, 2013). On the contrary, it is important to take note that such technology is also relevant in

other settings. One interesting research context is the use of mobile phones, particularly smartphones, by healthcare professionals in the hospital setting (Mobasheri et al., 2015).

Mobile Phones in the Hospital Setting

Healthcare Professionals' Use of Mobile Phones in the Hospital Setting

In recent years, mHealth research has been extended by scholars to examine how mobile phones were used by hospital-based healthcare professionals to enhance their work. This is not surprising as previous studies even among non-healthcare workers showed that such devices are instrumental to workers' productivity (e.g., Li & Lin, 2018; Ling et al., 2015; Stephens & Ford, 2016). Besides, the mobile phone's multi-functionality, portability, ease of use, and ubiquity make it an attractive device for work productivity (Barkhuus & Polichar, 2013), especially among healthcare professionals (Prgomet, Georgiou, & Westbrook, 2009). For instance, nurses and doctors are now able to communicate clinical information with each other through their mobile phones via text messages and voice calls (Mobasheri et al., 2015). By reducing the frequent need to meet face-to-face to complete clinical tasks, the time saved can be allocated to more fruitful patient interactions (e.g., providing health teaching and counseling). Therefore, it is not surprising that mobile phones are being used by healthcare professionals to increase productivity (Aziz, Sheikh, Paraskeva, & Darzi, 2003; Derbyshire & Burgess, 2006; Ettelt et al., 2006).

Several studies found that mobile phone use in hospital settings benefits healthcare professionals and patients. For example, studies showed that voice calls and text messages through mobile phones improve communication among doctors by reducing the time for information exchange (e.g., Gallot-Reeves, 2015; Lo, Wu, Morra, Lee, & Reeves, 2012; Whitlow, Drake, Tullmann, Hoke, & Barth, 2014; Wu et al., 2011, 2013). Another study among anesthesiologists found that mobile phone use was associated with reduced risk of patient injury due to reduced delay in communication (Soto, Chu, Goldman, Rampil, & Ruskin, 2006). Aside from enhanced communication, mobile phones, particularly smartphones, enabled healthcare professionals to easily and immediately access useful and relevant clinical

information which aided them to arrive at appropriate clinical decisions for patient at the point of care (e.g., Franko & Tirrell, 2012; Ganasegeran et al., 2017; Mosa, Yoo, & Sheets, 2012; Payne et al., 2012).

Nonetheless, other studies have also identified negative implications from healthcare professionals' use of mobile phones in hospital settings. Specifically, these studies have associated mobile phone use with certain risks such as staff distraction (Gill et al. 2012), increased spread of hospital-acquired infections (Brady et al., 2009; Stein, 2014), privacy and confidentiality concerns (Gill et al. 2012), and decreased quality of inter-professional communication (Lo et al., 2012; Wu et al., 2011). Weighing on its advantages and disadvantages, some scholars argued that the benefits offered by mobile phones are far greater than the risks associated with it (Derbyshire & Burgess, 2006; Ettelt et al., 2006; Soto et al., 2006). Nonetheless, it is essential that realistic policies are instituted to minimise risks and maximise the benefits associated with the use of mobile phones in hospital settings (Aziz et al., 2003; Ettelt et al., 2006; Gill et al. 2012).

Policies on Healthcare Professionals' Use of Mobile Phones in the Hospital Setting

Policy plays a crucial role in how health information technologies, such as mobile phones, are used in hospital settings (Ettelt et al., 2006; Powell, Landman, & Bates, 2014). Despite the promising advantages offered by mobile phones in the work of healthcare professionals, its use in healthcare institutions was initially opposed by health authorities. One prominent reason was that mobile phones were suspected of transmitting electromagnetic interference that can cause several types of medical equipment (e.g., mechanical ventilators, infusion pumps) to malfunction which puts patients at risk (Aziz et al., 2003; Ettelt et al., 2006; Klein & Djaiani, 2003).

Consequently, health authorities in several countries have issued policies that ban the use of mobile phones in hospital premises. For instance, hospitals in the U.K. instituted a ban in 1994 on the use of mobile phones as recommended by the U.K. Medical Devices Agency (MDA) (Aziz et al., 2003; Ettelt et al., 2006; Klein & Djaiani, 2003). Similarly, health authorities in Canada (Rosenfield, Hébert, Stanbrook, MacDonald, & Flegel, 2011; Yang,

Frize, & Eng, 2003) and European countries (i.e., Germany, Finland, France, Norway, the Netherlands, Sweden) have created policies prohibiting the use of mobile phones in hospitals (Ettelt et al., 2006). Similarly, health authorities in Japan (Shimbun, 2014) and Hong Kong (Li, 2003) instituted mobile phone restrictions in hospitals during the late 1990s due to electromagnetic interference concerns.

However, several scholars argued that an outright ban of mobile phones in hospital premises was unnecessary since there was inadequate empirical evidence that it caused serious injuries due to medical equipment interference (Ettelt et al., 2006; Soto et al., 2006; Tri, Severson, Hyberger, & Hayes, 2007). Besides, not all patients in hospitals are critically ill that require being hooked to medical devices (Soto et al., 2006). For instance, a European systematic review on the interference caused by mobile phones to medical equipment found that mobile phones did not pose any threat to patient safety if used more than one meter away from the target medical device (Ettelt et al., 2006). Also, a U.S. study involving 192 medical equipment found that mobile phones did not cause any interference that led to serious patient safety issues (Tri et al., 2007).

Consequently, several scholars urged hospital authorities to lift the outright ban on mobile phones in hospital premises since there was inadequate evidence that mobile phones posed severe injury to patients hooked with medical equipment (Klein & Djaiani, 2003; Rosenfield et al., 2011; Soto et al., 2006). At the same time, these scholars argue that the use of mobile phones can significantly help healthcare staff to be productive at work. Likewise, the American Medical Association and the Australian Mobile Telecommunications Association also condoned the outright ban of mobile phone use in hospitals and claimed the potential benefits of using mobile phones outweighed the risks involved in its use (Australian Mobile Telecommunications Association, 2015). As argued by Jorm and Roper (2016), implementing a blanket ban on mobile phones is simply unrealistic considering that it is difficult to implement such policy in hospitals that do not provide adequate technologies to healthcare staff.

Given the inadequate evidence linking electromagnetic interference from mobile phones with patient safety concerns, several health authorities

and hospitals have instituted relaxed policies in the use of mobile phones. For instance, in 2004, the U.K. Medicines and Healthcare Products Regulatory Agency (formerly MDA) removed the total ban of mobile phones in hospitals and urged hospital administrators to create selective policies (e.g., avoid using mobile phones near medical equipment) to regulate mobile phone use by patients, visitors, and hospital employees (Derbyshire & Burgess, 2006; Ettelt et al., 2006). This was made since the electromagnetic interference caused by mobile phones were not deemed to compromise patient safety and such technology can be used by healthcare professionals to improve patient management.

During the early 2000s, hospitals in some European countries (i.e., Finland, Norway, the Netherlands, and Sweden) that previously banned mobile phones also relaxed such policies by limiting its restriction in operating theatres and intensive care units (Ettelt et al., 2006). Hong Kong's Hospital Authority also relaxed such policy in 2008 for the sake of enhancing communication between healthcare professionals (Hospital Authority-Hong Kong, 2008). In 2012, six hospitals under Canada's McGill University Health Centre, which previously banned mobile phones, also allowed healthcare professionals to use mobile phones in hospitals (McGill Reporter, 2012). Since 2014, hospital administrators in Japan were also encouraged by the government to allow healthcare staff and patients to use mobile phones in hospital premises (Shimbun, 2014). Nonetheless, hospitals in France (Boring, 2015) and Germany (Chrzanowska, 2013) still enforce an outright ban on mobile phones in hospital premises to comply with their government's initiative of limiting the public's exposure to electromagnetic waves. Moreover, although there is no total ban of mobile phones in U.K. hospitals, U.K.'s Royal College of Nursing (2016) expressed that they do not support nurses' use of smartphones for work purposes as these should not be used to record, transmit, or store patient-related health information.

Despite the relaxations in the use of mobile phones in hospital premises in several countries, it is still up to hospital administrators to limit how it can be used by their healthcare staff (Brandt et al., 2016; Royal College of Nursing, 2016). More importantly, hospitals can decide what kind of mobile phone should be used on hospital premises. For instance, a few hospitals in the

U.S., like Frisbie Memorial Hospital (Gallot-Reeves, 2015) and Strong Memorial Hospital (Scott, 2015), have provided unit phones to their healthcare staff as a secure means of clinical communication and information sharing. Similarly, some U.S. hospitals instituted policies that only allowed the use of unit phones and restricted the use of personal ones (Greater Hudson Valley Health System, 2013).

On the contrary, several hospitals in the U.S. (Elgarico, 2009; Montana State Hospital, 2016), Canada (Jewish General Hospital, 2013) and Ireland (O'Neill, 2014) have allowed the use of mobile phones among their healthcare staff if they adhered to hospital-instituted policies governing its use. Nonetheless, policy discrepancies regarding the use of personal devices are evident. For instance, a survey of 450 healthcare organisations across North America found that 73% allowed their healthcare staff to bring their own devices (primarily smartphones) for work purposes. Of these healthcare organisations, only 51% allowed their nurses to use personal devices for work as compared to 91% of doctors (Spok, 2015).

Overall, hospital administrators, through their policies, have the discretion to support or disapprove nurses' use of smartphones for work purposes. Based on existing policies in various hospitals, mobile phones that were allowed may either be personally owned by the healthcare staff or the one provided by the hospital. In cases that healthcare staff could use their smartphones, they must adhere to guidelines that promote responsible use. Considering the growing adoption of mobile phones for clinical work, there is a need to understand organisational issues related to the use of smartphones for work purposes, particularly among nurses situated in developing countries.

Research Gaps on Studies about Mobile Phone Use in the Hospital Setting

Among studies regarding the use of mobile phones for work purposes in the hospital setting, four limitations should be noted.

First, most of them focused on doctors' use of mobile phones (e.g., Franko & Tirrell, 2012; Lo et al., 2012; Mosa et al., 2012; Payne et al., 2012; Soto et al., 2006; Wu et al., 2011, 2013). Although doctors work with nurses in the healthcare setting, each of them has different patterns of using smartphones for work purposes (Mobasheri et al., 2015). Besides, nurses tend

to spend more time to interact with patients than doctors which makes a study focusing on nurses much relevant (Neville et al., 2015).

Second, most of these studies depicted the use of mobile phones that were provided by hospitals (e.g., Lo et al., 2012; Whitlow et al., 2014; Wu et al., 2011, 2013). In the context of this research and in most hospitals situated in developing countries, hospitals tend to lack the required budget to provide their healthcare staff with even the most basic form of health information technologies (Maglogiannis, 2012). This indicates that more research is needed on the use of smartphones as this technology is already owned by healthcare professionals, even to those situated in developing countries.

Third, a majority (e.g., Franko & Tirrell, 2012; Lo et al., 2012; Mosa et al., 2012; Payne et al., 2012; Soto et al., 2006; Wu et al., 2011, 2013) of these studies originated from developed countries where technologies are more advanced as compared to most developing countries (Hsu et al., 2015, Otero et al., 2015). Since the adoption rate of health information technologies may vary from one country to the other (Maglogiannis, 2012), findings from developed countries may not be fully applicable in an Asian country such as the Philippines.

Finally, as these studies generally provide descriptive results, it is difficult to ascertain how these findings contribute to theories. This is a recognised problem in most health informatics research that several scholars have called for more integration of theories when examining various forms of health information technologies (Fanning, et al., 2017; Orlowski et al., 2015; Xue et al., 2015). Theory integration in health information technology research is needed to uncover patterns on how these technologies interact with social systems (e.g., users, organisations, policies) as these are instrumental when creating well-informed policies (Cresswell & Sheikh, 2013; Kruse, DeShazo, Kim, & Fulton, 2014).

These limitations offer new research directions. First, studies can focus on how and why contemporary mobile phones such as smartphones are used for clinical practice considering that healthcare professionals are now using it for work purposes in hospital settings (Mobasheri et al., 2015). Second, research on smartphone use for clinical work can emphasise on nurses as they play a crucial role in providing patient care in a hospital setting (Kurtzman et

al., 2010; Neville et al., 2015). Third, scholars must now theoretically and empirically examine the predictors and outcomes of smartphone use among healthcare professionals in a hospital context. Fourth, recognising that hospitals may or may not support the use of smartphones at work, it is interesting to examine several issues that arise from its use, particularly in hospitals that do not support such use. Finally, by conducting the research in the Philippines, this study can contribute knowledge on how nurses outside developed countries use smartphones for work purposes.

Overall, the limitations in prior studies suggest that more in-depth scholarly research is needed. However, before continuing this research, it is also imperative to review studies that have focused on nurses' use of smartphones for work purposes in hospital settings. Insights from these studies can help identify specific research questions that need to be addressed.

Studies on Nurses' Use of Smartphones for Work Purposes in the Hospital Setting

This section provides a focused review of studies involving nurses' use of smartphones for work purposes. The goal here is to identify additional research gaps that can be used as a basis for research questions. Insights derived from these studies are also valuable to strengthen the theoretical and methodological aspects of the proposed studies in this research.

Nurses' Use of Smartphones for Work Purposes

Previous studies have illustrated how nurses use their smartphones for work purposes. Common findings are that nurses use their smartphones at work for communication, information seeking, and documentation purposes. In this context, communication refers to the interpersonal exchange of verbal and nonverbal messages. For instance, a survey of U.K. (Mobasheri et al., 2015) and U.S. (Flynn et al., 2018) nurses found that many used voice calls and text messaging for clinical communication. Nurses also use commercially available instant messaging applications (e.g., Line) to coordinate patient care with fellow nurses (Chiang & Wang, 2016). Some hospitals even develop their messaging applications, which nurses install and use on their smartphones

(Stephens et al., 2017). Not only do nurses use their smartphones to communicate with other healthcare professionals, but they also use them to communicate with patients or their guardians when coordinating patient care (Chiang & Wang, 2016; Nilsson, Skär, & Söderberg, 2010).

Another use of smartphones for work purposes is related to information seeking. In this context, smartphones can help nurses to quickly search for information that serves a utility or is useful for achieving a functional outcome. For instance, about half of U.K. nurses use their smartphones to search for information on the Internet (Mobasheri et al., 2015). Other uses include reviewing clinical textbooks and applications (Moore & Jayewardene, 2014) and accessing clinical information via the Internet (Flynn et al., 2018; Johansson, Petersson, Saveman & Nilsson, 2014).

Finally, nurses use their smartphones for documentation. In this context, documentation refers to storing visual, audio, or textual information as a record of work performance. Some instances of documentation via smartphones include the use of note-taking applications (Johansson et al., 2014), setting reminders in calendar applications for meetings (Mobasheri et al., 2015), and, in some cases, taking photographs of patient records (e.g., patient chart) or patient outcomes (e.g., presence of wound; Flynn et al., 2018; Sharpe & Hemsley, 2016).

Based on prior studies, this research defines nurses' use of smartphones for work purposes as *nurses' use of their smartphones at work for communication, information seeking, and documentation purposes.*

Perceptions of Nurses on the Use of Smartphones for Work Purposes

Studies suggest that nurses had various perceptions of the use of smartphones for work purposes. These perceptions ranged from those that were positive (i.e., advantages) to those that were negative (i.e., disadvantages). A review of various perceptions and its relationship with nurses' use of smartphones for work purposes is outlined below.

Positive Perceptions

Positive perceptions on the use of smartphones were based on the advantages that they provide to nurses' work. According to Mobasheri et al.

(2015), about 53% of U.K. nurses reported that smartphones were very useful or useful when performing clinical tasks. Their study also noted that such devices are helpful, essential, innovative and simple to use. On a similar note, Moore and Jayewardene (2014) also reported that usefulness, time-saving, ease of use, and facilitation of improved care were the advantages of using smartphones for work purposes. Moreover, Nilsson, Skär, and Söderberg (2010) described that nurses used their smartphones to make them more accessible to patients particularly to those with chronic illnesses and limited mobility. Likewise, previous studies also found that the advantages of using smartphones for work purposes can bring about more confidence in performing clinical duties, stress reduction, and enhanced patient safety and quality of care (Chiang & Wang, 2016; Giles-Smith, Spencer, Shaw, Porter, & Lobchuk, 2017; Johansson et al., 2014; Sharpe & Hemsley, 2016).

Overall, these studies suggest that positive perceptions might influence nurses' intention and use of smartphones for work purposes. In literature, these positive perceptions can be referenced as positive attitudes. In fact, a study by Park and Chen (2007) based on Davis' (1989) Technology Acceptance Model and Rogers' (1995) Diffusion of Innovation Theory found that positive attitudes were associated with doctor's and nurses' intention to use smartphones in the hospital setting. Moreover, previous studies that utilised those theories also found that smartphone observability and organisational support (i.e., pro-smartphone policy) on the use smartphones at work predicted nurses' attitudes on the use of smartphones at work (Park & Chen, 2007; Putzer & Park, 2010).

Negative Perceptions

On the contrary, nurses' use of smartphones for work purposes also came with several negative perceptions. Studies noted that one of the key disadvantages of using it is work distraction (Giles-Smith, Spencer, Shaw, Porter, & Lobchuk, 2017; McBride et al., 2015a; Mobasheri et al., 2015; Moore & Jayewardene, 2014). Accordingly, smartphones serve as distractions by taking away nurses' focus from the patient (Johansson, Petersson, Saveman, & Nilsson, 2014; McNally, Frey & Crossan, 2017; Moore & Jayewardene, 2014). Other scholars (McBride et al., 2015a; McNally et al.,

2017) also argued that the distraction caused by smartphones are greater when used for non-work purposes, such as playing games, watching videos, or accessing social media sites. Some also argued that such distractions can contribute to unsafe work practices that put patients at risk for injuries (Brandt et al., 2016; McNally et al., 2017).

Another negative perception associated with nurses' use of smartphones is reduced professionalism. Nurses uphold certain ethical and legal standards that define the profession and some studies noted that the use of smartphones at work, even for work purposes, can reduce nurses' professionalism (Brandt, Katsma, Crayton & Pingenot, 2016; McNally et al., 2017). As an attempt to maintain a professional image, nurses avoided using their smartphones in front of their patients since they can be accused of using it for personal reasons even it is used entirely for work purposes (Giles-Smith et al., 2017; Johansson et al., 2014; Stephens et al., 2017).

Collectively, it is important to acknowledge that there are negative perceptions of nurses' use of smartphones for work purposes and these might lead to negative outcomes. However, McBride et al. (2015b) reported that using such device did not have a negative effect on nurses' work performance. Specifically, very few nurses noted that the use of smartphones at work reduced their work performance (7.4%), increased clinical error (0.8%), or increased the chance to miss important clinical information (4%). Such results support the argument that the advantages of using smartphones for work purposes outweighed its disadvantages, most especially when realistic policies (e.g., allowing nurses to use their smartphones when such devices–or its equaivalent–are not provided by the hospital) are instituted (Giles-Smith et al., 2017; Moore & Jayewardene, 2014; Sharpe & Hemsley, 2016).

Policies on Nurses' Use of Smartphones

Several studies found that policy plays a vital role on the extent that nurses have used their smartphones at work. For instance, a survey of nurse leaders in the U.S. found that hospitals had different policies regarding nurses' use of smartphones for work purposes (Brandt et al., 2016). Although some reported that it is completely banned even for work purposes (23%) or should be kept in lockers (3%), some reported that the ban is either in all patient care

areas (42%), in selected areas of the hospital (e.g., emergency room, labor and delivery, 5%), or when close to sensitive medical equipment (3%). Some also noted that only hospital-provided mobile phones should be used (11%). On the other hand, some reported that smartphones could only be used in lunch areas (36%), if it is for work purposes (3%), during emergency situations (5%), or if it is in vibration mode (5%). Moreover, specific functions such as picture taking (3%) and accessing social media (1%) were not allowed, but work-related texting was allowed (1%). In case of violations to such policies, some steps taken include verbal and written reprimands (35%), disciplinary actions (25%), counselling (23%) and confiscation of smartphones (5%).

Aside from policies created at the hospital level, policy enforcement by immediate superiors played a role in nurses' use of smartphones. For instance, McNally et al. (2017) found that nurse managers highly opposed nurses' and student nurses' use of smartphones as an educational tool in hospital settings. First, they perceived that it reduced nurses' professionalism and time searching for information using smartphones should be allocated to patient care. Second, nurse managers do not trust that nurses will act ethically. Moreover, they believed that they are more likely to use it for non-work purposes; thus, there is a need for routine policing to prevent such behaviour. Third, nurse managers were concerned over the safety (or accuracy) of information that nurses obtain from using smartphones. They noted that inaccurate information might represent a risk to patient safety. Finally, nurse managers indicated that their hospitals are not yet prepared to implement a bring-your-own-device (BYOD) policy and that safety and security measures needed to allow nurses to use their smartphones for work purposes safely have not been explored.

Despite policy restrictions presented in previous studies (e.g., Brandt et al., 2016; McNally et al., 2017), some scholars noted that nurses continued to use their smartphones as it helped them provide quality care to patients even at their own expense (Chiang & Wang, 2016; Giles-Smith et al., 2017; Sharpe & Hemsley, 2016). In some cases, nurses continued to use it since hospitals did not provide their staff with mobile phones (Chiang & Wang, 2016; Sharpe & Hemsley, 2016) or policies about the use of smartphones were ambiguous and

ill-informed (Chiang & Wang, 2016; Sharpe & Hemsley, 2016; Stephens et al., 2017; Stephens, 2018).

Aside from issues arising from restrictive policies on nurses' use of smartphones, Stephens et al. (2017) also found several policy issues when a hospital allowed nurses to use their smartphones to access a hospital communication app. These issues tend to originate at the organisational, team, and individual levels. Organisational issues consisted of ambiguous policy on the use of smartphones for work purposes (e.g., what functions are allowed or not allowed? Should hospitals wipe data when a nurse's smartphone is lost or stolen?) and costing (e.g., should employees shoulder data costs when they use the communication app?). At the team level, nurses raised issues on the creation of formal and informal policies regarding the use of the communication app. For instance, in some nursing units, although it was acceptable to use smartphones for work purposes, nurses preferred to use group messaging via *Facebook Messenger* rather than the hospital communication app since the former was easy to use and most of them were already familiar with it. At the individual level, nurses reported having individual preferences in the use of smartphones for work purposes. Specifically, some nurses indicated that using the communication app in front of the patient was highly inappropriate since most patients would assume that they are using their smartphones for non-work purposes even though they are using it for work purposes (i.e., using the communication app to communication with healthcare colleagues).

Summary

This chapter reviewed studies relevant to nurses' use of smartphones for work purposes. These studies showed that communication is a crucial part of nursing practice and technologies that enhance nurses' communication with other healthcare professionals are greatly needed. One of the promising technologies that can improve the work of healthcare professionals is the mobile phone. As a health information technology, mobile phones can be used easily to communicate with healthcare colleagues. With contemporary mobile phones such as smartphones, healthcare professionals can also use it to easily search for information at the point of care and perform patient documentation. Although its use can help increase healthcare professionals' productivity, it also comes with drawbacks, such as work distraction and privacy concerns. Although much of the literature suggests that the advantages of using smartphones for work purposes outweigh the disadvantages in hospital settings, most hospitals have policies that do not support its use. Overall, insights from the literature review will be used to inform the theoretical framework and research design to be discussed in Chapter Three.

CHAPTER THREE THEORETICAL FRAMEWORK AND RESEARCH DESIGN

Chapter Three introduces the theoretical framework and the research design that will be used to address the hypotheses and research questions. First, it presents a conceptualisation of nurses' use of smartphones for work purposes. Next, it presents the theoretical framework that guides the research on nurses' use of smartphones for work purposes. The framework is informed by behavioural (i.e., Theory of Planned Behaviour) and organisational (i.e., Organisational Support Theory and IT Consumerisation Theory) theories. It also presents the hypotheses and research questions embedded in the theoretical framework. This chapter concludes with a discussion of the research design used to answer the hypotheses and research questions.

Theoretical Framework

Conceptualising Nurses' Use of Smartphones for Work Purposes

This research refers to nurses' use of smartphones for work purposes as the focal behaviour of interest. As mentioned in Chapter Two, nurses' use of smartphones for work purposes was defined as *nurses' use of their smartphone at work for communication, information seeking, and documentation purposes*. Table 3.1 provides a summary on how nurses have used their smartphones for work purposes based on previous studies.

Although Agarwal et al. (2015) have proposed six classifications on how mobile phones were used by healthcare workers (i.e., data collection and reporting, improved communication, alerts and reminders, client education, emergency referrals, supervision), these classifications were based on a study of community health workers rather than nurses working in hospitals. Thus, adopting a new classification based on relevant studies on nurses' use of smartphones is much more appropriate. The following sections outlines some of the relevant theories that can explain why nurses use smartphones for work purposes and to what outcome.

Table 3.1 Classification of Nurses' Use of Smartphones for Work Purposes

Source	Descriptions of usage
Communication purposes	
Chiang & Wang (2016)	• Use instant messaging applications for communication with healthcare team and patient's family
McBride et al. (2014)	• To communicate with other members of the healthcare team to coordinate patient care
Mobasheri et al. (2015)	• Phone calling • Email • SMS messaging • Picture messaging • App-based messaging
Nilsson et al. (2010)	• Communicate with colleagues and patient's family.
Stephens et al. (2017)	• Use hospital-developed messaging application for communication with healthcare team
Information seeking purposes	
Johansson et al. (2014)	• Access clinical information
McBride et al. (2014)	• Access work-related drug references • Access work-related nursing/medical information • Access work-related protocols • Access work-related applications that assist patient care • Access sites for professional education and development • Access sites for patient handouts and teaching
Mobasheri et al. (2015)	• Web browsing (work-related)
Moore & Jayewardene (2014)	• Accessing textbooks and formularies • Use as clinical decision applications
Documentation purposes	
Flynn et al. (2018)	• Taking photographs of patient outcomes (e.g., presence of wound, radiology imagery, and procedural equipment)
Johansson et al. (2014)	• Use note taking applications
Mobasheri et al. (2015)	• Calendar
Sharpe & Hemsley (2016)	• Taking photographs of patient outcomes (e.g., presence of wound)

Theory of Planned Behaviour

The Theory of Planned Behaviour (Ajzen, 1988, 1991) is one of the most influential theories used to predict human behaviour, including the use of technology (Ajzen, 2011; Nosek et al., 2010). Previous works have used this theory to explain healthcare professionals' use of mobile devices (Wu, Li, & Fu, 2011), electronic health records (Leblanc, Gagnon, & Sanderson, 2012), and computerised systems (Malo, Neveu, Archambault, Émond, & Gagnon, 2012; Shoham & Gonen, 2008). According to the theory, attitude toward the behaviour, subjective norm, and perceived behavioural control predict

behavioural intention. Then, behavioural intention predicts actual behaviour, particularly when there is a high degree of actual behavioural control.

Figure 3.1 provides a diagram of the interrelationship of factors based on the Theory of Planned Behaviour.

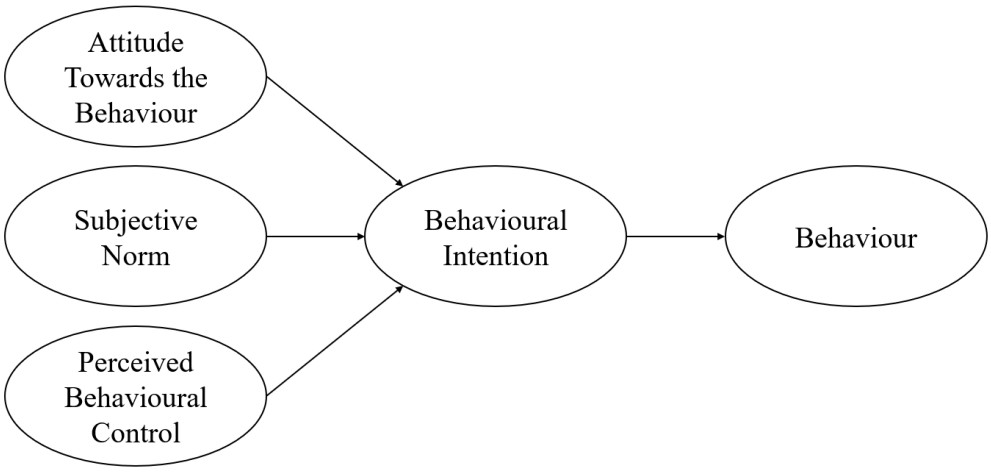

Figure 3.1. The Theory of Planned Behaviour

There were several justifications for using the Theory of Planned Behaviour as a theory to predict nurses' use of smartphones for work purposes. First, although theories like the Technology Acceptance Model (Davis, 1989) and its successor, The Unified Theory of Acceptance and Usage of Technology (UTAUT; Venkatesh & Zhang, 2010), can also be used as theoretical frameworks in this study, their use may lead to some potential problems or conceptual confusion (Bagozzi, 2007; Chen & Levkoff, 2015). For instance, van Raaij and Schepers (2008) argued that constructs within UTAUT are theoretically and psychometrically problematic because they lack conceptual specificity. Besides, these theories are often used to examine healthcare professionals' acceptance and usage of new technologies implemented in hospital settings (e.g., Liu et al., 2015; Maillet, Mathieu, & Sicotte, 2015). In contrast, the current study examines a technology and its affordances that see routine use, with varying degrees of formal and informal adoption in healthcare settings. Previous works suggest such routine use is the case among nurses in the U.S. (Flynn et al., 2018) and the U.K. (Mobasheri et al., 2015). In sum, the Theory of Planned Behaviour draws clear distinctions

among a few key constructs and is appropriate to predict nurses' use of an existing communication technology.

Second, the Theory of Planned Behaviour is flexible to be augmented with other constructs (Norman, 2011; Thomas & Upton, 2014). Ajzen (1991) acknowledged that other factors might be at play in the Theory of Planned Behaviour model and welcomed the inclusion of additional predictors to improve the explanation for intention and behaviour. In response to this, the attitude component was differentiated from its instrumental and affective components (Ajzen & Fishbein, 2005; Lawton, Ashley, Dawson, Waiblinger, & Conner, 2012), and subjective norm was differentiated with its injunctive and descriptive components (Lawton et al., 2012; Smith et al., 2008). Below is a discussion on how factors derived from the Theory of Planned Behaviour are associated with nurses' use of smartphones for work purposes.

Intention to Use Smartphones for Work Purposes

Behavioural intention refers to the willingness to exert effort to perform a behaviour (Ajzen, 1991). Intention has a rational basis and reflects motivations that derive from beliefs about the behaviour. According to the Theory of Planned Behaviour, an individual's intention to perform a behaviour influences the performance of the behaviour. In this study, it is argued that nurses' intention to use smartphones for work purposes is correlated with its use (i.e., operationalised as their use during the past month).

Previous research has examined this concept in healthcare settings. In the context of nurses' use of Web 2.0 (e.g., blogs, wikis, and social media), intention was positively correlated with use (Lau, 2011). In the context of using health information technologies among Thai healthcare professionals, there was a positive association between intention and use (Kijsanayotin, Pannarunothai, & Speedie, 2009). Similarly, previous studies show that willingness among nurses (Chiang & Wang, 2016; Giles-Smith, Spencer, Shaw, Porter, & Lobchuk, 2017; Moore & Jayewardene, 2014; Stephens et al., 2017) and community healthcare workers (Hampshire et al., 2017) seem to influence the use of mobile phones for work purposes. Consistent with the theory and prior research, this study hypothesises that:

H1. Nurses' intention to use smartphones for work purposes is positively associated with their use of smartphones for work purposes.

Instrumental and Affective Attitudes

Attitude towards a behaviour is based on beliefs formed when individuals associate the behaviour with certain perceptions, outcomes, or consequences (Ajzen, 1991). Based on the aggregate of these beliefs, individuals develop positive or negative feelings toward a behaviour, which directly influences their intention to perform the behaviour.

Scholars have differentiated instrumental and affective dimensions of attitude (Ajzen & Fishbein, 2005; Lawton et al., 2012). Instrumental attitude refers to the cost-benefit aspects (e.g., useful, necessary, helpful) of performing the behaviour, whereas affective attitude refers to feelings or emotions associated with performing the behaviour (e.g., pleasant, acceptable, a good idea). These dimensions may have unique influences on intention because individuals make both rational and emotional considerations about behaviours they may perform (Lawton et al., 2012).

Prior research has shown a link between attitude and intention on health information technology research (Park & Chen, 2007; Putzer & Park, 2012; Wu, Li, & Fu, 2011). Similarly, Park and Chen (2007) also found that nurses' attitude towards the use of smartphones among hospital nurses predicted intention. However, these studies did not differentiate the instrumental and affective components of attitude. Such differentiation may be informative by suggesting the relative importance of functionality versus feeling as sources of behavioural motivation.

Nonetheless, previous works suggest the presence of instrumental and affective attitudes toward the use of smartphones for work purposes. For instance, previous studies (Chiang & Wang, 2016; Johansson et al., 2014; Mobasheri et al., 2015; Moore & Jayewardene, 2014) found that nurses showed positive (e.g., useful, necessary, and helpful) and negative (e.g., distracting and expensive) instrumental attitudes with their use of smartphones for work purposes. Similarly, there were negative affective attitudes (e.g., unprofessional, unacceptable, unethical) found in previous works (Brandt et

al., 2016; McNally et al., 2017) that might influence nurses' intention to use smartphones for work purposes. Considering the influence of instrumental and affective attitudes on nurses' intention to use smartphones for work purposes, this study proposes the following hypotheses:

H2. Instrumental attitude is positively associated with nurses' intention to use smartphones for work purposes.
H3. Affective attitude is positively associated with nurses' intention to use smartphones for work purposes.

Injunctive and Descriptive Norms

Subjective norm refers to the perception of others' approval or disapproval of a behaviour (Ajzen, 1991). Social influences create a normative pressure that directs the performance of a behaviour (White, Smith, Terry, Greenslade, & McKimmie, 2009). Normative influences are particularly strong when they emanate from perceptions of important others (Rivis & Sheeran, 2003).

Although subjective norm has been a salient feature of the Theory of Planned Behaviour, several studies have criticised its role among other factors that influence intention. According to previous Theory of Planned Behaviour meta-analyses (Armitage & Conner, 2001; Godin & Kok, 1996), the correlation between subjective norm and intention is much lower than the correlations between attitude and perceived behavioural control to intention. Furthermore, a meta-analysis on the Theory of Reasoned Action (the predecessor of Theory of Planned Behaviour) showed that subjective norm was a weaker predictor of intention as compared to attitude (Sheppard, Hartwick, & Warshaw, 1988). Due to these criticisms, scholars have argued that the weak association of subjective norm to intention was attributed to the use of a single-item measure (Armitage & Conner, 2001). Ajzen (1991) also noted that it is naturally a weak predictor as compared to attitude and perceived behavioural control. This led some scholars to remove subjective norm in their analysis (Kurland, 1995; Sparks, Shepherd, Wieringa, & Zimmermanns, 1995). Others noted that the construct itself was poorly conceptualised (Armitage & Conner, 2001, Rivis & Sheeran, 2003), and

reconceptualising it can be a means to improve its predictive power (Lawton et al., 2012; White et al., 2009).

Subjective norm reflects the normative influence based from the social approval of a behaviour, which closely reflects the concept of injunctive norm (Rivis & Sheeran, 2003; Smith et al., 2008). To overcome the weakness of subjective norm, scholars referred to it as injunctive norm and differentiated it from descriptive norm, which is related to perceptions of other people engaging in the behaviour themselves (Lawton et al., 2012; White et al., 2009). Descriptive norm is an element of social cognitive theory (Bandura, 2001), which suggests that individuals are motivated to perform a behaviour when they observe others performing it, particularly when that behaviour results in a positive outcome for others.

Prior research has shown that subjective norm is positively related to intention to use health information technologies (Yi, Jackson, Park, & Probst, 2006), electronic health records (Aggelidis & Chatzoglou, 2009; Leblanc et al., 2012), and Web 2.0 (Lau, 2011). However, those studies operationalised subjective norm by referring only to the injunctive dimension. It is important to note that both injunctive and descriptive norms were shown in previous studies. For instance, nurses' use of smartphones for work purposes were readily observable (descriptive norm) in the workplace (Mobasheri et al., 2015; Moore & Jayewardene, 2014) and that there is an expectation (injunctive norm) of its use because members of the healthcare team rely on it when coordinating relevant tasks (Chiang & Wang, 2016; Stephens et al., 2017). Although it is unclear from prior research whether injunctive or descriptive norms affect intention, such relationships are consistent with theory and align with empirical findings in similar research contexts. Therefore, this study hypothesises that:

H4. Injunctive norm is positively associated with nurses' intention to use smartphones for work purposes.
H5. Descriptive norm is positively associated with nurses' intention to use smartphones for work purposes.

Perceived Behavioural Control

Perceived behavioural control refers to beliefs about the resources, opportunities, and skills that facilitate performing a behaviour (Ajzen, 1991, 2002). If these facilitating factors are limited, then individuals may feel unable to control the behaviour (Sparks, Guthrie, & Shepherd, 1997). Consequently, individuals will have a weaker behavioural intention. Further, even when individuals have the intention, the lack of facilitating factors means that intention to is unlikely to translate into behaviour.

Prior research has argued that perceived behavioural control should be differentiated from perceived self-efficacy (i.e., perceived ease or difficulty of performing a behaviour) and perceived controllability (i.e., extent to which behavioural performance is dependent on the will of an individual). Based from the results of exploratory factor analyses in previous studies, several scholars found that items comprising perceived behavioural control were composed of two factors that were subsequently referred to as perceived self-efficacy and perceived controllability (Armitage & Conner, 1999a, 1999b; Manstead & van Eekelen; 1998; Norman & Hoyle, 2004; Sparks et al., 1997). Although a move towards a decomposed perceived behavioural control construct is possible, Ajzen (2002) argued that a hierarchical model of perceived behavioural control is more appropriate theoretically because it recognises the uniqueness of perceived self-efficacy and perceived controllability but also considers them as two constructs that collectively form the higher-order construct of perceived behavioural control. Taking Ajzen's (2002) advice, this study used a hierarchical model of perceived behavioural control where items for perceived self-efficacy and perceived controllability were aggregated to operationalise this construct.

Previous studies found that perceived behavioural control was positively associated with intention to use several health information technologies, such as personal digital assistants (Yi, Jackson, Park, & Probst, 2006), clinical decision support systems (Hung, Ku, & Chien, 2012), telemedicine (Chau & Hu, 2001), and electronic health records (Leblanc et al., 2012). Similar work also suggests that nurses who were given training on how to use their smartphones to search for clinical information (Giles-Smith et al., 2017) and younger nurses who were mobile-savvy (Moore & Jayewardene,

2014) were likely to use smartphones for work purposes. Based on the Theory of Planned Behaviour and previous studies, this study hypothesises that:

H6: Perceived behavioural control is positively associated with nurses' intention to use smartphones for work purposes.

Addressing the Limitations of the Theory of Planned Behaviour

As outlined earlier, the Theory of Planned Behaviour provides a good theoretical basis to generate hypotheses that link behavioural antecedents with nurses' intention and use of smartphones for work purposes. However, the theory has several criticisms that need to be acknowledged and addressed.

First, although the Theory of Planned Behaviour provides behavioural factors (i.e., attitudes, norms, behavioural control) that are commonly used to predict intention and behaviour, using them only to predict nurses' intention to use smartphones for work purposes do not reflect other factors that might predict it. Several scholars (Conner & Armitage, 1998; Sheeran & Silverman, 2003) have noted that, depending on the context of the research, researchers would need to include additional variables that would improve the variance in predicting intention or behaviour. Based on the literature review (e.g., Brandt et al., 2016; Giles-Smith et al., 2017; Moore & Jayewardene, 2014), another factor that has the potential to inform the theoretical framework would be the inclusion of organisational support. Its inclusion in the theoretical framework is logical because it can act as a "distal antecedent" when predicting intention (Massu, Caroff, Souciet, & Lubart, 2018). Pages 34-38 discusses how Organisational Support Theory and perceived organisational supported contribute to the research's theoretical framework.

Another criticism of the Theory of Planned Behaviour is that variables used to augment or extend it are those that precede intention (Conner & Armitage, 1998; Sheeran & Silverman, 2003). Currently, there are limited studies that show any outcome associated with the performance of a behaviour. In the context of health informatics, recent studies that have used the Theory of Planned Behaviour focus on predicting intention of usimg health information technologies (e.g., Herrmann & Kim, 2017; Ifinedo, 2017). Clearly, not much has been done to investigate any outcome of the use of such

technology. To address this limitation, aside from identifying potential factors that can predict nurses' intention and use of smartphones for work purposes, this research would also determine an outcome arising from such behaviour. Based on the literature review, qualitative studies suggest that nurses' use of smartphones for work purposes is an attempt to improve the quality of care rendered to patients (e.g., Chiang & Wang, 2016; Moore & Jayewardene, 2014). These studies indicate that improved quality of care might be a relevant outcome of nurses' use of smartphones for work purposes. Therefore, it is reasonable to include quality of care in the theoretical framework. Pages 41-43 discusses the link between nurses' use of smartphones for work purposes and perceived quality of care through IT Consumerisation Theory.

Organisational Support Theory

Aside from behavioural antecedents, previous studies suggest that organisational factors play a role in nurses' use of smartphones for work purposes. Specifically, an important factor to consider is the perception of organisational support on the use of smartphones at work. To link perceived organisational support to nurses' use of smartphones for work purposes, this study draws on Organisational Support Theory (Eisenberger et al., 1986).

Organisational Support Theory argues that employees develop beliefs about how organisations support their actions (Eisenberger et al., 1986). It is based on the premise that employees can personify their organisations since they can develop favourable or unfavourable feelings toward them (Levinston, 1965). The personification of an organisation is acted upon by its policies; its agents who exert power over individual employees (i.e., top management, immediate superiors, rank and file employees); and its legal, moral, and financial responsibilities (Levinston, 1965). Beliefs resulting from the personification of an organisation, in turn, affect intentions to engage in relevant work behaviours, such as the use of technology (Ahmed, Nawaz, Ali, & Islam, 2015; Magni & Pennarola, 2008).

In the context of the current study, perceived organisational support can refer to nurses' perceptions of support to the use of smartphones for work purposes (i.e., perceived organisational support). More specifically, perceived organisational support on the use of smartphones for work purposes means the

perception of nurses if they are allowed to use such devices for work purposes. There is a need to include perceived organisational support as a predictor of nurses' intention to use smartphones for work purposes since the use of such technology is not only dependent on psychological factors but also includes organisational factors, especially in research that involves technology use in organisations. Previous work has shown that perceived organisational support has several antecedents (e.g., fairness of treatment and organisational rewards) and outcomes (e.g., organisational commitment and job satisfaction; Kurtessis et al., 2017; Rhoades & Eisenberger, 2002). However, considering the context of this research, the focus is on explaining how perceived organisational support influences antecedents of organisational use of technology (i.e., nurses' use of smartphones for work purposes). Therefore, aside from factors derived from the Theory of Planned Behavior, the research model draws on Organisational Support Theory to explain how perceived organisational support is associated with the factors derived from the Theory of Planned Behaviour.

Perceived Organisational Support

Perceived organisational support refers to employee perceptions of the level of support obtained from employers (Eisenberger et al., 1986; Rhoades & Eisenberger, 2002). Support from employers can include increased pay, job promotion or influence over favourable organisational policies (Eisenberger et al., 1986). In terms of technology use, such perception is instrumental to workplace technology adoption since employees can readily ascertain whether their employers support or restrict the use of a particular technology (Magni & Pennarola, 2008; O'Driscoll, Brough, Timms, & Sawang, 2010). In the context of this research, a hospital may or may not support nurses' use of smartphones for work purposes (Brandt et al., 2016; Giles-Smith et al., 2017). While the notion of support is abstract, a concrete way of expressing support to nurses' use of smartphones for work purposes is by allowing its use. However, regardless of the actual support within the hospital, what matters most are nurses' perception of how much they are allowed to use smartphones for work purposes in the hospital.

Although perceived organisational support can be derived from the organisation per se (i.e., the hospital organisation), it is more appropriate to conceptualise and operationalise this construct based on the source of such support. As argued by Eisenberger et al. (1986), employees derive organisational support from different agents within an organisation. In the context of this research, support regarding nurses' use of smartphones for work purposes can emanate from hospital administrators, nursing superiors, fellow nurses, and other members of the healthcare team (e.g., medical doctors, pharmacists, and physical therapists). For instance, while hospital administrators would issue a restrictive policy that prevents nurses from using their smartphones for work purposes, nurses' immediate superiors or colleagues may allow it use since it is needed to facilitate work. Using a source-based conceptualisation of perceived organisational support is also consistent with the idea that perceived support from both top management (i.e., hospital administrators) and employees (i.e., immediate supervisors and colleagues) are key to workplace technology adoption (Hein & Rauschnabel, 2016). Therefore, in this research, perceived organisational support is conceptualised as the extent by which nurses perceive that organisational agents (e.g., hospital administrators, nursing superiors, fellow nurses, and other members of the healthcare team) allow their use of smartphones for work purposes.

Previous works on nurses' use of smartphones for work purposes found that perceived organisational support is related to nurses' intention and use of smartphones for work purposes. For instance, Moore and Jayewardene (2014) found that perceived organisational support in the form of official endorsement and colleague recommendation affect nurses' use of smartphones for information seeking purposes. Other studies also found that relaxing restrictions and creating policies that allow nurses to use their smartphones for work purposes can encourage them to use it (Brandt et al., 2016; Giles-Smith et al., 2017). Previous studies have examined the effects of similar constructs, such as internal environment (Putzer & Park, 2010) and management support (Park & Chen, 2007), on intention to use smartphones for work purposes.

Despite the presence of studies suggesting a direct link between perceived organisational support and intention, it is interesting to note that it

may not be a proximal (i.e., direct) antecedent of intention but, perhaps, a distal (i.e., indirect) antecedent. As noted by Ajzen and Fishbein (1980) the three factors that predict intention (i.e., attitude, subjective norm, and perceived behavioural control) are internal motivators and can be predicted by a general attitude. They also noted that this general attitude can indirectly affect behaviour through the following internal motivators. Following their theoretical assumptions, perceived organisational support can be considered as a general attitude and this can directly predict internal motivators and indirectly predict intention. Appropriating this in the context of this research, perceived organisational support regarding the use of smartphones for work purposes can predict internal motivators, such as instrumental and affective attitudes, injunctive and descriptive norms, and perceived behavioural control. Moreover, it can also indirectly predict intention to use smartphones for work purposes through these internal motivators. In other words, nurses who have a high perception of organisational support regarding the use of smartphones for work purposes are likely to have a more positive instrumental and affective attitude towards smartphone use for work purposes; perceived greater expectation (injunctive norm) and observation (descriptive norm) of smartphone use for work purposes; and greater control in using smartphones for work purposes, which then results to a greater intention to use smartphones for work purposes.

Aside from theoretical considerations, several empirical studies have shown that perceived organisational support and other general attitudes directly affect internal motivators and indirectly affect intention. For instance, in the context of intention to adopt innovative behaviours, Massu et al. (2018) proposed that employees' perception of organisational support for innovation would result to the formation of a more positive attitude and greater perceived behavioural control toward innovative behaviours. Interestingly, aside from having perceived organisational support predict attitude and perceived behavioural control, their findings also showed that it had an indirect effect on intention. On the other hand, Chen and Tung (2014) found that a general attitude, such as environmental concern, predicted attitude towards visiting green hotels, subjective norms, and perceived behavioural control, which then predicted intention to visit green hotels. More recently, Leung and Rosenthal

(2019) found that perceived sustainability-related climate (another type of general attitude similar to perceived organisational support) is indirectly associated with recycling intention through attitude, subjective norm, and perceived behavioural control. Considering theoretical assumptions and previous studies, this study proposes the following hypotheses and research question:

H7: Perceived organisational support is positively associated with instrumental attitude.
H8: Perceived organisational support is positively associated with affective attitude.
H9: Perceived organisational support is positively associated with injunctive norm.
H9: Perceived organisational support is positively associated with descriptive norm.
H10: Perceived organisational support is positively associated with descriptive norm.
H11: Perceived organisational support is positively associated with perceived behavioural control.
RQ1: Is perceived organisational support indirectly related to nurses' intention to use smartphones for work purposes?

The Influence of Organisational Issues on Superiors' Organisational Support to Nurses' Use of Smartphones for Work Purposes

Aside from perceived organisational support, it is also relevant to examine the support conveyed by agents within a hospital regarding nurses' use of smartphones for work purposes (i.e., actual organisational support; Eisenberger et al., 1986). However, what is more intriguing is identifying the organisational issues associated with such behaviour and its influence on the support conveyed by nurse administrators – one of the key organisational agents of the hospital. The rationale is these issues can influence nurse administrators' support to nurses' use of smartphones for work purposes, which then influences nurses' perceived organisational support. The following paragraphs provide details on the mechanism by which organisational issues

influence perceived organisational support via support derived from nurse administrators.

As discussed earlier, perceived organisational support is the support felt by employees from various agents of the organisation. Beyond perceived organisational support, Organisational Support Theory also posits that the support exhibited by organisational agents constitutes actual organisational support (Eisenberger et al., 1986). According to Rhoades and Eisenberger (2002), one of the key organisational agents that directly influences employees' perception of organisational support are their supervisors. This is for the fact that supervisors have the responsibility to direct and evaluate subordinates. Therefore, the extent of support conveyed by supervisors (i.e., actual organisational support) can influence employees' perceived organisational support.

For the purposes of this research, supervisors will be referred to as nurse administrators which are nurses with supervisory function (Kelly, 2011). In the Philippines, nurse administrators include charge nurses (referred to as head nurses also; entry-level supervisory position), nurse managers (mid-level supervisory position), and nurse supervisors (mid-level supervisory position). Following Organisational Support Theory, nurse administrator's support to nurses' use of smartphones for work purposes (i.e., actual organisational support) can influence nurses' perceived organisational support on the use of smartphones for work purposes. This link is supported by meta-analyses where supervisor support is a strong positive predictor of perceived organisational support (Kurtessis et al., 2017; Rhoades & Eisenberger, 2002). However, what is currently lacking in literature is the influence of organisational issues on nurse administrators' support to nurses' use of smartphones for work purposes. Although Chapter Two showed that scholars (Brandt et al., 2016; Chiang & Wang, 2016; McNally et al., 2017) present several issues associated with nurses' use of smartphones for work purposes (e.g., blanket ban of smartphones at work, reduced professionalism, and hospitals not providing smartphones), it is unknown whether the presence of these issues would encourage or inhibit nurse administrators to support nurses' use of smartphones for work purposes. For instance, although a hospital blanket ban on smartphones, would a nurse administrator still prohibit a nurse

to a smartphone if this is the only means possible to contact a physician given that the is no hospital provided smartphone?

Overall, there is a need to identify organisational issues related to nurses' use of smartphones for work purposes and the influence it has on nurse administrators' support for such behaviour. Exploring organisational issues related to personally-owned smartphones as a health information technology is interesting because, unlike other health information technologies, they are seldom instituted and supported by hospitals (Brandt et al., 2016). Such actions by hospitals are understandable since implementing BYOD policies have implications for security (e.g., privacy and confidentiality risks to patient information) and governance (e.g., lack of clear guidelines and protocols; Marshall, 2014). As one of the hospital's organisational agents, nurse administrators need to deal with these issues because despite the risks associated with it (e.g., privacy and confidentiality concerns), there are also certain advantages of using smartphones for clinical work (e.g., opportunity to enhance quality of care to patients, faster communication and information seeking), especially among nurses in low-resource settings. Therefore, these issues have the tendency to influence nurse administrators' support to nurses' use of smartphones for work purposes. Furthermore, identifying and clarifying these issues can help with the development of recommendations. Consequently, these recommendations can be used to guide hospital administrators when making context-sensitive policies that consider the increasing use of consumer technologies by healthcare professionals in healthcare settings (Marshall, 2014). Therefore, the second RQ asks:

RQ2: What are the organisational issues that influence support to nurses' use of smartphones for work purposes?

IT Consumerisation Theory

The final theoretical perspective informing this research is IT Consumerisation Theory, which posits that the use of privately-owned devices for business purposes improves work performance (Niehaves et al., 2013). IT Consumerisation Theory is rooted in the growing consumerisation of information technology, where personal digital devices are increasingly used for all kinds of purposes, including work purposes (Köffer, Junglas, Chiperi, & Niehaves, 2014). With personal devices like smartphones, tablets and laptops becoming more accessible, powerful, and portable (Marshall, 2014), the consumerisation of these devices means that employees have new capabilities to perform certain work-related activities (Köffer et al., 2014).

Proponents of IT Consumerisation Theory have argued that allowing employees to use their own devices at work can improve work performance since ancillary devices are less necessary for them to perform tasks (Köffer, Ortbach, & Niehaves, 2014). Consistent with that argument, some employers have policies that encourage employees to bring their own devices to work (Marshall, 2014; Schalow, Winkler, Repschlaeger, & Zarnekow, 2013). Aside from being adept in using their own devices (Kirk, Swain, & Gaskin, 2015), scholars argued that allowing employees to use their own devices at work can improve work performance since they need not use another device to perform tasks (Köffer et al., 2014).

On the other hand, some studies on IT consumerisation present negative implications related to the use of personal devices in the workplace. For instance, there is evidence that allowing employees to use their own device comes with privacy and data security concerns (Moyer, 2013). For instance, mobile devices that are insufficiently secured (e.g., weak device password and data encryption) can be problematic when lost and used by unauthorised individuals (Disterer & Kleiner, 2013). Utter and Rea (2015) also present governance issues regarding the ownership and control of the device. For example, while the smartphone is owned by the employee, should an organisation decide to wipe out data in instances that the smartphone is lost or stolen? Moreover, since the device is not owned by the organisation, an employee may wrongfully destroy or withhold information on the device upon cessation of employment.

Aside from privacy and governance issues, there is the issue of cost from the perspective of employees. Recent studies show that healthcare workers are keen on using their own mobile phone to facilitate work in the hospital on the grounds that it might improve work productivity and the quality of care delivered to patients (Chiang & Wang, 2016; Hampshire et al., 2017; Stephens et al., 2017). However, they might be bearing the cost of its use unwillingly, which can lead to unintended financial constraints that employers may not realise (Chiang & Wang, 2016; Hampshire et al., 2017; Stephens et al., 2017).

Nonetheless, IT Consumerisation Theory is a framework that fits the current context because nurses' use of smartphones for work purposes is an example of IT consumerisation (Marshall, 2014). Of present interest is to what extent nurses associate their use of smartphones for work purposes with their work performance. While the Theory of Planned Behaviour and Organisational Support Theory were used to predict nurses' use of smartphones for work purposes, IT Consumerisation Theory would contribute to the understanding of its outcomes. Following this theory, nurses' use of smartphones for work purposes should enhance their work performance. The current study considers perceived quality of care (i.e., the perception of being able to delivery quality care to patients) as an aspect of perceived work performance that is specific to the healthcare setting: (Krebs, Volpe, Aisen, & Hogan, 2000; Letvak, Ruhm, & Gupta, 2013).

Perceived Quality of Care

A nurse's primary role is to provide quality care based on established nursing standards (American Nurses Association, 2010). Quality of care refers to the provision of healthcare in a way that benefits and satisfies the patient (Mosadeghrad, 2014). Thus, the best judge of the quality of care received is the patient (Donabedian, 1988; Leggat, Bartram, Casimir, & Stanton, 2010). However, acquiring such data from patients is not always feasible. Rather, nurses' own ratings of quality of care can be informative and relatively easy to access (Aiken, Clarke, & Sloane, 2002; Chang, Ma, Chiu, Lin, & Lee, 2009). Since nurses typically provide direct patient care, they should have accurate perceptions of quality of care (Laschinger, Shamian, & Thomson, 2001).

Previous studies have examined many non-HIT factors related to perceived quality of care, such as nurse staffing (Aiken et al., 2002), shift work category (Griffiths et al., 2014), and burnout (Poghosyan, Clarke, Finlayson, & Aiken, 2010; Van Bogaert, Meulemans, Clarke, Vermeyen, & Van de Heyning, 2009). Other scholars have suggested that research should focus on how health information technologies affect perceived quality of care (DesRoches, Miralles, Buerhaus, Hess, & Donelan, 2011; While & Dewsbury, 2011). There is evidence of this linkage in the context of electronic health records (DesRoches et al., 2011) and personal digital assistants (Doran et al., 2010).

Although there is some evidence that nurses' use of smartphones in healthcare settings enhances information seeking and communication among healthcare workers (e.g., Mobasheri et al., 2015; Moore & Jayewardene, 2014), it is unclear to what extent such uses affect nurses' perceptions of the quality of care rendered to patients. Nonetheless, previous studies (Chiang & Wang, 2016; Moore & Jayewardene, 2014) showed that nurses use their smartphones for work purposes to enhance the quality of care rendered to patients. Considering IT Consumerisation Theory and past studies, this study hypothesises that:

H12: Nurses' use of smartphones for work purposes is positively associated with perceived quality of care.

Theoretical Synthesis

The theoretical framework of this research is guided by a combination of behavioural and organisational theories, such as the Theory of Planned Behaviour, Organisational Support Theory, and IT Consumerisation Theory (see Figure 3.2). This framework also reflects the research's hypotheses and research questions. Table 3.2 shows a summary of the hypotheses and research questions.

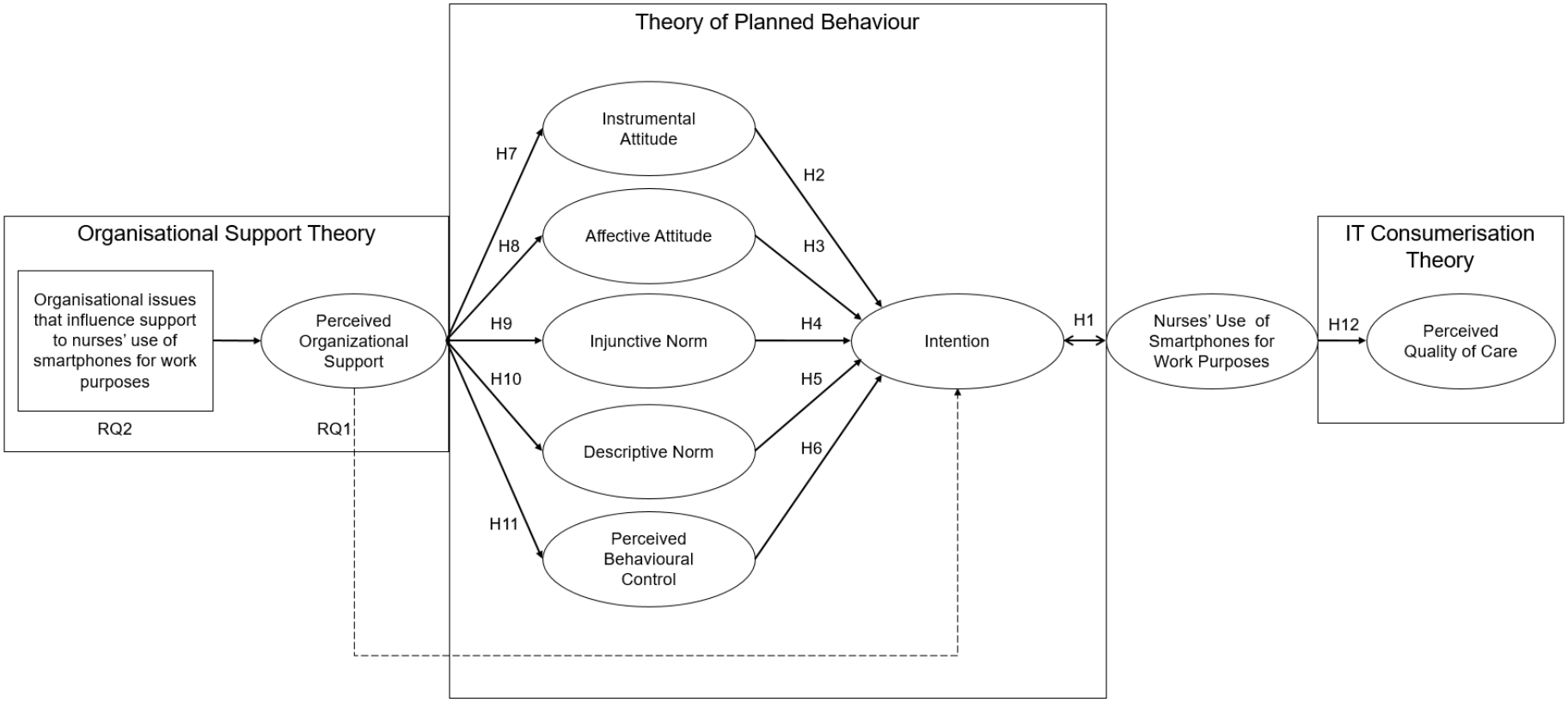

Figure 3.2. Theoretical Framework

Table 3.2. Summary of Hypotheses and Research Questions

Hypotheses	
H1	Nurses' intention to use smartphones for work purposes is positively associated with their use of smartphones for work purposes.
H2	Instrumental attitude is positively associated with nurses' intention to use smartphones for work purposes.
H3	Affective attitude is positively associated with nurses' intention to use smartphones for work purposes.
H4	Injunctive norm is positively associated with nurses' intention to use smartphones for work purposes.
H5	Descriptive norm is positively associated with nurses' intention to use smartphones for work purposes.
H6	Perceived behavioural control is positively associated with nurses' intention to use smartphones for work purposes.
H7	Perceived organisational support is positively associated with instrumental attitude.
H8	Perceived organisational support is positively associated with affective attitude.
H9	Perceived organisational support is positively associated with injunctive norm.
H10	Perceived organisational support is positively associated with descriptive norm.
H11	Perceived organisational support is positively associated with descriptive norm.
H12	Nurses' use of smartphones for work purposes is positively associated with perceived quality of care.
Research Questions	
RQ1	Is there an indirect effect between perceived organisational support and nurses' intention to use smartphones for work purposes?
RQ2	What are the organisational issues that influence support to nurses' use of smartphones for work purposes?

To construct the theoretical framework, an initial conceptualisation of nurses' use of smartphones for work purposes is needed. In this research, it is defined as *nurses' use of their smartphone at work for communication, information seeking, and documentation purposes*. With a conceptual definition at hand, it is now possible to construct the theoretical framework by integrating constructs from behavioural and organisational theories.

Based on Chapter Two, relevant studies on this topic were descriptive and had less emphasis on using theories to determine what motivate nurses to use their smartphones for work purposes (e.g., McBride et al., 2015a, 2015b; Mobasheri et al., 2015). To overcome this gap, this research adopts the Theory of Planned Behavior to predict nurses' intention and use of smartphones for

work purposes. These are outlined in H1 to H6. Although the Theory of Planned Behaviour provides a set of behavioural factors to predict intention, using this theory is insufficient to fully characterise the use of technology in an organisational setting. Therefore, this research overcomes the limitations of this theory by augmenting it with Organisational Support Theory. Following Organisational Support Theory, this research proposes H7 to H11 and RQ1 to examine whether perceived organisational support directly (i.e., instrumental and affective attitudes, injunctive and descriptive norms, and perceived behavioural control) and indirectly (i.e., intention) predict behavioural antecedents. The theoretical framework also includes RQ2 which aims to identify organisational issues that influence support to nurses' use of smartphones for work purposes. This is based on the argument that issues encountered by nurse administrators regarding nurses' use of smartphones for work purposes can influence their support to this behaviour, which then can influence nurses' perceived organisational support.

In Chapter Two, previous studies also argued that nurses' use of smartphones for work purposes is related to enhanced quality care provided to patients (e.g., Chiang & Wang, 2016; Johansson et al., 2014; Sharpe & Hemsley, 2016). However, no study has yet tested this on an empirical basis. By adopting IT Consumerisation Theory, H12 hypothesises that nurses' use of smartphones for work purposes is positively associated with perceived quality of care. Understanding the relationship between the use of such devices to this outcome is crucial because more nurses are likely to use their smartphones as part of their clinical routines (Mobasheri et al., 2015; Jorm & Roper, 2016). This justifies the importance and inclusion of perceived quality of care in the theoretical framework. Overall, the theoretical framework highlights the process to identify the predictors, outcome, issues of nurses' use of smartphones for work purposes.

The following section provides the research design on how to address the resulting hypotheses and research questions in the theoretical framework.

Research Design

Three interrelated studies were designed to test the hypotheses and answer the research questions. These studies include the Exploratory Study, Study I, and Study II. Figure 3.3 summarises the research design and the process by which the studies answer specific research questions.

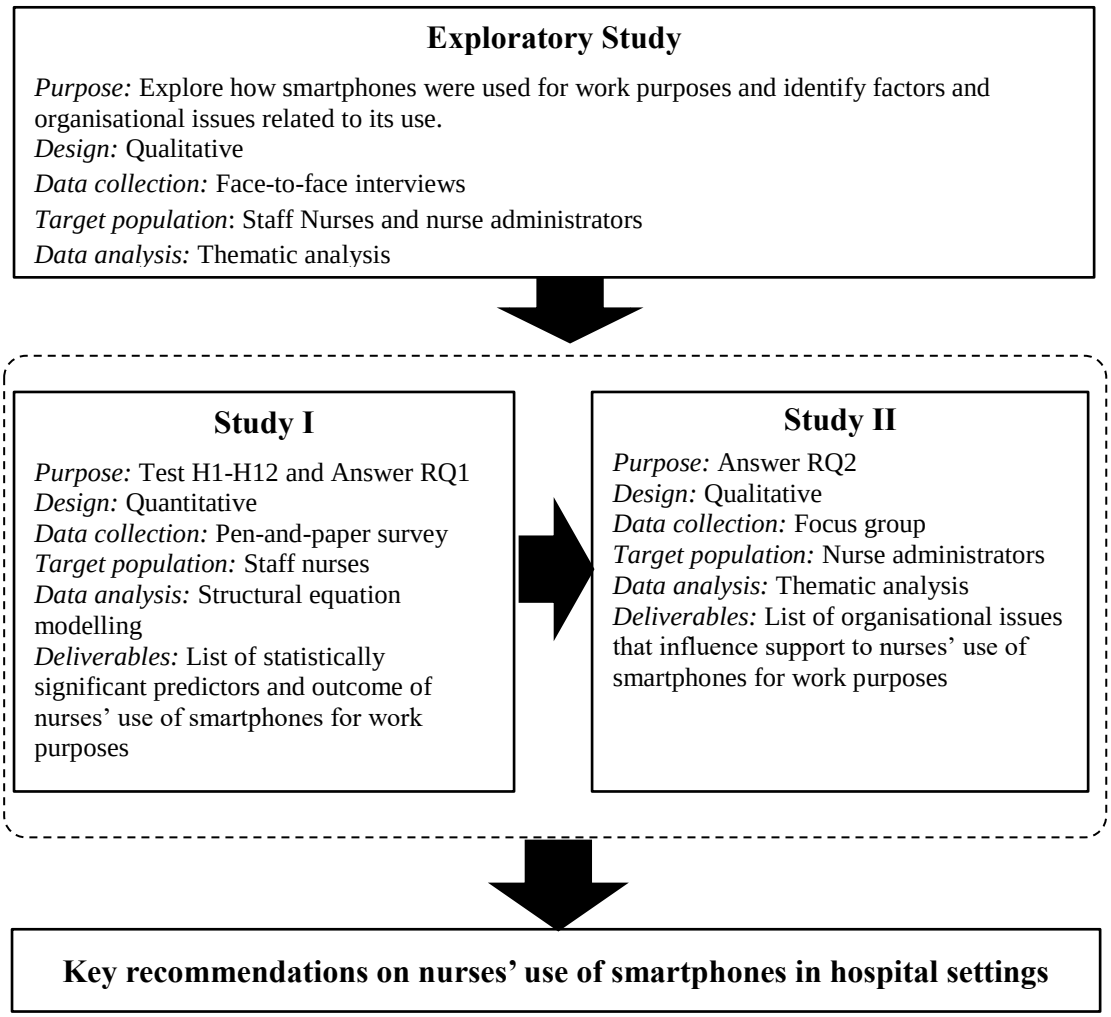

Figure 3.3. Research Design

As shown in Figure 3.3, this research follows a mixed-method design. According to Cameron (2009), the use of mixed-method design allows the findings of an initial study to be used as a basis for a follow-up study. Such logic is needed to provide an in-depth understanding of nurses' use of smartphones for work purposes and to be able to provide theory and evidence-based recommendations based on the findings of the research (Wheeler & Åhlberg, 2012). Specifically, the overall research design is as follows: it starts

with a qualitative approach (Exploratory Study), followed by a quantitative approach (Study I), and ends with a qualitative approach (Study II). The Exploratory Study served as the starting point of the research and was used as a basis to conduct Study I and Study II. An exploratory study was needed because of the lack of literature on this topic, especially in the Philippines. By eliciting the beliefs and perceptions of nurses on their use of smartphones for work purposes, the findings of the Exploratory Study can inform the execution of the proposed studies in this research (Holden, 2010; Holden & Karsh, 2010). Specifically, results of the Exploratory Study were used in Study I to guide the development of survey items and strengthen the research model that can be used to identify the predictors and outcome associated with nurses' use of smartphones for work purposes. Aside from this research, previous studies have used a qualitative study to inform a succeeding quantitative study by developing survey items and informing theoretical models to examine the relationship between online healthcare information access and healthcare utilisation (Osei-Frimpong, Wilson, & Lemke, 2018). Similarly, such an approach has been used to develop a graphical tool to measure medication adherence in asthma patients (Yousif, Lemière, Cartier, Forget, & Blais, in press).

Moreover, findings of both the Exploratory Study and Study I were used to inform Study II to explore the influence of organisational issues on perceived organisational support by looking how such issues influence actual organisational support. As discussed later, the Exploratory Study uncovered a few issues identified by nurse administrators on nurses' use of smartphones for work purposes that can be further explored in Study II. Aside from this research, such an approach has been utilised to further understand the role of organisational issues in the use of health information technologies in hospital settings (Farahat, Hegazy, & Mowafy, 2018; Gupte et al., 2016).On the other hand, data from Study I will be used to identify hositals that have high and low perceived organisational support. On a practical note, conducting Study II would provide sufficient data to generate relevant recommendations that have policy implications on smartphone use in hospital settings.

Summary

This chapter presents the theoretical framework and research design used to address the hypotheses and research questions. First, a conceptual definition of nurses' use of smartphones for work purposes was proposed. Next, a theoretical framework was constructed based on behavioural (i.e., Theory of Planned Behavior) and organisational (i.e., Organisational Support Theory) theories. This framework explains how organisational and behavioural factors are associated with nurses' use of smartphones for work purposes. The theoretical framework also outlines the hypotheses and research questions to be addressed in this research. To test the hypotheses and answer the research questions, a mixed-method research was proposed (i.e., Exploratory Study, Study I, and Study II). The following chapter provides details on the first phase of the research – the Exploratory Study.

CHAPTER FOUR EXPLORATORY STUDY

Given the lack of literature on this topic in the Philippines, the Exploratory Study identifies specific ways that nurses have used their smartphones for work purposes in the Philippines including the issues they face with its use. It also determines whether the factors proposed in Chapter Three are relevant in the context of the research. Moreover, the Exploratory Study determines a few organisational issues related to nurses' use of smartphones for work purposes in the Philippines.[1] The following sections provide a brief overview of the method of the Exploratory Study. It concludes with the presentation of the results and a discussion on how the results serve as a foundation for conducting Study I and Study II.

Method

Ethics Approval

The Institutional Review Board of Nanyang Technological University provided ethical clearance for this interview-based study (IRB-2015-05-013, see Appendix A). Accordingly, interviewees gave written and verbal consent before the interviews (see informed consent form in Appendix B). To anonymise the findings, codes for position gender and age were only used to refer to interviewees (e.g., Staff Nurse 1, Male, 26) and contextual information was de-identified. Interviewees were given gift vouchers worth PHP 200 (approximately USD 4) as incentives.

Interviewee Selection and Profile

Since this study used a qualitative research design, non-probability sampling techniques were used to select interviewees. First, potential interviewees were selected using purposive sampling based on the inclusion criteria: interviewees should be (1) at least 21 years old and (2) works as a registered nurse (3) for at least a year (4) in either a government or private

[1] Results based on data collected for the Exploratory Study were published in *International Journal of Medical Informatics* (2016) and *International Journal of Nursing Practice* (2017). See appendix L for more details.

hospital in Metro Manila, Philippines. Metro Manila was chosen as the primary research locale since it is the country's capital region and it is where most of the hospital organisations that employ nurses are located (Castro-Palaganas et al., 2017; Lorenzo et al., 2007). Aside from purposive sampling, snowball sampling was used by obtaining interviewees through referrals made by potential and actual interviewees including other professional contacts.

Overall, 30 nurses from six government and seven private hospitals were interviewed in July 2015. Of these nurses, most of them were staff nurses (n = 23) since they provide considerable time with patients (Kelly 2011; Neville et al., 2015). More importantly, they are mostly young adults that are enthusiastic about using the latest in mobile technologies (Chen et al., 2016), especially in the Philippines (We Are Social, 2017).

Table 4.1. Profiles of Staff Nurses (n = 23)

Profile	Values
Demographics	
Average age (range)	26.57 (23-45)
Female (%)	13 (57%)
Work background	
Private hospital (%)	16 (70%)
Government hospital (%)	7 (30%)
Average years employed (range)	2.5 (1-5.5)
Technographics	
Owns more than one mobile phone (%)	6 (26%)
Average years of mobile phone ownership (range)	11.87 (5-16)
Average years of smartphone ownership (range)	4.75 (.7-8)
Postpaid subscription (%)	12 (52%)
Average monthly mobile phone expenditure in USD (range*)	23.40 (4.41-57.34)
Connects to mobile internet via 3G or 4G (%)	19 (87%)

*Converted from Philippine Peso (PHP). Exchange rate on 20 July 2015 is USD 1 = PHP 45.34.

Table 4.1 shows the profiles of staff nurses. To perform maximum variation sampling (Tracy, 2013), nurse administrators, such as charge nurses (CN, n = 4) and nurse managers (NM, n = 3), were also interviewed as a means of acquiring different viewpoints. Moreover, nurses working in various nursing units (e.g., operating theatres, medical wards, emergency departments, etc.) were interviewed to enhance the transferability of the findings.

Data Collection and Analysis

Personal interviews were condicted so that interviewees can freely disclose information privately (Asgary et al., 2015). Interviews were scheduled at a time and location deemed appropriate by the interviewees (e.g., after their shift or rest day in coffee shops or food stalls). Before starting each interview, verbal and written consent were obtained to conduct, and audio record the interview. Conversations were held using a mix of English and Tagalog (widely used Filipino language) for them accurately convey their thoughts. Interviews lasted for an average of 25 minutes.

A semi-structured interview approach was used by asking open-ended questions (see Appendix C for the interview guide). These questions were created based on a review of relevant literature on nurses' use of smartphones (e.g., McBride et al., 2013, 2015a, 2015b; Mobasheri et al., 2015). Utilising a semi-structured interview approach provided the flexibility of asking more questions beyond the interview guide, especially when clarifications are needed and if the researcher wants to explore more details. (Irvine, Drew, & Sainsbury, 2013).

Two research assistants fluent in English and Tagalog produced verbatim transcriptions of the interviews and translated them into English. A qualitative data analysis software (*NVivo10*) was used to analyse interview transcripts. Following recommendations from Ellison, Heino, and Gibbs (2006), preliminary coding was conducted by assigning open codes for each transcript line-by-line. This allows breaking down the data into smaller pieces to easily facilitate the identification of emerging themes (Tracy, 2013). After initial coding, the researcher had several rounds of critical deliberation with his former supervisor (Asst. Prof. Trisha T. C. Lin) to ensure the accuracy, consistency, and relevance of the codes for thematic analysis (Asgary et al., 2015). Routine discussions were also conducted to determine how themes vary from one case to another in consideration of the characteristics of the interviewees.

Trustworthiness

Steps were taken to enhance the trustworthiness of the exploratory study by applying the principles of credibility, transferability, dependability, and confirmability (Shenton, 2004). First, the study enhanced its credibility by establishing rapport with the interviewees (to promote honest answers) and used iterative questioning (to identify false details). Next, the principle of transferability was upheld by conducting interviews with nurses from various nursing areas in government and private hospitals. Although qualitative research does not aim for generalisability, strategies at improving transferability would enhance the study's applicability in other settings (Shenton, 2004). Moreover, the study upheld dependability since protocols for data collection and analysis were technically sound and ethical. Finally, the study followed the principle of confirmability by adding relevant quotes that best represent the experiences and ideas of the participants.

Results and Discussion

Defining Nurses' Use of Smartphones for Work Purposes

Table 4.2 summarises how nurses used their smartphones for work purposes. Consistent with previous studies (e.g., Mobasheri et al., 2015; Chiang & Wang, 2016; Nilsson et al., 2010), the Exploratory Study showed that nurses use their smartphones for communication, information seeking, and documentation purposes. Considering that most of them use smartphones, a definition of nurses' use of smartphones for work purposes proposed in Chapter Three was supported by the results of the Exploratory Study (i.e., *nurses' use of their smartphones at work for communication, information seeking, and documentation purposes*).

Nonetheless, it is important to note that smartphones were primarily used for communication purposes, followed by information seeking, and documentation purposes. This result is somewhat intuitive, as mobile phones are mainly communication devices (Steinhubl, Muse, & Topol, 2015). However, given that smartphones have multimedia and Internet connection capabilities (Mobasheri et al., 2015), it is not surprising that it is also used for information seeking (e.g., searching information on the Internet or clinical

mobile applications) and documentation purposes (e.g., taking pictures, creating notes via mobile applications).

This study also provided specific scenarios of nurses' use of smartphones for work purposes (e.g., sending a text message or making calls to doctors). These scenarios will be useful when developing items to measure nurses' use of smartphones for work purposes.

Table 4.2. Nurses' Use of Smartphones for Work Purposes

Purpose	Usual routine	Routine when using smartphones	Sample quotes
Communication			
Inform patient updates to members of the healthcare team.	Inform them face-to-face. Use the hospital's telephone or paging system.	Send text messages via SMS. If urgent, call them. Sometimes send relevant text and images via instant messaging applications.	*"If the patient undergoes code blue [cardiopulmonary arrest], we just text or call doctors instead of looking for them."* (Government Staff Nurse 14, Female, 34).
Inform nurses with work-related information.	Announce meetings or work schedule face-to-face or through memo.	Send text messages via SMS. If urgent, call them. Sometimes send relevant text and images via instant messaging applications.	*"We use Facebook Messenger [through smartphone]. Sometimes our schedule for the next week is released late by our [nurse] manager. Since our charge nurse often receives our schedule table first, she just takes a picture of it and posts in our Facebook Messenger group."* (Private Staff Nurse 9, Male, 23)
Inform relatives on the status of patient.	Inform the relatives face-to-face.	Send SMS text messages. If urgent, call them.	*"In the ICU [Intensive Care Unit], patients are often unstable. The relatives are not always there so we need to call them if ever they would like a DNR [do not resuscitate] if the patient becomes unstable"* (Government Staff Nurse 17, Female, 28).
Communicate to a patient with a different language.	Acquire the services of a hospital interpreter.	Use mobile translation applications.	*"We cater international patients like Japanese patients who have difficulty speaking in English. I use Google Translate so that we can talk with them"* (Private Staff Nurse 1, Male, 26).
Information seeking			
Search relevant information for patient care.	Retrieve from memory. Consult colleagues. Look for reference books.	Search patient care information through mobile internet. Open clinical applications or e-books.	*"I open my mobile data then search it [drug info] via Google so I don't have to open books anymore"* (Private Staff Nurse 19, Female, 25].
Answer patient queries.	Retrieve from memory. Consult colleagues.	Search information through mobile internet or check mobile applications.	*"Sometimes, patients ask 'where is the clinic of…' I just open our [hospital's] app then I show it to the patient. We don't really remember every detail, so it helps"* (Private Staff Nurse 2, Male, 24).
Documentation			
Document a patient outcome or incident.	Memorise the outcome/incident and take note in the patient's chart.	Use smartphone to take a picture of the outcome or incident as a reference.	*"We are referred to some patients for skin tests. If the doctor is busy, we take a picture of the [result of the] skin test"* (Private Staff Nurse 12, Male, 23).
Check details on relevant patient forms.	View the form physically. Should wait if someone is using it.	Acquire a digital copy of patient forms by taking a picture via smartphone.	*"…[T]he admitting sheet needs to be returned to the admitting officer, so we don't have a copy. We just take a picture of it using our cellphone, so we can carry-out the orders in it"* (Private Staff Nurse 18, Female, 25).

Factors and Organisational Issues

The results of the Exploratory Study show that factors identified in Chapter Three were relevant to nurses' use of smartphones for work purposes in the Philippines. Table 4.3 summarises these factors with corresponding quotes.

Consistent with the proposed theoretical framework in Chapter Three, the results showed that factors derived from the Theory of Planned Behaviour, such as intention, instrumental and affective attitudes, injunctive and descriptive norms, and perceived behavioural control, reflect those that were found in the interview data. Similarly, the results lend support to Organisational Support Theory since the interview data indicate that perceived organisational support is a relevant factor regarding nurses' use of smartphones for work purposes. Consistent with IT Consumerisation Theory, the results also showed that nurses' use of smartphones for work purposes could enable nurses to enhance the quality of care provided to patients.

In general, the results suggest that behavioural antecedents (i.e., intention, instrumental and affective attitudes, injunctive and descriptive norm, and perceived behavioural control) and organisational factors (perceived organisational support and perceived quality of care) can be included in the model that will be tested in Study I. Aside from providing evidence on the appropriateness of these factors in the model, the results would also help in the development of the survey items that will be used to measure these factors in Study I.

Aside from the results related to factors associated with nurses' use of smartphones for work purposes, the results also showed that there were some organisational issues related to nurses' use of smartphones for work purposes. These issues include unclear policies on the use of personal devices (e.g., the hospital does not allow smartphones at work, but nursing superiors allow their staff to use it) and the absence (or lack) of hospital-provided mobile phones which makes nurse administrators allow the use of personal smartphones. Organisational issues in the form of unclear policies (Stephens et al., 2017) and lack of hospital-provided mobile phones (Chiang & Wang, 2016; Sharpe & Hemsley, 2016) reflect previous studies. Collectively, these findings can provide the necessary foundation in Study II to further understand how

organisational issues faced by nurse administrators influence their support regarding nurses' use of smartphones for work purposes.

Table 4.3. Factors Related to Nurses' Use of Smartphones for Work Purposes

Factors	Sample quotes
Instrumental Attitude	*"I think the mobile phone is very useful in our area. The communication with the doctor is faster plus you can help the patient for them to exit [be discharged from the hospital] much faster because we text doctors during trans-out."* (Private Charge Nurse 3, Male, 26) *"Instead of looking for the attending physician, I can just use my smartphone to contact him. Even if he is justwithin the hospital, looking for him is time consuming. If I use mysmartphone, on the spot, I can reach him immediately."* (Private Staff Nurse 23, Female, 25)
Affective Attitude	*"While inserting an intravenous line to the patient, my phone suddenly ringed as there was someone calling me…it is quite distracting."* (Government Staff Nurse 13, Male, 25)
Iinjunctive norm	*"I want to finish thetask [informing the physician about patient updates] and have noworries." (Private Staff Nurse 1, Male, 26).* *"Some doctors want to see the patient's heart rate and rhythm through the cardiac monitor... Using my own smartphone, I am able to do that by taking a picture of the cardiac monitor screen and sending the image [to the doctors] via Viber because that's what they want."* (Private Staff Nurse 11, Female, 26)
Descriptive norm	*"It's like normal. Nowadays, everyone [at work], like doctors and nurses, are using their [personal mobile] phone [for work purposes] anytime and anywhere."* (Private Staff Nurse 18, Female, 25) *"I also seemy [nursing] supervisors using their [personal mobile] phones at work, while on duty."* (Government Staff Nurse 22, Male, 28).
Perceived behavioural control	*"Although we have a list of medications on MIMS [a drug reference book], it is far easier to just search the [generic] name or even brand name…or if you have [nursing] procedures that you don't know…even the preparations…I can easily find it on mobile internet."* (Private Staff Nurse 16, Female, 28)
Intention to use	*"[Asked if he will use desktop-based messaging provided by the hospital or his smartphone to contact a doctor during an emergency]. I will call [the doctor]. The advantage is my phone has a [postpaid] subscription plan so I am entitled to make unlimited calls."* (Private Staff Nurse 8, Male, 24)
Perceived organisational support	*"No phones allowed especially when you are about to take pictures of patients or take anything from the patient like voice record or pictures without any consent at all. However, we can use the [personal] mobile phone because we have to talk to some associates within the hospital. It's not really completely restricted."* (Private Staff Nurse 1, Male, 26) *"They [nurse managers] are strict on using [personal] mobile phones at work. But if it is for work purposes and not FB [Facebook] or Youtube, it's just ok for them."* (Private Staff Nurse 4, Female, 24)
Perceived quality of care	*"If we can communicate much faster with the physician, the faster our response to the patient. We avoid delays in the procedure to the patient…the less risk of harm to the patient."* (Private Staff Nurse 2, Male, 24)

Summary

The Exploratory Study showed that nurses in the Philippines use their smartphones at work for communication (e.g., sending text messages or calling nurses or doctors), information seeking (e.g., searching information on the Internet), and documentation purposes (e.g., taking a picture of patient-related outcomes and forms). Results also showed that the behavioural antecedents (i.e., intention, instrumental and affective attitudes, injunctive and descriptive norms, and perceived behavioural control) and organisational factors (perceived organisational support and perceived quality of care) proposed in Chapter Three are relevant in the context of the research and can be used as factors for model testing in Study I. Finally, the Exploratory Study also shed light on a couple of organisational issues related to nurses' use of smartphones for work purposes in the Philippines. Such findings can be used to improve the design and execution of Study II.

CHAPTER FIVE STUDY I

Predictors and Outcome of Nurses' Use of Smartphones for Work Purposes

Chapter Five presents Study I where it tests a research model derived from the theoretical framework of this research. Specifically, the model allows for the identification of the predictors and outcome of nurses' use of smartphones for work purposes. First, it presents the method employed to test the research model developed in Chapter Three. A structural equation modelling was performed to test the hypotheses (H1-H12) and answer RQ1. This chapter ends with a presentation and discussion of the results.[2]

Method

Study Design and Ethics Approval

A cross-sectional design was used to test the research model. Conducting a cross-sectional survey was needed to obtain quantitative survey data from several respondents within a reasonable amount of time.

The Institutional Review Board of Nanyang Technological University gave ethical clearance for Study I (IRB 2016-09-003, see Appendix D). Moreover, the ethics committees or administrators of the hospitals where the surveys were conducted gave permission to conduct the survey. Respondents also provided written and verbal consent before answering the survey (see informed consent form in Appendix E). The survey was anonymous since names and other identifying information were not collected in the survey.

[2]Results based on data collected for Study I were published in *Computers in Human Behavior* (2018), *Journal of the American Medical Informatics Association* (2018), and *CIN: Computers, Informatics, Nursing* (2019). A conference paper based on Study I won the *Top Paper in Mobile Communication* at the 2018 International Communication Association Conference. See Appendix L for more details.

Sampling Procedure

Target respondents were staff nurses working for at least a year in tertiary-level general hospitals in Metro Manila, Philippines. Staff nurses were selected because they allocate more time to direct patient care than other healthcare professionals (Harvath et al., 2008) and their actions have a significant impact on patient care (Neville et al., 2015). In addition, staff nurses are mostly young adults who tend to be heavy users of digital technologies (Duggan, 2015; Vromen, Xenos, & Loader, 2015). Considering that there are several types of hospitals in the Philippines, only tertiary-level general hospitals were selected since these hospitals assign nurses in different hospital areas (e.g., emergency room, general wards, operating theatre, intensive care) that provide services for most medical concerns (Department of Health-Philippines, 2012).

Multistage sampling was used to obtain a heterogeneous sample. Using a heterogenous sample is needed to improve the generalisability of the findings (Eide, Benth, Sortland, Halvorsen, & Almendingen, 2015). Sampling began with a list of all Metro Manilla hospitals categorised by their level, ownership, bed capacity, and location (PhilHealth, 2015). Among tertiary-level general hospitals in the list (N = 45), hospitals were stratified based on ownership (i.e., government and private), bed capacity (i.e., < 300 beds and > 300 beds), and location (i.e., North, Central, South).

The stratification produced 12 clusters, each of which had a minimum of two and a maximum of ten hospitals (Figure 5.1). Hospital selection was conducted by randomly selecting half of the hospitals within each cluster. Table 5.1. shows the characteristics of hospitals selected for Study I. Finally, respondents were selected based on purposive sampling at the hospital level. Inclusion criteria for respondents include those who have a staff nurse position, are at least 21 years of age, and had worked for at least a year at the time they answered the survey. On the other hand, exclusion criteria were non-staff nurses who were less than 21 years of age and had worked for less than a year.

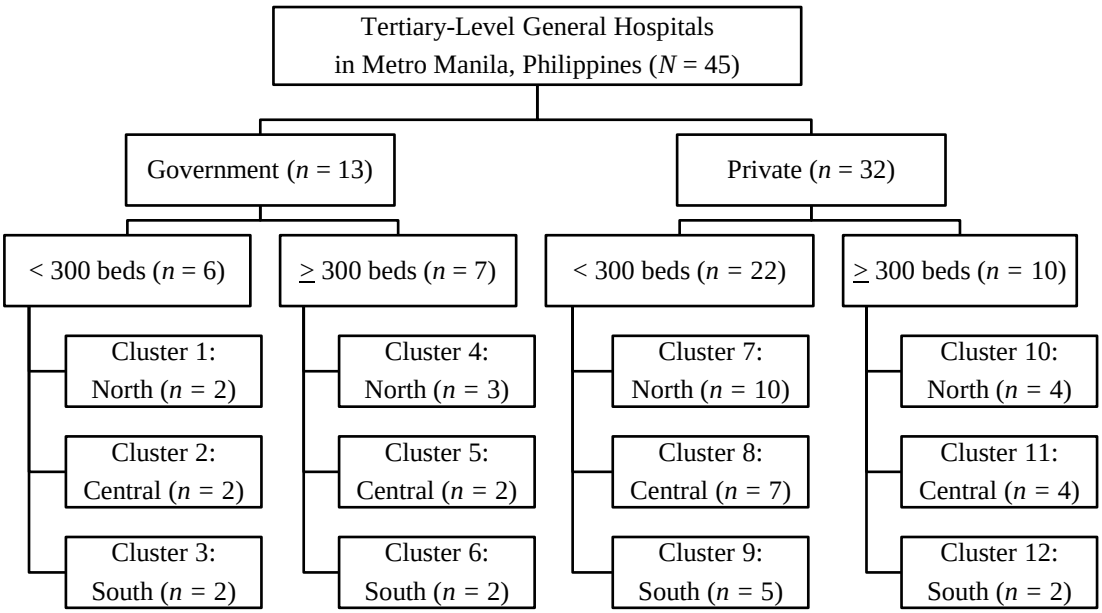

Figure 5.1. Sampling Frame of Tertiary-level General Hospitals in Metro Manila, Philippines (N = 45)

Table 5.1. Characteristics of Hospitals Selected for Study I

Hospital ID	Location	Ownership	Bed capacity*	Number of nurses*^	Initial / Final Respondents[#]	Estimated proportion of final respondents to the number of nurses*
1	South	Private	≥ 300	≥ 200	28 / 28	< 10%
2	North	Government	≥ 300	≥ 200	28 / 26	< 10%
3	South	Government	< 300	< 200	28 / 27	10-20%
4	Central	Private	< 300	< 200	28 / 27	≥ 20%
5	North	Private	< 300	≥ 200	28 / 28	10-20%
6	North	Private	< 300	< 200	28 / 27	≥ 20%
7	North	Private	< 300	< 200	28 / 28	≥ 20%
8	North	Private	< 300	< 200	28 / 28	10-20%
9	South	Private	< 300	≥ 200	28 / 28	10-20%
10	North	Private	≥ 300	≥ 200	28 / 28	< 10%
11	Central	Private	≥ 300	≥ 200	28 / 26	10-20%
12	North	Government	< 300	< 200	30 / 30	≥ 20%
13	Central	Private	< 300	< 200	28 / 27	10-20%
14	South	Government	≥ 300	≥ 200	28 / 28	10-20%
15	Central	Private	< 300	< 200	28 / 26	≥ 20%
16	Central	Government	< 300	≥ 200	28 / 27	< 10%
17	Central	Private	≥ 300	> 200	28 / 27	10-20%
18	South	Private	≥ 300	≥ 200	28 / 27	10-20%
19	North	Private	< 300	< 200	28 / 24	10-20%

Notes: *In compliance with NTU's Institutional Review Board, exact values were withheld to preserve the privacy of the hospitals. ^All nurses in the hospital which includes nurses other than staff nurses. [#]Final number of respondents refer to respondents whose data were included for data analysis after data cleaning.

Data Collection Procedure

Data collection was conducted from January to June 2017. A letter requesting permission collect survey data was submitted to all hospitals that were randomly selected for this study. In instances that a hospital declined to participate in the survey, another hospital was randomly selected among the previously unselected hospitals within a cluster. Among the hospitals that declined to participate in the study, most did not specify any reason for declining. However, some explained that they did not allow research by unaffiliated or external researchers. Overall, 19 hospitals agreed to participate. These hospitals included 14 private and five government hospitals. Additional characteristics of these hospitals are shown in Table 4.3. The distribution of the hospitals for this study is close to our sampling frame where there is more than twice the number of private hospitals than government hospitals (PhilHealth, 2015). After securing permission to conduct the research, each hospital's nursing department was consulted to arrange a schedule for data collection.

Based on the advice of each hospital's nursing department, staff nurses were invited to take the survey after working hours in a designated area. Appendix F shows the questionnaire used during the survey. Before starting the anonymous survey, each respondent provided both verbal and written consent. It took around 15 minutes to finish the survey and participants received an incentive of 100 Philippine pesos (Approximately USD 2) for completing the survey. The incentive is reasonable since it is worth one to two hours of their wage. Given the number of observed (79) and latent (11) variables in the model, and an anticipated effect size of .03, an appropriate sample size to test the model was 448 (Soper, 2018). Based on this, funding was requested (see Appendix G) to obtain about 540 respondents which is about 20% more than the estimated sample size to account for potential sample loss.

Overall, data were collected from 534 respondents. Computing for the exact response rate per hospital was not possible since a record of the number of staff nurses approached during the survey was not available. However, to the best of my knowledge, it is estimated that out of ten potential participants invited, at least eight answered the survey (the incentive of USD 2 helped motivate participation). Thus, the estimated response rate is at least 80% per

hospital. Of those who refused to participate, most of the reasons were that they were exhausted or they had to immediately go somewhere else after work. After cleaning the data by removing non-smartphone users (n = 17), a final sample size of 517 was obtained. Table 4.1 shows the distribution of initial and final respondents per hospital, including the estimated proportion of final respondents to the number of nurses per hospital.

Measures

Most items were modified from previous studies. The items were originally written in English, which was retained, as English is the language for nursing education in the Philippines (Kinderman, 2006). Prior to full data collection, survey items were checked for face and content validity by five experts who were university faculty members with doctoral degrees in communication, information, or nursing. Similarly, feedback was also obtained from 31 staff nurses in September 2016. Based on consultation with staff nurses, items asking about their communication with patients (i.e., COM11 and COM12) should also reflect communication with their guardians since they serve as their representative during hospitalisation. Next, a pretest in December 2016 among 30 staff nurses in the Philippines was conducted to ensure preliminary item reliability.

Table 5.2. Survey Items

Factor	Items	*M*	*SD*	*α*	*AVE*	*S*	*K*
Nurses' use of smartphones for work purposes	15/20^	2.52	.68	.90	.68	.10	.22
Intention	15/20^	2.55	.74	.93	.67	.25	.35
Instrumental attitude	3/6*	4.14	.73	.86	.72	-1.23	2.71
Affective attitude	4/5*	3.51	.75	.90	.70	-.37	.70
Injunctive norm	4/4*	3.44	.87	.90	.69	-.87	.98
Descriptive norm	3/3^	3.92	.67	.79	.56	-.35	.73
Perceived behavioural control	4/4*	3.79	.80	.86	.59	-.96	1.82
Perceived organisational support	4/4*	3.60	.87	.89	.67	-.87	1.05
Perceived quality of care	3/3#	4.11	.58	.86	.68	-.41	.69
Non-work-related use of smartphones	5/7^	2.41	.77	.88	.57	.16	.24

Note: Items = retained over total, *M* = mean of retained items, *SD* = standard deviation of retained items, *α* = Cronbach's alpha of retained items, *AVE* = average variance extracted of retained items, *S* = skewness, *K* = kurtosis. ^ 1 (Never) - 5 (All the time). * 1 (Strongly disagree) - 5 (Strongly agree). # 1 (Poor) - 5 (Excellent). Non-work-related use of smartphones is a multi-item control variable.

Some items were removed after testing the model since they had factor loadings of less than .60 (McKay et al., 2015). Appendix H shows the complete list of the items and their factor loadings. Table 5.2 shows that the remaining items had good internal consistency, with Cronbach's alphas exceeding .70 and average variance extracted greater than .50. The constructs also had approximately normal distributions, based on Kline's (2015) criteria for kurtosis (within $\pm$10) and skewness (within $\pm$3). Standardised factor loading of the items for injunctive norm, descriptive norm, and perceived organisational support were not computed since they are not meaningful for formative constructs since the measurement items are not expected to correlate (Bollen & Bauldry, 2011).[3]

Nurses' Use of Smartphones for Work Purposes

Nurses' use of smartphones for work purposes (M = 2.52, SD = .68) was measured using items that were developed based on the Exploratory Study and previous studies (e.g., Brandt et al., 2016, McBride et al., 2013; 2015a; Mobasheri et al., 2015; Moore & Jayewardene, 2014). These items reflect nurses' use of smartphones for communication (12 items), information seeking (five items), and documentation (three items) purposes during the past month.

Items for communication measured nurses' use of smartphones to communicate with other healthcare providers (doctors and nurses) using voice calls, text messaging, and instant messing apps. These items also measured communication with patients via voice calls and text messaging. Items for information seeking measured information seeking through mobile apps, websites, and e-books. Additional items measured the sharing of clinical or nursing-related information with nurses and doctors. Finally, items for documentation measured the use of smartphones to take pictures relevant to patient care (e.g., wounds, patient chart) as well as its use to create notes,

[3]Items representing injunctive norm, descriptive norm, and perceived organisational support form a composite score that originate from items that represent diffent organisational entities (e.g., fellow nurses, medical doctors). As such, the items are not expected to correlate. For instance, staff nurses who feel their fellow staff nurses have an expectation (injunctive norm) of them using their smartphones for work purposes do not necessarily have the same feeling about medical doctors, immediate nursing superiors, and the hospital management.

reminders, and checklist regarding patient care. Respondents were asked to indicate their response using a five-point Likert scale (1 = "never," 5 = "all of the time"). The reliability of the final 15 items is excellent (Cronbach's α = .90; DeVellis, 2012). Pages 75-77 provide details of its factor structure and the reliability of each factor.

Factors Related to Nurses' Use of Smartphones for Work Purposes

Intention (*M* = 2.55, *SD* = .74). Nurses' intention to use smartphones for work purposes was measured using items similar to nurses' use of smartphones for work purposes (20 items). However, instead of measuring their use during the past month, the items reflect nurses' use of smartphones for communication (12 items), information seeking (five items), and documentation (three items) purposes during the next month. Respondents were asked to indicate their response using a five-point Likert scale (1 = "never," 5 = "all of the time"). The reliability of the final 15 items is excellent (Cronbach's α = .93; DeVellis, 2012). Pages 78-79 provide details of its factor structure and the reliability of each factor.

Instrumental attitude (*M* = 4.14, *SD* = .73). This variable was measured using six items derived from previous studies (Hung et al., 2012; McBride, et al. 2013). Some of the items asked whether the use of mobile phones for work purposes would be useful, necessary, etc. (see Appendix H for all items). Respondents were asked to indicate their response using a five-point Likert scale (1 = "strongly disagree," 5 = "strongly agree"). Three items (i.e., distracting, inexpensive, and unhygienic) were dropped in the final analysis of the study due to poor factor loading. Moreover, the items were removed since they might not have reflected the instrumentality of mobile phones for work purposes. The remaining items had good reliability (Cronbach's α = .86; DeVellis, 2012).

Affective attitude (*M* = 3.51, *SD* = .75). This variable was measured using five items derived from previous studies (Hung et al., 2012; McBride et al., 2013). Some of the items asked whether the use of mobile phones for work purposes would be professional, acceptable, etc. (see Appendix H for all items). Respondents were asked to indicate their response using a five-point Likert scale (1 = "strongly disagree," 5 = "strongly agree"). One item (i.e., a

good idea) was dropped in the final analysis of the study due to poor factor loading. Moreover, this item might not have reflected an emotional sentiment regarding the use of mobile phone for work purposes. The remaining items had excellent reliability (Cronbach's α = .90; DeVellis, 2012).

Injunctive norm (*M* = 3.44, *SD* = .87). This variable was measured using five items derived from previous studies (Hung et al., 2012; Yi et al., 2006). Based on the Exploratory Study, important others who expect the use of smartphones for work purposes include the hospital administration, immediate nursing superiors (e.g., charge, manager, supervisor), fellow staff nurses, and doctors. Rather than asking a general question on important others (i.e., *"Most persons who are important to me expects me to use smartphones at work for work purposes…"*), using multiple specified important others can enhance the measurement of injunctive norm (Yi et al., 2006). Respondents were asked to indicate their response using a five-point Likert scale (1 = "strongly disagree," 5 = "strongly agree"). The items had excellent reliability (Cronbach's α = .90; DeVellis, 2012).

Descriptive norm (*M* = 3.92, *SD* = .67). This variable was measured using four items that were developed following recommendations proposed by several studies (Fishbein & Ajzen, 2010; Shteynberg, Gelfand, & Kim, 2009; Yi et al., 2006). Guided by the results of the Exploratory Study, the items asked respondents on how often colleagues are using their smartphones at work for work purposes. In the context of this research, important colleagues refer to nursing superiors (e.g., charge, manager, and supervisor), fellow staff nurses, and doctors. Rather than asking a general question (i.e., *"Most persons who are important to me use smartphones at work for work purposes…"*), using multiple specified important others can enhance the measurement of descriptive norm (Yi et al., 2006). Respondents were asked to indicate their response using a five-point Likert scale (1 = "never," 5 = "all of the time"). The items had good reliability (Cronbach's α = .79; DeVellis, 2012).

Perceived behavioural control (*M* = 3.79, *SD* = .80). This variable was measured using four items derived from previous studies (Sparks et al., 1997; Terry & O'Leary, 1995). Sample items include "*using my own mobile phone at work for work purposes is completely up to me*" and "*it will be very easy for me to use my own mobile phone at work for work purposes*" (see Appendix H

for all items). Respondents were asked to indicate their response using a five-point Likert scale (1 = "strongly disagree," 5 = "strongly agree"). All items had good reliability (Cronbach's α = .86; DeVellis, 2012).

Perceived organisational support (*M* = 3.60, *SD* = .87). This variable was measured using four items that were developed following recommendations by Eisenberger et al. (1986). Guided by the results of the Exploratory Study, the items asked respondents on how several entities of a hospital's organisation allow nurses to use their smartphones for work purposes. Allowing nurses to use smartphones for work purposes is an indication of supporting such usage. In the context of this study, an organisation would refer to the hospital management as well as organisational actors, such as nursing superiors (e.g., charge, manager, supervisor), fellow staff nurses, and doctors. Respondents were asked to indicate their response using a five-point Likert scale (1 = "strongly disagree," 5 = "strongly agree"). The items had good reliability (Cronbach's α = .89; DeVellis, 2012).

Perceived quality of care (*M* = 4.11, *SD* = .58). This variable was measured using three items derived from Van Bogaert et al. (2009; 2017). Scholars argue that nurses' own assessment of quality of care is a useful and valid measure (Aiken et al., 2002; Pearson et al., 2000; Poghosyan et al., 2010). Although previous studies have measured perceived quality of patient care using one item (e.g., Ball, Murrells, Rafferty, Morrow, & Griffiths, 2013; Poghosyan et al., 2010), a three-item measure of this construct provided a more reliable and valid measurement (Van Bogaert et al., 2009; 2017). Sample items include "*in general, how would you describe the quality of nursing care delivered to patients in your unit?*" and "*how would you describe the quality of nursing care that you have delivered on your last shift?*" (see Appendix H for all items). Respondents were asked to indicate their response using a five-point Likert scale (1 = "poor," 5 = "excellent"). All items had good reliability (Cronbach's α = .86; DeVellis, 2012).

Control Variables

Aside from providing context to the study, the following control variables were included in the analysis to statistically control for their effect when examining the relationship of the main independent variables with the

dependent variables. These control variables were included based on the results of the Exploratory Study (e.g., hospital provision of mobile phone based on the presence of mobile phone in the area)

Demographics. This includes the age, gender, and monthly salary of the respondents.

Technographics. This includes the number of smartphones owned by the respondents and their subscription service (prepaid or postpaid). Monthly mobile phone expenditure was also obtained.

Work background. This includes the hospital category where the respondents were working (private or government), years of clinical experience in their current hospital, current unit assignment, the number of patients handled in the previous shift, and presence of mobile phone (i.e., unit phone) in the work area.

Non-work-related use of smartphones (*M* = 2.41, *SD* = .77). This variable was measured using seven items that were developed based on several studies (e.g., Brandt et al., 2016, McBride et al., 2015a). The items asked if nurses have used their mobile phone at work to make non-work-related phone calls and text messages, browse websites not related to work, etc. See Appendix H for all items. Respondents were asked to indicate their response using a five-point Likert scale (1 = "never," 5 = "all of the time").

Two items (i.e., playing mobile games and listening to music) were dropped in the final analysis due to poor factor loading. Playing mobile games was excluded since there are strong policies against it and its use denotes extreme disrespect to patients and healthcare colleagues. On the other hand, listening to music was excluded since it might not have been considered as a counter-productive activity at work. The remaining items had good reliability (Cronbach's $\alpha = .88$; DeVellis, 2012).

Analytic Strategies

This study used *SPSS Statistics 23* and *Mplus7* for data management and analysis. First, *SPSS Statistics 23* was used to perform data encoding, missing values treatment, descriptive statistics, reliability assessment (i.e., Cronbach's alpha, collinearity diagnostics) and exploratory factor analysis (EFA). Next, *Mplus 7* was used to perform confirmatory factor analysis (CFA) and structural equation modelling (SEM) for hypothesis testing.

Missing Values Treatment

During data collection, strategies were implemented to reduce missing data (e.g., providing incentives as a motivation for respondents to completely answer the survey form and requesting them to answer missed items). However, there were still few items that had missing values. Treating missing values was needed before further analyses to reduce potential bias due to missing data (Acock, 2005). To determine the appropriate treatment for missing values, it was important to check the pattern of missing values (Cox, McIntosh, Reason, & Terenzini, 2014).

First, the data was analysed using the missing value analysis function. There were missing values in the data, but a nonsignificant Little's MCAR test (p = .20) suggested that the missingness was completely at random (Little, 1988). Since the missing value pattern was MCAR, listwise deletion of missing values would be acceptable; however, it would result in a smaller sample size (Lin, 2010). To maintain the sample size, missing data were imputed using expectation maximisation, which produced unbiased estimates of missing values (Lin, 2010).

It is important to note that the imputed data were used for analyses performed in *IBM SPSS Statistics 23* (except for descriptive statistics), and non-imputed data were used for analyses in *Mplus 7* since it uses full information maximum likelihood algorithm to treat missing values (Wang & Benner, 2014). That approach retains the full sample size and results in less statistical bias than other approaches to handling missing values, such as listwise deletion and mean imputation (Rosenthal, 2017; Wang & Benner, 2014).

Exploratory Factor Analysis

EFA was used to determine the factor structure of nurses' intention and use of smartphones for work purposes. Since these variables were measured using multiple items that were developed for this study, performing EFA was an initial step to establish its construct validity (Chan et al., 2012; Sarac, Flin, Mearns, & Jackson, 2011). In other words, performing EFA would provide information on underlying factors that characterise nurses' intention and use of smartphones for work purposes. Factors were extracted using maximum likelihood estimation since the data for these variables were normally distributed (Costello & Osborne, 2005). Moreover, items were rotated using promax rotation (an oblique method of rotation) since it produces a more accurate and reproducible rotation solution than orthogonal methods of rotation, such as varimax, quartimax, and equamax (Costello & Osborne, 2005). Factors were selected if they had eigenvalues greater than one (Kahn, 2006). Items were retained if they had factor loadings on a single factor greater than .40 and did not load in multiple factors (Kahn, 2006). After determining the factor structure, reliability values were estimated for each factor to determine internal consistency. Cronbach's alpha was used as a reliability measure for factors with at least three items and Spearman-Brown coefficient was used for those with two items only (Eisinga, Te Grotenhuis, & Pelzer, 2013).

Confirmatory Factor Analysis

Although previous studies on the development and evaluation of nurse-related instruments only utilised exploratory factor analysis (e.g., Chen, Watson, & Hilton, 2016; Liaw et al., 2017), Study I utilised CFA to provide a robust evaluation of the construct validity of nurses' intention and use of smartphones for work purposes. Here, CFA was used to validate the factors found in EFA and determine if they adequately fit the observed data. Previous studies (Hu & Bentler, 1999; González-Guarda, McCabe, Florom-Smith, Cianelli, & Peragallo, 2011) suggested that a CFA model has acceptable fit if relative chi-square (X^2/df) is less than three, the comparative fit index (CFI) and Tucker-Lewis index (TLI) are greater than .90, the root mean square error

of approximation (RMSEA) is less than .06, and the standardised root mean square residual (SRMR) of is less than .08.

Structural Equation Modelling

After establishing the factor structure of nurses' intention and use of smartphones for work purposes, SEM was utilised to test the hypotheses of the study. SEM is appropriate since it allows simultaneous analysis of more than one regression model (Kline, 2015). Aside from testing the hypotheses, SEM provides results on potential indirect effects among the independent and dependent variables (Kline, 2015). Acceptable benchmarks for model fit in SEM are the same for CFA.

Before performing SEM, collinearity diagnostics were conducted to check if the predictors of nurses' intention and use of smartphones for work purposes suffer from multicollinearity. Multicollinearity refers to the linear relationship among variables that poses concerns when estimating the results of regression-based analyses such as SEM (Alin, 2010). Multicollinearity is not a concern when the variance inflation factor (VIF) is less than ten and the tolerance value is more than .20 for each predictor (Vinzi, Chin, Henseler, & Wang, 2010).

Results

Respondents' Profiles

Respondents were 21 to 50 years of age (M = 28.93, Mdn = 27, SD = 5.90). Most of them were female (69.8%), held a Bachelor of Science in Nursing degree (90.9%), and earned below PHP15,000 per month (66.1%). Most of them were employed in private hospitals (73.3%), were assigned to general nursing units (53.8%) and had between one and 27 years of clinical experience (M = 4.61, Mdn = 3, SD = 4.28). Most (56.7%) of the respondents reported that they do not have any mobile phone that they can use in their work area. Table 5.3 shows a summary of their profile including relevant results for the number of smartphones and subscription type, and the number of patients handled in the previous shift.

Table 5.3. Profiles of the Respondents (N = 517)

Characteristics	*n*	%
Demographics		
Age (M = 28.93, *Mdn* = 27, SD = 5.90)		
21-29	346	66.9
30-39	113	21.9
≥ 40	46	8.9
Missing	12	2.3
Gender		
Male	156	30.2
Female	361	69.8
Highest educational attainment		
Bachelor of Science in Nursing	470	90.9
Pursuing Master's Degree	30	5.8
Master's Degree	16	3.1
Pursuing Doctoral Degree	1	.2
Monthly salary (USD 1 = PHP 51.65, February 2018)		
< PHP10,000	118	22.8
PHP 10,000-14,999	224	43.3
PHP 15,000-19,999	81	15.7
PHP 20,000-24,999	56	10.8
≥ PHP 25,000	38	7.4
Technographics		
Number of smartphone owned		
1	375	72.5
≥ 2	142	27.5
Subscription		
Prepaid	367	71.0
Postpaid	150	29.0
Monthly Mobile Phone Expenditure (USD 1 = PHP 51.65, February 2018)		
< PHP 500	264	51.1
PHP 500-999	147	28.4
PHP 1,000-1,499	50	9.7
PHP 1,500-1,999	23	4.4
≥ PHP 2,000	31	6.0
Missing	2	.4
Work Background		
Hospital Category		
Private	379	73.3
Government	138	26.7
Nursing Unit		
General (Wards, Ancillary, Outpatient)	278	53.8
Special (Intensive care, Emergency, Operating theatre)	239	46.2
Years of clinical experience (M = 4.61, *Mdn* = 3, SD = 4.28)		
1-4.99	338	65.4
5-9.99	114	22.1
10-14.99	42	8.1
15-19.99	13	2.5
≥ 20	8	1.5
Missing	2	.4
Patients handed in previous shift (M = 10.60, *Mdn* = 7, SD = 14.04)		
1-5	173	33.5
6-10	178	34.4
≥ 11	136	26.3
Missing	30	5.8
Presence of mobile phone in work area		
Present	224	43.3
Absent	293	56.7

Factor Analysis of Nurses' Intention and Use of Smartphones for Work Purposes

Before conducting EFA and CFA, respondents were randomly allocated into two groups, with the data from one half used for exploratory factor analysis (n = 258) and data from the other half used for confirmatory factor analysis (n = 259). Using split-half validation technique helps establish robust construct validity (Chan et al., 2012; Sarac et al., 2011). Pett, Lackey, and Sullivan (2003) recommend a minimum of 10 respondents per item in factor analysis. Following this recommendation, 20 items require at least 200 respondents, for which the current sample for EFA and CFA is more than adequate.

Exploratory Factor Analysis

Preliminary results suggested an adequate sample and appropriate data structure for conducting EFA. First, Bartlett's test of sphericity was significant for intention (χ^2 = 4,781.42, df = 190, $p < .001$) and nurses' use of smartphones for work purposes (χ^2 = 3,636.66, df = 190, p < .001). Second, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .89 for intention and .85 nurses' use of smartphones for work purposes. Bartlett's test of sphericity should have a p-value of less than .05 and KMO should exceed .50 (Williams, Onsman, & Brown, 2010). Finally, Harman's single factor test showed that no single factor accounted for more than 50% of the total item variance for each variable (Sheng & Chien, 2016). The reason to conduct this test is to check whether survey items with a common method of measurement tend to correlate as a function of their measurement (Busching et al., 2015). Such common method bias obscures conceptual differences among items. Current results suggest common method bias is not a concern.

Nurses' use of smartphones for work purposes. The EFA resulted in five factors with eigenvalues of at least 1, which explained 73% of the variance in 15 out of 20 items. Four factors were related to the use smartphones for communication with healthcare practitioners and patients, and one factor was related to the use of smartphones for information seeking. Interestingly, all items on the use of smartphones for documentation (DOC1, DOC2, and DOC3) and two items for information seeking (INFO1 and

INFO2) failed to load on any factor. Table 5.4 shows the results of the EFA analysis.

The first factor contained four items and was related to *communication with clinicians via call and text*. The second factor contained three items and was related to c*ommunication with doctors via instant messaging*. The third factor contained three items and was related to *information seeking*. The fourth factor contained three items related to *communication with nurses via instant messaging*. Finally, the fifth factor contained two items related to *communication with patients via call and text*. Items per factor were reliable since Cronbach's alpha values for factors one to four ranged from .85 to .91, and factor five had a Spearman-Brown coefficient of .91.

Table 5.4. Exploratory Factor Analysis Results for Nurses' Use of Smartphones for Work Purposes (n = 258)

Item	*M*	*SD*	Factors and factor loadings				
			1	2	3	4	5
Factor 1: Communication with clinicians via call and text							
[COM7] Exchanging work-related text messages via SMS with doctors	3.31	1.20	.90				
[COM6] Making work-related calls with doctors	3.10	1.18	.89				
[COM1] Making work-related calls with nurses	3.27	1.01	.81				
[COM2] Exchanging work-related text messages via SMS with nurses	3.40	1.04	.80				
Factor 2: Communication with doctors via instant messaging							
[COM9] Exchanging work-related images via instant messaging apps with doctors	1.88	1.02		.91			
[COM10] Exchanging work-related videos via instant messaging apps with doctors	1.63	.91		.89			
[COM8] Exchanging work-related text messages via instant messaging apps with doctors	2.07	1.14		.78			
Factor 3: Information seeking							
[INFO4] Websites	2.94	1.09			.90		
[INFO3] Clinical reference apps	2.84	1.07			.86		
[INFO5] E-books saved on your own mobile phone	2.34	1.15			.71		
Factor 4: Communication with nurses via instant messaging							
[COM4] Exchanging work-related images via instant messaging apps with nurses	2.35	1.10				.90	
[COM3] Exchanging work-related text messages via instant messaging apps with nurses	2.84	1.21				.79	
[COM5] Exchanging work-related videos via instant messaging apps with nurses	1.92	1.01				.75	
Factor 5: Communication with patients via call and text							
[COM12] Exchanging work-related text messages via SMS with patients or patients' guardian(s)	2.01	1.12					.99
[COM11] Making work-related calls with patients or patients' guardian(s)	2.01	1.10					.84
Dropped items							
[INFO1] Asking for clinical information with nurses	2.97	1.11					
[INFO2] Asking for clinical information with doctors	2.66	1.23					
[DOC1] Using mobile apps to document patient care such as creating notes, reminders or checklists	2.02	1.02					
[DOC2] Taking a picture of patient outcomes like wounds, ECG tracing, X-ray films, skin rashes, etc.	2.17	1.09					
[DOC3] Taking a picture of the patient's chart	1.70	1.03					
Reliability (Factors 1-4: Cronbach's alpha; Factor 5: Spearman-Brown Coefficient)			.91	.89	.86	.85	.91
Eigenvalue			8.14	2.23	1.61	1.45	1.17
Percentage of variance explained			40.70	11.13	8.06	7.27	5.85

Note: *M* = mean; *SD* = standard deviation

Intention. Table 5.5 shows the results of the EFA analysis for intention. The EFA resulted in five factors with eigenvalues of at least 1, which explained 79% of the variance in 15 out of 20 items. Like the EFA results for nurses' use of smartphones for work purposes, four factors were related to the use smartphones for communication with healthcare practitioners and patients, and one factor was related to the use of smartphones for information seeking Interestingly, all items on the use of smartphones for documentation (DOC1, DOC2, and DOC3) and two items for information seeking (INFO1 and INFO2) failed to load on any factor.

The first factor contained four items and was related to communication with clinicians via call and text. The second factor contained three items and was related to communication with doctors via instant messaging. The third factor contained three items and was related to information seeking. The fourth factor contained three items related to communication with nurses via instant messaging. Finally, the fifth factor contained two items related to communication with patients via call and text. Items per factor were reliable since Cronbach's alpha values for factors one to four ranged from .86 to .93, and factor five had a Spearman-Brown coefficient of .95.

Table 5.5. Exploratory Factor Analysis Results for Intention (n = 258)

Item	*M*	*SD*	Factors and factor loadings				
			1	2	3	4	5
Factor 1: Communication with clinicians via call and text							
[COM7] Exchanging work-related text messages via SMS with doctors	3.14	1.16	.94				
[COM6] Making work-related calls with doctors	3.06	1.12	.94				
[COM1] Making work-related calls with nurses	3.24	.99	.78				
[COM2] Exchanging work-related text messages via SMS with nurses	3.29	.95	.78				
Factor 2: Communication with doctors via instant messaging							
[COM9] Exchanging work-related images via instant messaging apps with doctors	1.95	1.07		.95			
[COM10] Exchanging work-related videos via instant messaging apps with doctors	1.77	.98		.90			
[COM8] Exchanging work-related text messages via instant messaging apps with doctors	2.15	1.11		.87			
Factor 3: Information seeking							
[INFO4] Websites	2.98	1.15			.88		
[INFO3] Clinical reference apps	2.93	1.12			.88		
[INFO5] E-books saved on your own mobile phone	2.41	1.18			.71		
Factor 4: Communication with nurses via instant messaging							
[COM4] Exchanging work-related images via instant messaging apps with nurses	2.41	1.09				.94	
[COM3] Exchanging work-related text messages via instant messaging apps with nurses	2.77	1.14				.84	
[COM5] Exchanging work-related videos via instant messaging apps with nurses	2.05	1.02				.84	
Factor 5: Communication with patients via call and text							
[COM12] Exchanging work-related text messages via SMS with patients or patients' guardian(s)	2.11	1.10					.99
[COM11] Making work-related calls with patients or patients' guardian(s)	2.14	1.10					.91
Dropped items							
[INFO1] Asking for clinical information with nurses	2.81	1.16					
[INFO2] Asking for clinical information with doctors	2.53	1.27					
[DOC1] Using mobile apps to document patient care such as creating notes, reminders or checklists	2.16	1.10					
[DOC2] Taking a picture of patient outcomes like wounds, ECG tracing, X-ray films, skin rashes, etc.	2.21	1.14					
[DOC3] Taking a picture of the patient’s chart	1.80	1.00					
Reliability (Factors 1-4: Cronbach’s alpha; Factor 5: Spearman-Brown Coefficient)			.92	.93	.86	.90	.95
Eigenvalue			10.06	1.92	1.49	1.33	1.01
Percentage of variance explained			50.29	9.58	7.47	6.66	4.64

Note: *M* = mean; *SD* = standard deviation

Confirmatory Factor Analysis

The CFA supported the proposed 15-item five-factor model for nurses' intention and use of smartphones for work purposes (Figure 5.2). The factor model had good fit with the observed data for intention (χ^2/df = 2.62, RMSEA = .079 [90% CI = .065 - .093], CFI = .97, TLI = .95, SRMR = .046) and nurses' use of smartphones for work purposes (χ^2/df = 1.65, RMSEA = .050 [90% CI = .034 - .065], CFI = .98, TLI = .97, SRMR = .047). Standardised factor loading of the items were significant ($p < .001$) for both variables and reached the least acceptable value of .60 (McKay et al., 2015).

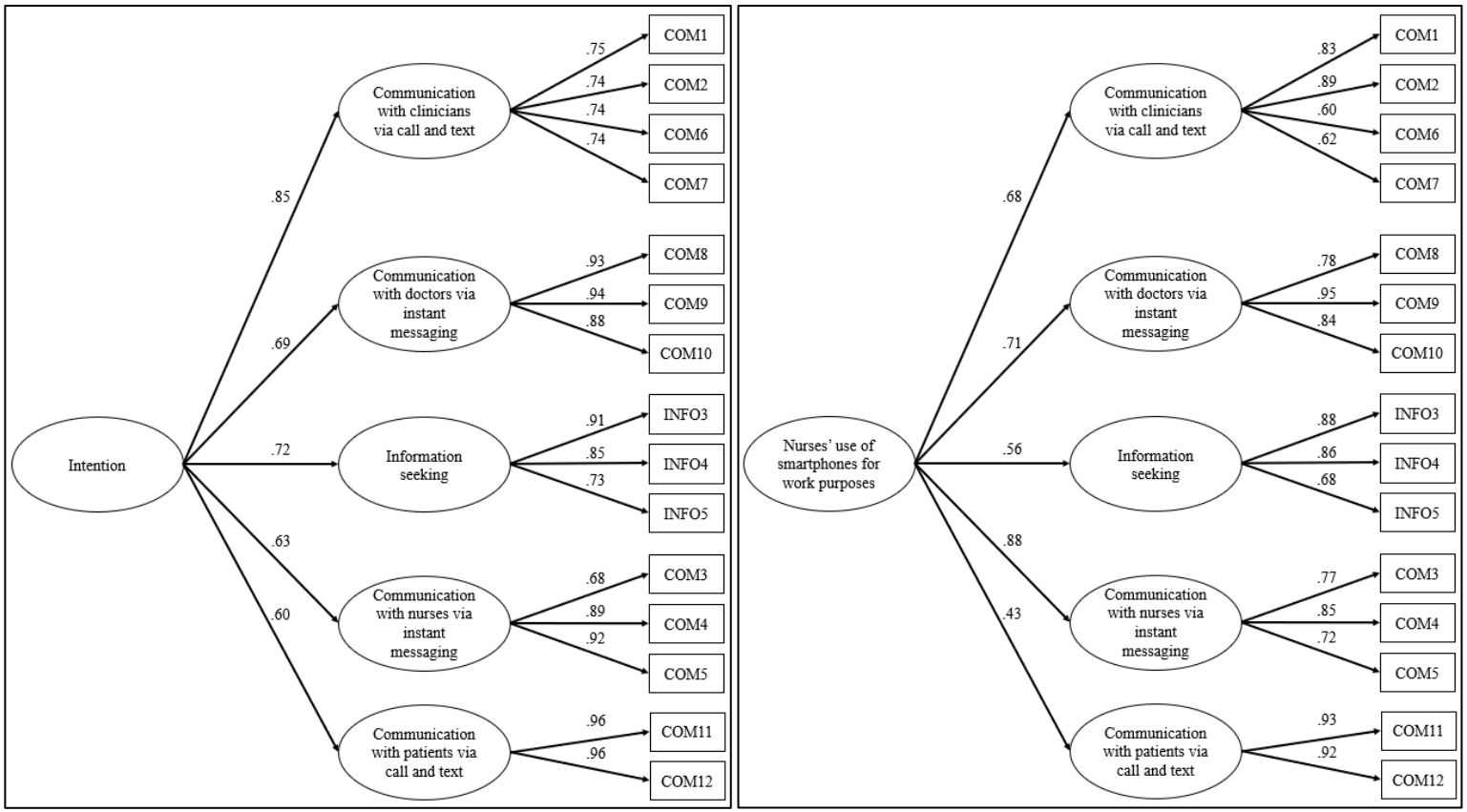

Figure 5.2. CFA Results for Nurses' Intention and Use of Smartphones for Work Purposes (n = 259)

Notes: Model fit for intention: χ^2/df = 2.62, RMSEA = .079 (90% CI = .065–.093), CFI = .97, TLI = .95, SRMR = .046; Model fit for nurses' use of smartphones for work purposes: χ^2/df = 1.65, RMSEA = .050 **(**90% CI =.034–.065), CFI=.98, TLI=.97, SRMR=.047. Standardised factor loadings are reported.

Measurement Model

After checking the factor structure of nurses' intention and use of smartphones for work purposes, several evaluations were performed before SEM analysis. First, the measurement model needs to be estimated to determine if the items of the constructs within the model load adequately and fit the data (Kline, 2015). Results of the measurement model analysis indicate adequate fit with the observed data, χ^2/df = 1.93, RMSEA = .043 (90% CI = .040–.045), CFI = .96, TLI = .95, SRMR = .062. (Bentler, 1990). Besides, Table 5.6 shows that multicollinearity is not a concern since the values for tolerance (> .20) and VIF (< 5) were within normal range (Walker, 2003). Overall, these results provide the clearance to perform SEM for hypothesis testing.

Table 5.6. Multicollinearity Diagnostics

Factors	Intention		Nurses' use of smartphones for work purposes	
	Tolerance	VIF	Tolerance	VIF
Instrumental attitude	.55	1.83	.55	1.84
Affective attitude	.61	1.65	.61	1.66
Injunctive norm	.43	2.31	.43	2.34
Descriptive norm	.68	1.48	.67	1.49
Perceived behavioural control	.58	1.74	.56	1.79
Perceived organisational support	.50	2.23	.50	2.23
Perceived quality of care	.98	1.03	.97	1.03
Intention	-	-	.80	1.25

Structural Model

The structural model had adequate fit with the observed data, χ^2/df = 1.73, RMSEA = .038 (90% CI = .035–.040), CFI = .95, TLI = .94, SRMR = .078 (Bentler, 1990). Factors predicting nurses' intention to use smartphones for work purposes accounted for 11% (R^2 = .11) of the variance. Moreover, factors predicting perceived perceived quality of care accounted for 5% (R^2 = .05) of the variance. Figure 5.3 shows a graphic representation of the SEM results. Finally, factors predicting instrumental attitude (R^2 = .24), affective attitude (R^2 = .21), injunctive norm (R^2 = .51), descriptive norm (R^2 = .21), and perceived behavioural control (R^2 = .39) ranged from 21% to 51%.

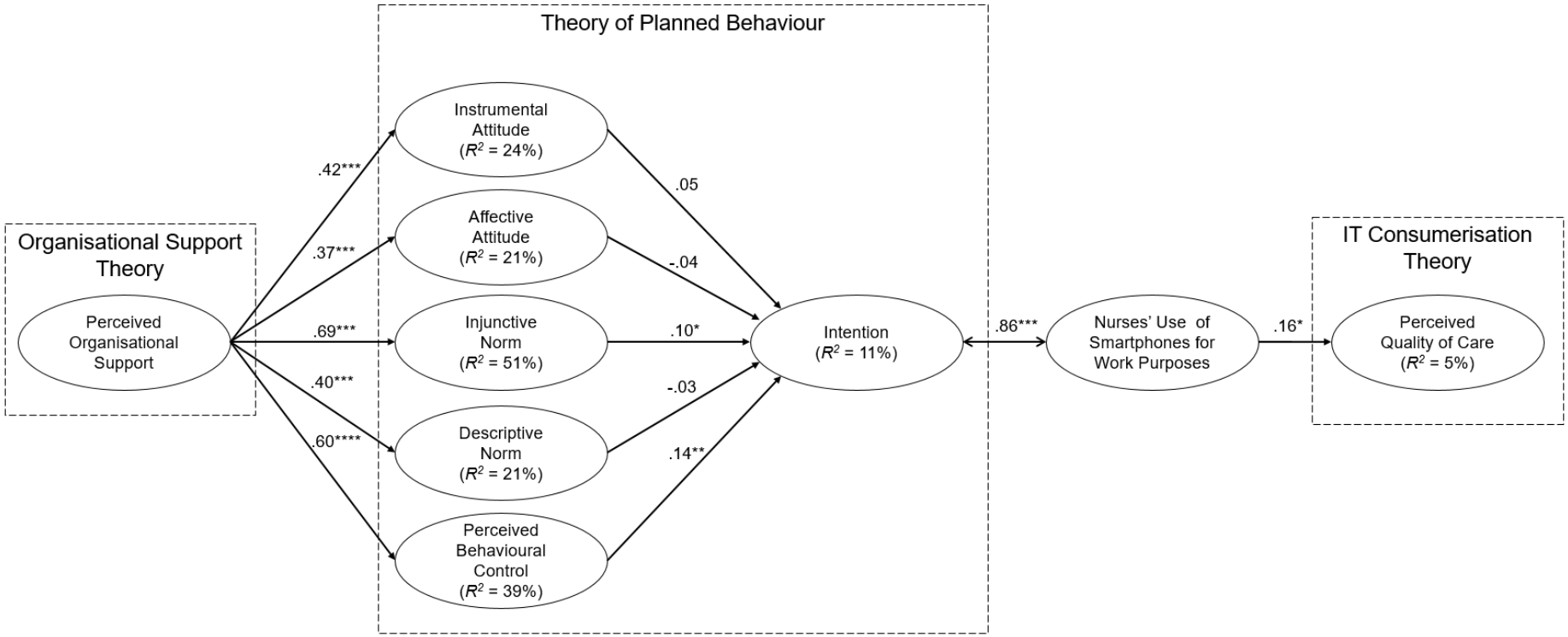

Figure 5.3. SEM Results (N = 517)

Notes: χ^2/df = 1.73, RMSEA = .038 (90% CI = .035–.040), CFI = .95, TLI = .94, SRMR = .078. Control variables were included in the analysis but not shown. Standardised path coefficients are reported. * $p < .05$, ** $p < .01$, *** $p < .001$.

Hypothesis Testing

Prior to the results of hypothesis testing, it is important to examine control variables that were significantly associated with the model's dependent variables.

First, results showed that nurses who handled more patients in their last shift were more likely to have a higher intention to use smartphones for work purposes (β = .20, $p < .001$). Next, nurses who had less years of clinical experience (β = -.15, $p = .004$) and those in government hospitals (β = .15, $p = .009$) were more likely to have a positive instrumental attitude towards the use of smartphones for work purposes. Similarly, nurses who had less years of clinical experience (β = -.13, $p = .006$), and those in the general nursing units (β = -.08, $p = .04$) and government hospitals (β = .17, $p = .002$) were more likely to have a positive affective attitude towards the use of smartphones for work purposes.

Moreover, monthly salary is positively associated with injunctive norm (β = .11, $p = .008$) whilst those who own smartphones with a postpaid service had higher descriptive norm (β = .11, $p = .02$). Finally, results showed that non-work-related use of smartphones was negatively associated with perceived quality of care (β = -.20, $p = .001$).

Table 5.7. Summary of Hypothesis Testing Results

	Hypothesis	*B*	*S.E.*	β	*p* value	Inference
H1	Intention ↔ Nurses use of smartphones for work purposes	-	-	.86^	< .001	Supported
H2	Instrumental attitude → Intention	.05	.04	.05	.22	Rejected
H3	Affective attitude → Intention	-.03	.03	-.04	.24	Rejected
H4	Injunctive norm → Intention	.07	.03	.10	.01	Supported
H5	Descriptive norm → Intention	-.03	.03	-.03	.36	Rejected
H6	Perceived behavioural control → Intention	.11	.03	.14	.001	Supported
H7	Perceived organisational support → Instrumental attitude	.34	.04	.42	< .001	Supported
H8	Perceived organisational support → Affective attitude	.35	.04	.37	< .001	Supported
H9	Perceived organisational support → Injunctive norm	.55	.04	.69	< .001	Supported
H10	Perceived organisational support → Descriptive norm	.69	.03	.40	< .001	Supported
H11	Perceived organisational support → Perceived behavioural control	.31	.03	.60	< .001	Supported
H12	Nurses use of smartphones for work purposes → Perceived quality of care.	.15	.07	.16	.02	Supported

Note: *B* = unstandardised path coefficients. *S.E.* = Standard error. β = standardised path coefficients.
^ Hypothesis testing based on Pearson correlation (*r*).

Table 5.7 summarises the results of the hypothesis testing. H1 predicts that nurses' intention to use smartphones for work purposes is positively associated with their use of smartphones for work purposes. Results supported H1 since intention was positively associated with nurses' use of smartphones for work purposes ($r = .86$, $p < .001$).

H2 and H3 predict that instrumental and affective attitudes are positively associated with nurses' use of smartphones for work purposes, respectively. Results showed that instrumental ($\beta = .05$, $p = .22$) and affective ($\beta = -.04$, $p = .24$) attitudes were not associated with nurses' use of smartphones for work purposes, thus H2 and H3 were rejected.

H4 and H5 predict that injunctive and descriptive norms are positively associated with nurses' intention to use of smartphones for work purposes, respectively. Results showed that only injuctive norm ($\beta = .10$, $p = .01$) was positively associated with nurses' intention to use smartphones for work purposes and not descriptive norm ($\beta = -.03$, $p = .36$), thus H4 was supported and H5 was rejected.

H6 predicts that perceived behavioural control is positively associated with nurses' intention and use of smartphones for work purposes. Results supported H6 since perceived behavioural control was positively associated with intention ($\beta = .14$, $p = .001$).

H7 to H11 predict that perceived organisational support has a positive association with instrumental and affective attitudes, injunctive and descriptive norms, and perceived behavioral control, respectively. Results supported H7 to H11 since perceived organisational support was positively associated with instrumental attitude ($\beta = .42$, $p < .001$), affective attitude ($\beta = .37$, $p < .001$), injunctive norm ($\beta = .69$, $p < .001$), descriptive norm ($\beta = .40$, $p < .001$), and perceived behavioural control ($\beta = .60$, $p < .001$), respectively.

H12 predicts that nurses' use of smartphones for work purposes is positively associated with perceived quality of care. Results supported H12 since nurses' use of smartphones for work purposes was positively associated with perceived quality of care ($\beta = .16$, $p = .02$).

Indirect Effect Analysis

RQ1 asks if there is an indirect effect between perceived organisational support and nurses' intention to use smartphones for work purposes. To answer this question, an indirect effect analysis using 5,000 bootstrap samples was performed. Results shows that perceived organisational support has a positive indirect effect on nurses' intention to use smartphones for work purposes via injunctive norm and perceived behavioural control (see Table 5.8).

Table 5.8. Indirect Effect of Perceived Organisational Support

Indirect path	Indirect effect, 95% confidence interval, *p* value
POS → IN → INT	*B* = .05, *S.E.* = .02, β = .07, 95% CI (.002, .118), *p* = .04
POS → PBC → INT	*B* = .06, *S.E.* = .02, β = .09, 95% CI (.024, .147), *p* = .006

Note: *B* = unstandardised indirect effect. *S.E.* = Standard error. β = standardised indirect effect. POS = perceived organisational support. IN = injunctive norm. PBC = perceived behavioural control. INT = intention. USE = nurses' use of smartphones for work purposes. Indirect effect based on 5,000 bootstrap samples.

Discussion

Operationalising Nurses' Use of Smartphones for Work Purposes

This study found that nurses' use of smartphones for work purposes divides into five factors, four of which are related to communication with healthcare providers and patients, and one that is related to information seeking. This finding diverges somewhat from the Exploratory Study and prior research where nurses also use smartphones for documentation purposes (e.g., Mobasheri et al., 2015; Sharpe & Hemsley, 2016). Drawing from the results of the exploratory and confirmatory factor analysis, nurses' use of smartphones for work purposes is now referred to as *nurses' use of their smartphone at work for communication (with healthcare professionals and patients) and information seeking purposes.*

Interestingly, the variety of communication uses is consistent with prior findings that nurses use smartphones primarily for communication purposes (Chiang & Wang, 2016; Mobasheri et al., 2015; Nilsson et al., 2010). The current study extends previous works by conceptually and statistically differentiating communication uses. The dominant communication factor is the use of smartphones for voice calls and text messaging with fellow nurses

and doctors (Factor 1). This result is somewhat intuitive, as voice calls and text messaging are the most basic functions of mobile phones (Steinhubl et al., 2015).

Another important function of smartphones is providing users with the capability to communicate using instant messaging, which nurses do with doctors (Factor 2) and fellow nurses (Factor 4). These factors make sense, as instant messaging applications are part and parcel of smartphone usage (Oghuma, Libaque-Saenz, Wong, & Chang, 2016). With instant messaging apps, nurses can send and receive text, image, and video messages with fellow nurses and doctors. Previous studies highlight that nurses' use of smartphones to access instant messaging apps for work purposes can enhance communication and information sharing among the healthcare team (Chiang & Wang, 2016; Stephens et al., 2017).

It is also important to note that communication for work purposes in the hospital setting is not limited to communication among clinicians: nurses may also use smartphones for voice calls and text messaging with patients or their guardians (Factor 5). Results of the Exploratory Study suggests that such use of smartphones is an important aspect of communication in Philippine hospitals since it expedites the sharing of information with patients or their guardians, particularly during emergency situations.

In addition to communication, information seeking is an essential way nurses used smartphones for work purposes (Factor 3). Smartphones enable the use of a range of information utilities, such as clinical mobile applications, websites, and eBooks. These applications facilitate faster and easier acquisition of useful information, which can help nurses efficiently perform their task at the point of care (Mobasheri et al., 2015; Moore & Jayewardene, 2014). Out of the five items developed for information seeking, items on information seeking with nurses (INFO1) and doctors (INFO2) using smartphones were removed due to poor factor loading. A potential reason is that respondents might have preferred to search for information on their own rather than asking a colleague. This finding supports one of the results of the Exploratory Study where nurses noted that instead of consulting a colleague, they would search for information on their own using their smartphones.

Whereas the current analysis identified communication and information seeking as factors in the scale, items for documentation did not load on any of the factors nor constitute a separate factor. This outcome is interesting and accords with prevailing hospital policies on the use smartphones for work purposes (Brandt et al., 2016), particularly in the Philippines based on the Exploratory Study. Typically, permitted uses of smartphones in a hospital setting are limited to communication and information seeking purposes, and documentation purposes, such as taking pictures, are prohibited (Brandt et al., 2016). This restriction is reasonable because taking pictures in a hospital setting may risk patient privacy and confidentiality (Brandt et al., 2016; Royal College of Nursing, 2016). Although nurses can use their smartphones for other documentation purposes, such as creating notes, reminders, or checklists, it is possible that they prefer to use pen and paper for those purposes.

Predicting Nurses' Intention and Use of Smartphones for Work Purposes

Consistent with previous studies (e.g., Kijsanayotin et al., 2009; Lau, 2011) and the Theory of Planned Behaviour (Ajzen, 1991, 2011), intention had a strong association with nurses' use of smartphones for work purposes. Moreover, the results showed that perceived organisational support has an indirect effect on intention. Close inspection of the indirect effect results show that perceived organisational support had a nonsignificant direct effect on intention ($\beta = .01$, $p = .89$). Collectively, these findings indicate that nurses' use of smartphones for work purposes is mostly a function of willingness and a rational decision based on a cognitive evaluation than it is a direct function of organisational support. Taken together, these results suggest that intention to use smartphones for work purposes is based more on *behavioural-motivational factors than on organisational considerations*.

Previous research provides clues to explain these patterns in the results. First, prior evidence suggests that nurses are willing to use their smartphones to accomplish tasks, and this willingness might be independent of hospital regulations about such use. As reflected in the Exploratory Study and the study of Sharpe and Hemsley (2016), nurses are willing to use their

smartphones especially when they know that they can easily finish their task despite some restrictions set by hospitals.

Second, following the results of the Exploratory Study, nurses believe that restrictive policies are outdated and counterproductive given how smartphones can support work activities. In effect, nurses are inclined to use smartphones for work purposes because of how they think and feel about such use. When that inclination pushes against restrictive hospital policies, nurses may attempt to justify their behavioural preference by regarding the policies as unwarranted. When hospital policies are supportive, nurses might perceive the policies as concordant with their preferences, but still, their preferences dominate the behavioural decision. As argued by Brandt et al. (2016), hospital policies on smartphone use need to be revisited so that they can become relevant in a time where mobile technologies have the potential to improve nurses' work. Thus, such policies that are counter-productive to the work of nurses will not have much effect on nurses' decision to use their smartphones for work purposes if these were perceived to be irrelevant.

Regarding predictors of intention, results showed that only injunctive norm and perceived behavioural control were associated with it. Other variables such as instrumental and affective attitudes and descriptive norm did not predict intention. Interestingly, the results also showed that perceived organisational support had a positive indirect effect on intention through injunctive norm and perceived behavioural control. Although some of the findings were inconsistent with previous research on health information technologies, they make sense considering other research.

First, results showed that injunctive was associated with nurses' intention to use of smartphones for work purposes. This suggests that expectations from colleagues and hospital management exert an influence on nurses' intention to use smartphones for work purposes. In other words, greater expectations on the use smartphones for work purposes increases nurses' wilingness to use it. Results regarding the positive relationship between injunctive norm and intention is consistent the Exploratory Study and with earlier research on health information technologies (e.g., Yi et al., 2006; Leblanc et al., 2012).

Second, as hypothesised based on the Theory of Planned Behaviour, results showed that perceived behavioural control was positively associated with intention. This result is consistent with previous works that found a significant positive relationship between perceived behavioural control and intention to use health information technologies (e.g., Leblanc et al., 2012; Yi et al., 2006). Since the respondents in the current study were mostly young adults (mean respondent age is 28.93), it is likely that they possessed skillsets to use their smartphones confidently for a range of activities and this helps them to form a greater intention of using it for work purposes.

Third, perceived organisational support may be crucial to influencing intention. This was the thrust of hypotheses H7 to H11 and RQ1. Consistent with previous work (e.g., Massu et al., 2018; Leung & Rosenthal, 2019), the results suggest that perceived organisational support influences intention indirectly by changing how individuals think and feel about the behaviour, which then affects their intentions. Specifically, the results showed that perceived organisational support has a positive indirect effect on intention through injunctive norm and perceived behavioural control. There is a certain causal logic to that sequence, which is a requirement of mediation analyses (Hayes, 2013); though, the current results, being cross-sectional, cannot resolve any causal ordering among the variables of interest. Regardless, this finding extends Organisational Support Theory since very few studies demonstrate such result (e.g., Massu et al., 2018; Leung & Rosenthal, 2019) as compared to those that depict a direct relationship between organisational support and intention or acceptance to use organisational technologies (e.g., Hsiao & Chen, 2015; Park & Chen, 2007; Putzer & Park, 2010). A key takeaway from this result is that hospital policy (a reflection of organisational support enacted by hospital administrators and colleagues) can affect intention to use smartphones work purposes, but that influence is indirect. Policies that target injunctive norm and perceived behavioural control should be effective at influencing the intention and use of smartphones for work purposes. For instance, policies such as asking nurses to place their smartphones inside their lockers would limit their intention of using it since it reduces the expectations and control of its use.

Outcome of Nurses' Use of Smartphones for Work Purposes

IT Consumerisation Theory argues that the use of personal devices can improve workers' work performance (Niehaves et al., 2013). In Study I, results support the hypothesis where nurses' use of smartphones for work purposes is positively associated with perceived quality of care. This provide support to the applicability of IT Consumerisation Theory in healthcare settings. More importantly, it also provides empirical support for the argument that nurses' use of smartphones for communication and information seeking purposes can enhance the quality of care rendered to patients (Chiang & Wang, 2016; Johansson et al., 2014). Interestingly, the results also suggest that perceived organisational support could facilitate this positive outcome by encouraging nurses to use their smartphones for work purposes. Such finding should be especially interesting to hospitals, which have a strong interest in delivering quality care to patients. Although perceived quality of care is not the same thing as actual quality of care rendered to patients, they are likely close proxies (Aiken et al., 2002; Pearson et al., 2000; Poghosyan et al., 2010). Overall, the findings contribute to IT Consumerisation Theory since it provides a mechanism of how organisational and behavioural antecedents of using consumer devices (e.g., smartphones) can lead to enhanced of quality of care rendered to patients in hospital settings.

Although this study offers a positive view of the use of smartphones in hospital settings, nurses should also be cautious about such use. The findings also showed that non-work-related use of smartphones was negatively related to perceived quality of care. This indicates that the use of smartphones for non-work purposes can compromise a nurses' quality of care rendered to patients. Further examination of the results showed that the top three uses for non-work purposes include exchanging non-work-related text messages, accessing social media, and making non-work-related phone calls. Such findings are reflective of those found in the Exploratory Study. For instance, nursing superiors (i.e., nurse managers and charge nurses) believed that the use of smartphones, most especially when used for non-work purposes, can disrupt nurses' work and can potentially compromise the quality of care given to patients. Past studies also support the results. For instance, nurses mostly used their smartphones for non-work purposes by making non-work-related

calls and texts (McBride et al., 2015b) but nurse managers tend to be concerned with its use for non-work purposes since it can serve as a distraction and can potentially affect patient care (McNally et al., 2017).

Another point that needs to be considered based on the findings is that while nurses are using their smartphones for the benefit of their patients (by improving the quality by which healthcare services can be provided; Hampshire et al., 2017), it is also equally important that nurses should be mindful of preventing any harm resulting from the accidental transmission of patient information to people that are not part of the patient's healthcare team. Considering that using one's personal device for work purposes puts patients into privacy and confidentiality risks (Mobasheri et al., 2015), it is crucial for nurses to uphold the principle of nonmaleficence (i.e. do no harm). For instance, given that their institutions might not be able to provide secure technologies, nurses that use their own smartphones should only send patient information to the intended receiver (e.g., the doctor in charge of the patient). Aside from using nonmaleficence as an ethical principle, nurses in the Philippines can also use the country's Data Privacy Act of 2012 as a guide to protect the personal information of patients that are transmitted over their smartphones (National Privacy Commission, 2012).

Summary

This chapter identified the predictors and outcome of nurses' use of smartphones for work purposes using factors derived from behavioural and organisational theories, such as the Theory of Planned Behaviour, Organisational Support Theory, and IT Consumerisation Theory.

In general, results showed that intention was associated with nurses' use of smartphones for work purposes and the former is positively associated with injunctive norm and perceived behavioral control. Interestingly, perceived organisational support was a predictor of instrumental and affective attitudes, injunctive and descriptive norms, and perceived behavioural control. Moreover, results showed that perceived organisational support has an indirect effect on nurses' intention to use smartphones for work purposes. These findings provide theoretical contribution on how Organisational Support Theory augments the Theory of Planned Behaviour to explain technology use in organisational settings.

In terms of the outcome of nurses' use of smartphones for work purposes, results showed that nurses' use of smartphones for work purposes was positively associated with perceived quality of care. The results supported IT Consumerisation Theory including previous works where it was argued that its smartphone use could enhance nurses' quality of care rendered to patients. However, the results also showed that its use for non-work purposes could lead to a negative outcome, such as nurses' decreased perceptions of quality of care. These findings only indicate that policies regarding nurses' use of smartphones should consider both its potential positive and negative implications. Overall, the results of Study I contributed several theoretical insights and the findings can be used to better inform recommendations on nurses' use of smartphones in hospital settings.

CHAPTER SIX STUDY II

Organisational Issues Related to Nurses' Use of Smartphones for Work Purposes

Chapter Six presents Study II and it identifies organisational issues that influence support to nurses' use of smartphones for work purposes (RQ2).[4] This chapter focuses on organisational support from the perspective of nurse administrators since they are one of the key organisational entities in Study I where nurses obtain organisational support on the use of smartphones for work purposes. Methodologically, this study utilises a qualitative approach through focus groups in nine hospitals where the surveys in Study I were conducted. This chapter ends with a thorough presentation and discussion of the results.

Method

Study Design and Ethics Approval

This study utilised a qualitative research design. According to Sandelowski (2000), this design is used to uncover who, what, and where components of a phenomenon. Besides, qualitative research is applicable since it allows the collection of rich descriptions of organisational issues related to nurses' use smartphones (Kossman, & Scheidenhelm, 2008). Previous studies have used the qualitative design to identify organisational issues related to health information technologies such as electronic health records (Kossman, & Scheidenhelm, 2008), nursing information systems (Lee, 2008), and personal digital assistants (Lee, 2007).

This study used focus group for data collection since it is a useful technique when uncovering insights of a situation (Dürrenberger, Kastenholz, & Behringer, 1999). Warr (2005) argues that such insights are best extracted from focus group data since focus groups enables to discover multiple

[4] A conference paper based on Study II was selected as part of the Young Scholar Program of the 2019 Pacific Telecommunications Council Conference. See Appendix L for more details.

perspectives about a situation since it *"encourage participants to present, explain, and occasionally defend their opinions in a group setting"* (p. 201). Besides, focus groups have been used to uncover issues and generate recommendations on several health information technologies, such as electronic health records (Simon et al., 2009), electronic medical records (Zarcadoolas et al., 2013), and mHealth applications (Parker, Jessel, Richardson, & Reid, 2013).

The Institutional Review Board of Nanyang Technological University gave ethical clearance for the research design and procedures of Study II (IRB 2016-09-003, see Appendix D). Moreover, the administrators or ethics committees of the nine hospitals where the focus groups were conducted approved the study. All participants (N = 43) provided written and verbal consent to join the focus groups and perform audio recording (see informed consent form in Appendix I). To maintain confidentiality, participants were assured that their identities and workplaces were confidential since only interviewee and hospital codes were used in the analysis and presentation of the results. Participants were given PHP 200 (approximately USD 4 in July 2017) worth of gift vouchers for their participation.

Selection and Profile of Focus Group Sites

To obtain diverse perspectives on organisational issues related to nurses' use of smartphones for work purposes, hospitals that were part of Study I were randomly selected from a hospital matrix. The hospital matrix was developed based on data collected for Study I. These data reflect organisational factors, such as perceived organisational support and respondents with a hospital-provided mobile phone or unit phone (see Table 6.1). These organisational factors were relevant since the Exploratory Study showed that nurses' use of smartphones might depend on existing organisational policies (i.e., policies that support or prohibit the use of smartphones) and technologies (i.e., presence or absence of a unit phone).

Table 6.1. Study I Data Used to Develop the Hospital Matrix

Hospital ID	Perceived organisational support (mean; out of 5)	Percentage of respondents with hospital-provided mobile phone	Focus group site*
1	3.85	100	Yes
2	4.12	36	No
3	3.71	14	Yes
4	3.84	18	No
5	3.79	18	Yes
6	3.29	93	No
7	3.18	68	No
8	3.18	54	Yes
9	3.51	25	No
10	3.21	11	Yes
11	3.34	14	No
12	3.72	17	No
13	3.60	93	Yes
14	3.55	39	Yes
15	3.49	11	No
16	3.88	39	Yes
17	3.51	57	Yes
18	3.82	79	No
19	3.55	46	No

Note: *Refers to hospitals that eventually became focus group sites for Study II.

An initial step to create the hospital matrix was to visualise the data in Table 6.1 into a scatterplot. This was performed by plotting the mean perceived organisational support on the *y*-axis and the percentage of staff nurses with a unit phone on the *x*-axis. To identify hospitals that have similar characteristics, cutoff values were used as markers for perceived organisational support (i.e., mean value of 3.59) and the percentage of nurses with a unit phone (i.e., at the 50% mark) in the scatterplot. Based on Figure 6.1, the 19 hospitals from Study I belong in one of the four quadrants.

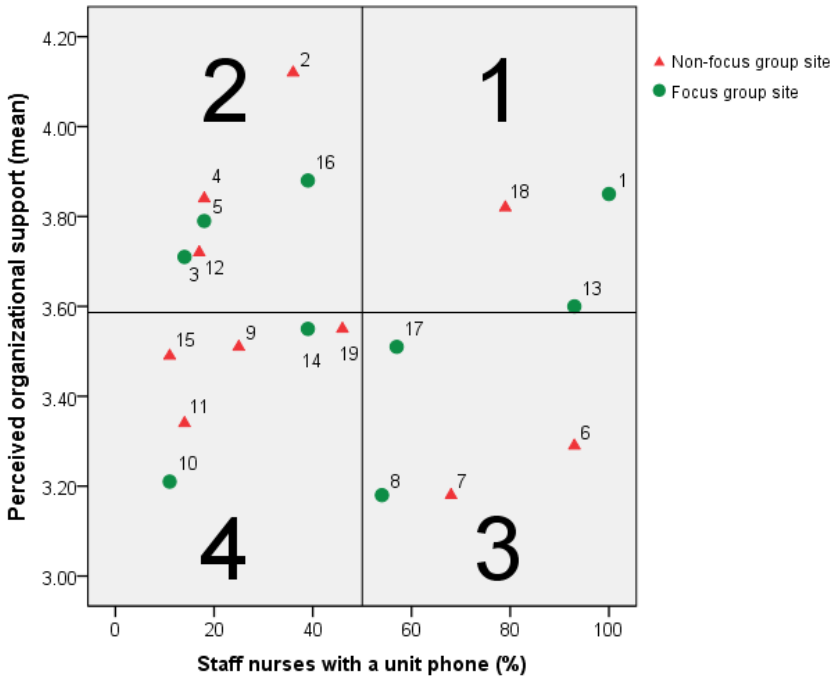

Figure 6.1. Hospital Quadrants and Focus Group Sites.

Note: Each dot or triangle represents the hospital code based on Study I. Dots represent focus group sites.

Quadrant one includes three private hospitals that had high perceived organisational support (≥ 3.59) and more than 50% of their staff nurses had a unit phone. Quadrant two includes six hospitals (four government and two private hospitals) that had high perceived organisational support (≥ 3.59) and less than 50% of their staff nurses had a unit phone. Quadrant three includes four private hospitals that had low perceived organisational support (≤ 3.59) and more than 50% of the staff nurses had a unit phone. Finally, quadrant four includes six hospitals (one government and five private hospitals) that had low perceived organisational support (≤ 3.59) and less than 50% of the staff nurses had a unit phone. It is interesting to note that hospitals in quadrants one and three were all private hospitals and all government hospitals were in quadrants three and four. Such groupings support one of the findings in the Exploratory Study that nurses from private hospitals were more likely to have unit phones than government hospitals. Similarly, data from Study I showed that there was an association between employment in private hospitals and the presence of unit phones, X^2 (1) = 17.40, $p < .001$. Overall, Figure 6.1 shows a distinct distribution of hospitals for this study.

Regarding hospital selection, at least two hospitals per quadrant were needed as focus group sites. Although there is no consensus on the required number of focus group sites (Carlsen & Glenton, 2011), selecting at least two hospitals per quadrant ensured that each quadrant is represented not by a single hospital. Therefore, at least eight focus group sites are required for this study. Additional data from other focus group sites will be collected if data saturation has not been reached. To select hospitals, half of the hospitals from each quadrant were randomly selected. Except for quadrant one which only has three hospitals, two hospitals were randomly selected in this quadrant to satisfy the required number of focus group sites per quadrant.

Similar to Study I, permission was requested from each selected hospital to participate in a focus group study. In situations that a selected hospital declined the request, another hospital was randomly selected until each quadrant has at least two hospitals within the data collection period (June and July 2017). Figure 6.1 shows the hospitals where the focus groups were conducted, and Table 6.2 provides a summary of each selected hospital's characteristics (i.e., quadrant, hospital code, location, ownership, and bed capacity). Overall, focus groups were conducted in six private and three government hospitals. As mentioned in Study I, private hospitals are usually two times more than government hospitals.

Table 6.2. Characteristics of Hospital Sites for Focus Group

Quadrant	Hospital code	Location	Ownership	Bed capacity
1	Hospital 1	South	Private	$\geq$ 300
	Hospital 13	Central	Private	< 300
2	Hospital 3	South	Government	< 300
	Hospital 5	North	Private	< 300
	Hospital 16	Central	Government	$\geq$ 300
3	Hospital 8	North	Private	< 300
	Hospital 17	Central	Private	$\geq$ 300
4	Hospital 10	North	Private	$\geq$ 300
	Hospital 14	South	Government	$\geq$ 300

Hospitals were only identified using codes to protect their privacy (e.g., Hospital 1, Hospital 13). Furthermore, only estimated bed capacity was reported in Table 6.2 since actual values can be used to identify these hospitals.

Selection and Profiles of Participants

Consistent with qualitative research design, a purposive sampling method was used to select participants (Sandelowski, 2000). Compared to the Exploratory Study where most of the participants were staff nurses, the target participants for Study II were nurse administrators. In the Philippines, nurse administrators include head nurses (i.e., charge nurses), nurse supervisors, or nurse managers. Nurse administrators are appropriate participants for this study since they are agents of the hospital administration in the planning, implementation, and evaluation of hospital policies (Kelly, 2011), such as policies regarding the use of smartphones for work purposes. Although they are responsible to enforce policies on behalf of the hospital administration, nurse administrators can adjust how such policies are implemented based on organisational issues present in their area (Brandt et al., 2016). For instance, as shown in the Exploratory Study, although her hospital has a ban on the use of mobile devices at work, one nurse manager allowed her staff nurses to use their smartphones for communication purposes because the hospital did not provide a unit phone in her area. Moreover, considering the results of Study I, it is important to determine organisational issues faced by nurse administrators because it can affect their support to nurses' use of smartphones for work purposes. This in turn can indirectly affect nurses' use of smartphones use of smartphones for work purposes since nurse administrators are one of the entities where staff nurses derive organisational support on the use of smartphones for work purposes.

Selecting participants began by coordinating with each hospital's nursing department to request five nurse administrators assigned at various areas of the hospital. Inclusion criteria for participants were age of at least 21 years old, have worked for at least a year in their current hospital, and currently works as a nurse administrator (e.g., head nurse, nurse manager, nurse supervisor). On the other hand, exclusion criteria were non-nurse administrators that were less than 21 years old and has worked for less than a year in their current hospital. Having nurse administrators from various areas of the hospital ensured maximum variation sampling. Maximum variation sampling refers to the selection of diverse participants to obtain a heterogeneous sample (Tracy, 2013). In addition, requesting five nurse

administrators served two practical reasons. First, initial discussions with various nursing departments during Study I suggested that it would be difficult for them to pull out more than five nurse administrators at the same time since these nurses could be busy with their managerial and clinical duties. They also noted that it was impossible for the department to ask these nurses to participate in the focus groups during their off days. Thus, it would be feasible to invite five nurse administrators to participate during or after working hours.

Second, since the researcher was the only one who facilitated the focus groups, five participants in each focus group would be a manageable size. Although focus groups are usually composed of six to 12 participants per group (Freeman, 2006), it should be small enough for all participants to contribute yet large enough to share various opinions (Krueger, 1994). Based on this, having five participants was sufficient to obtain rich data during focus groups. Besides, previous works used four or five participants in their focus groups to identify organisational issues related to health information technologies (e.g., Lang, Pinchin, Sharples, & Shaw, 2015; Kowitlawakul, Wang, & Chan, 2013).

Overall, there were 43 focus group participants in the study (see Table 6.3). They were scattered into nine focus groups and were composed of 22 head nurses, ten supervisors, nine nurse managers, and two infection control nurses. Infection control nurses were eligible since it is considered to be a supervisory position in the hospitals where they were employed. Although most focus groups had five participants, two sessions only had four participants since these participants attended urgent work in their area. Aside from having at least two focus group sites per quadrant, data collection was concluded after the ninth focus group since there was an indication that data saturation has been reached.

Table 6.3. Profiles of Focus Group Participants (N = 43)

Q	Code	Hos	Sex	Age	Exp	Pos	S	Area
1	H1P1	Pvt	F	44	13	HN	17	Intensive care unit
	H1P2	Pvt	M	45	17	HN	13	Medical surgical ward
	H1P3	Pvt	F	46	10	HN	17	Emergency department
	H1P4	Pvt	F	45	14	NS	8	General nursing ward
	H1P5	Pvt	F	48	13	NS	26	Training and research
	H13P1	Pvt	F	57	15	HN	12	Pediatric ward
	H13P2	Pvt	F	52	13	HN	26	Operating/delivery room
	H13P3	Pvt	M	42	8	HN	11	Intensive care unit
	H13P4	Pvt	M	44	10	NS	50	Nursing department
	H13P5	Pvt	F	51	15	HN	10	Neonatal intensive care unit
2	H3P1	Gov	F	38	17	NM	13	Obstetrics/Gynecology ward
	H3P2	Gov	F	49	7	NM	7	Hemodialysis unit
	H3P3	Gov	F	44	24	NM	9	Surgical ward
	H3P4	Gov	F	45	15	NM	13	Pediatric ward
	H3P5	Gov	F	52	20	NM	20	Delivery room
	H5P1	Pvt	F	48	6	NM	100	General nursing units
	H5P2	Pvt	M	32	7	HN	18	Operating theatre
	H5P3	Pvt	M	29	5	HN	12	Medical surgical ward
	H5P4	Pvt	M	30	9	HN	20	Intensive care/medical unit
	H5P5	Pvt	F	40	18	NM	100	Special nursing units
	H16P1	Gov	F	34	26	HN	11	Pay ward
	H16P2	Gov	F	35	16	HN	22	Neuro/ear/nose/throat unit
	H16P3	Gov	F	36	41	NS	60	Medicine ward
	H16P4	Gov	F	37	37	NS	29	Emergency department
	H16P5	Gov	F	38	22	HN	16	Outpatient department
3	H8P1	Pvt	F	29	5	HN	38	General nursing unit
	H8P2	Pvt	F	50	26	HN	9	Neonatal intensive care unit
	H8P3	Pvt	F	45	14	HN	3	Ambulatory care
	H8P4	Pvt	F	39	15	NS	70	Acute and critical care units
	H17P1	Pvt	F	64	41	NS	9	Outpatient department
	H17P2	Pvt	F	43	17	NS	9	Nursing department
	H17P3	Pvt	F	50	25	HN	9	Outpatient department
	H17P4	Pvt	F	39	15	ICN	258	All nursing areas
	H17P5	Pvt	F	28	6	HN	13	Critical care unit
4	H10P1	Pvt	F	49	28	NM	45	Operating theatre
	H10P2	Pvt	F	36	12	HN	30	Newborn services unit
	H10P3	Pvt	F	38	19	HN	16	Pediatric/medical surgical unit
	H10P4	Pvt	F	45	22	HN	24	Delivery room
	H10P5	Pvt	F	53	32	HN	11	Obstetrics/Gynecology ward
	H14P1	Gov	M	51	29	NS	100	Operating/delivery/emergency
	H14P2	Gov	F	58	32	ICN	50	All nursing areas
	H14P3	Gov	F	58	34	NS	88	Nursing department
	H14P5	Gov	F	59	35	NM	15	Emergency department

Notes: Q = quadrant. Hos = hospital ownership. Pvt = private. Gov = government. Exp = years of work experience. Pos = position. S = number of staff nurses supervised. HN = head nurse. NS = nurse supervisor. NM = nurse manager. ICN = infection control nurse.

Table 6.3 shows a summary of the focus group participants' characteristics. Most of them were female (83.7%), and their median age was 45 years (M = 45.88, SD = 8.98), ranging from 28 to 64 years old. The median length of service was 16 years (M = 18.69, SD = 9.92), ranging from 5 to 41 years. Interestingly, the median number of nurses supervised was 17 nurses (M

= 33.42, *SD* = 44.13), ranging from three to 258 nurses. Based on the areas of the participants, maximum variation sampling (Tracy, 2013) was achieved since participants came from several general (e.g., wards and outpatient department) and specialty (e.g., intensive care, operating theatre, emergency department) areas. Achieving maximum variation sampling in this study was necessary to obtain insights from nurse administrators that represent various areas since issues might differ from one area to another.

Data Collection Procedure

All focus groups were conducted in a time and location arranged by each hospital's nursing department (e.g., during or after their shift in the hospital's nursing training office or vacant hospital room). Verbal and written consent to conduct and audio record the focus group was acquired from each participant before starting each session. Focus groups were held in June and July 2017.

Before starting each focus group, participants were given a clipboard that contains the interview guide (Appendix J). The interview guide consists of 11 questions about their (1) demographics and work background, (2) perceptions and attitudes on nurses' use of smartphones at work, (3) perceived work outcomes of nurses' use of smartphones at work, and (4) organisational support on the use of smartphones at work. These questions were created based on relevant literature on nurses' use of smartphones at work (e.g., McBride et al., 2015a, 2015b; Mobasheri et al., 2015; Moore & Jayewardene, 2014) and modified considering the results of the Exploratory Study and Study I. Although there were 11 preset questions in the interview guide, follow-up questions were also asked whenever participants mentioned an interesting statement or when clarifications were needed. Utilising a semi-structured interview approach provided the flexibility of asking more questions beyond the interview guide to obtain clarifications and explore more details (Irvine, Drew, & Sainsbury, 2013). Aside from verbal responses, non-verbal cues (e.g., body language, group dynamics) were recorded in the field notes (see Appendix K). To allow greater discussion during focus groups, participants were arranged to sit in a circular pattern (Ruff, Alexander, & McKie, 2005).

Participants were asked if they have additional insights to share before concluding the focus groups. Nonetheless, incentives were provided upon conclusion of each session. For most of the focus groups, off-the-record conversations with the participants occurred, and pertinent details were written in the field notes. Excluding off-the-record discussions, each focus group lasted for an average of 40 minutes.

Data Analysis

Audio recordings of each focus group underwent verbatim transcription right after each session which allowed for preliminary ideas to emerge. This also allowed the researcher to improve the focus group questions in subsequent sessions. The transcription was performed by the same researcher since he was also the moderator who could identify each participant's voices in the recordings. All information, such as verbal and non-verbal cues, were documented in the transcripts. All completed transcripts and field notes were imported in *NVivo 11* for data analysis. Using a computer-assisted qualitative data analysis software was essential to organise the codes and annotate memos relevant to these codes. This easily allowed constant comparison of existing of codes and creation of new ones as they emerged.

To analyse the data, a primary-cycle coding was first conducted to break down the data into smaller pieces (Tracy, 2013). This was performed by conducting an extensive line-by-line open coding where codes were assigned freely to the data (Tshube & Felthz, 2015). Aside from decomposing codes, there were instances that codes were merged to make sense of the emerging themes identified in the data. After primary-cycle coding, a secondary-cycle coding was performed by immersing and reflecting on existing codes. Subsequently, related codes were categorised into conceptual bins (Tracy, 2013). These bins were precursors to sub-themes and themes based on data. It was also during this stage that new codes were created, and existing ones were transferred as needed. This led to the removal of old codes that did not fit the revised codebook.

During secondary-cycle coding, the issues were grouped based on Organisational Support Theory (Eisenberger et al., 1986). To reiterate, Organisational Support Theory suggests that the level of support that

organisational agents (e.g., nurse administrators) exert on the use of technology can influence employees' (e.g., nurses) degree of workplace technology adoption (Eisenberger et al., 1986; O'Driscoll et al., 2010). Accordingly, the issues faced by nurse administrators could determine the extent of their support to nurses' use of smartphones. By drawing on this theory, issues were subsequently classified as those that encouraged and inhibited nurse administrators to support nurses' use of smartphones for work purposes. Classifying whether organisational issues encouraged and inhibited nurse administrators to support nurses' use of smartphone for work purposes was crucial since Study I showed that perceived organisational support had an indirect effect on staff nurses' intention to use smartphones for work purposes.

Discussions with research supervisors and consultation with qualitative research experts also helped indentify how themes vary from one case to another in consideration of the participants' characteristics (e.g., hospital type, area). Considering the depth of results obtained from the analysis, focus group data from 43 participants could satisfy data saturation. In the results section, keywords or phrases within quotes were underlined for emphasis.

Trustworthiness

Steps were taken to enhance the trustworthiness of Study II by applying the principles of credibility, transferability, dependability, and confirmability (Shenton, 2004). First, the study enhanced its credibility by establishing rapport with participants (to promote honest answers) and used iterative questioning (to identify false details). Credibility was also increased by requesting two Filipino qualitative research experts to check the accuracy of translation of the quotes presented in this study. One expert was a nurse administrator in the Philippines who has a doctorate degree in nursing and specialised in qualitative research; the other was a Filipino faculty member in a large university in Singapore who teaches advanced qualitative research methods. Aside from checking the translation, the credibility of this study was improved by having the nurse administrator expert check for the contextual appropriateness of the findings against nursing practice in the Philippines.

Next, the principle of transferability was upheld by conducting focus groups with nurse administrators from various nursing areas in government

and private hospitals. Although qualitative research does not aim for generalisability, strategies at improving transferability would enhance the study's applicability in other settings (Shenton, 2004). Moreover, the study upheld dependability since protocols for data collection and analysis were technically sound and ethical. Finally, the study followed the principle of confirmability by adding relevant quotes that best represent the experiences and ideas of the participants.

Theme 1: Issues that Encouraged Support

This theme refers to issues that encouraged nurse administrators to support nurses' use of smartphones for work purposes. Simply, the presence of these issues encouraged nurse administrators to allow their nurses to use their smartphones, particularly for work purposes. First, problems with existing workplace technologies were presented considering that it reflects the current state of technology in most hospitals in the Philippines. This is followed by issues related to mobile phone technologies such as absent or insufficient unit phones and insufficient unit phone credits. Aside from technology related-issues, the results also showed a policy-related issue in the form of unrealistic policies.

Problems with Existing Workplace Technologies

Generally, nurses should use technologies provided by their hospitals for work. Although technologies are limited in most hospitals where the focus groups were conducted, participants shared that their hospital provided technologies that they can use to facilitate communication with colleagues. These technologies include landline telephones, intercom systems, and desktop-based text messaging software. Although these can assist with nurses' communication at work, the nurse administrators interviewed during focus groups noted several problems in using these technologies that result in their support for staff nurses to use personal smartphones for work purposes.

Problems with Landline Telephones

Every private and government hospital had landline telephones considering that it is one of the most fundamental communication technologies

one would have. However, most participants reported that although their hospitals provide landline telephones, nurses cannot use them to call mobile phone numbers since they are limited for communication with other landline telephones within the hospitals. As a result, participants allowed nurses to use their smartphones to communicate with members of the healthcare team. One participant described some of the restrictions placed on their landline telephone.

> *"The options for us to call cellphone, overseas calls, and NDD [national direct dialing] is restricted [in the landline]. It is restricted to all [making out-of-hospital calls]."* (Hospital 5-Participant 3, H5P3, Head Nurse)

Hospital 8 was an exception since participants there can make mobile phone calls by using hospital landline telephones to connect them to mobile phone numbers through the operator. This is generally useful, but one participant from Hospital 8 noted that when operators are unavailable, nurse administrators would allow their nurses to use smartphones to contact doctors.

> *"My staff has Globe [a service provider] and if we need to inform a Smart [refers to a doctor that is subscribed to another service provider], we will call to the operator. Now, if Smart is not available to the operator, I have one staff [nurse] that has an unli [unlimited call] to Smart. One of my staff is unli to Globe. We just borrow [each other's smartphone]."* (Hospital 8-Participant 3, H8P3, Head Nurse)

Problems with the Intercom System

Participants from Hospital 3 and Hospital 5 described their intercom system as a localised two-way communication system where a microphone and a loudspeaker were installed in every nursing area. Although this was deployed to help facilitate communication among healthcare staff within the hospital, some of them noted several problems when using the intercom system that reduced its usefulness. For instance, in Hospital 3, Participant 3 (H3P3, Nurse Manager) noted that *"it is difficult to use"* the intercom system and Participant 1 (H3P1, Nurse Manager) shared that *"sometimes it is busy."* Similarly, a participant in Hospital 5 stated that such technology *"is actually good"* but lamented that it was also an inefficient form of communication:

> *"But with the number of patients being catered by the hospital including the number of resident doctors that is rotating in the*

> *hospital, doctors would not receive our message. So, our requests would take time." (*Hospital 5-Participant 3, H5P3, Head Nurse)

Consequently, the problems experienced by the participants with their intercom system served as a cue for them to allow staff nurses to use their smartphones for work purposes. This is somewhat expected considering that Hospital 3 and Hospital 5 are in quadrant two where staff nurses reported high perceived organisational support on the use of smartphones for work purposes. Several participants shared why nurses would prefer smartphones over the intercom system. For instance, one participant stated that they could *"directly call the doctors for a referral"* and they *"need not bother to press anything on our intercom."* (Hospital 3-Participant 3, H3P3, Nurse Manager). Similarly, when the intercom system was busy, one participant was relatively fine when her nurses *"made calls or texted"* (Hospital 3-Participant 1, H3P1, Nurse Manager) using their smartphones just to contact their patients' doctors. On the other hand, one participant explained that communication via mobile phones is faster than an intercom system, to the extent that they requested their management to provide them with a unit phone:

> *For us to mobilize and facilitate information and updates, it is much easier on our phones. It is not because we want to remove the paging system but there are times that we need a much faster means of communication. That is why we are requesting a [unit] phone."*
> (Hospital 5-Participant 3, H5P3, Head Nurse)

Problems with the Desktop-based Text Messaging Software

Another workplace technology that was shared by the participants was a desktop-based text messaging software. Participants described that this software allowed nurses to send and receive text messages to and from mobile phones regardless of service provider. In most situations, nurses often used them to send patient referrals to doctors. In Hospital 1, participants mentioned that their hospital installed *Maxxtext* in each desktop computer. Similarly, Hospital 17 also has a similar software called *Infotext*.

Despite being an alternative to mobile phones for sending text messages, a major problem with this technology is the difficulty in receiving replies. For instance, one participant shared that her nurses in the intensive

care unit used *Infotext*, but they were bothered because *"the problem with Infotext is we cannot immediately receive the reply"* (Hospital 17-Participant 5, H17P5, Head Nurse). She also noted doctors were familiar with this problem and "*it is not guaranteed that they will reply [in the Infotext]"* considering that there was a *"feedback problem"* (Hospital 17-Participant 5, H17P5, Head Nurse).

The feedback problem associated with this technology was a strong concern since a patient's life in the intensive care unit, especially during emergencies, depends on the speed of coordination among the healthcare team. Considering this problem, one participant shared that, instead of using *Infotext*, she allowed her nurses to use their smartphones when making referrals to doctors, especially during emergencies:

> *"If there were emergency cases, you cannot avoid not to use your personal phone because residents and consultants send their replies to us. We do not have a cellphone [in the area]. We just use our own cellphone."* (Hospital 17-Participant 5, H17P5, Head Nurse)

Participants in Hospital 1 also noted the feedback problem with *Maxxtext* and why it became unpopular among nurses and doctors. According to one participant, *Maxxtext* was quite useful until it had such problem, and this led to the termination of the software and the deployment of mobile phones in their hospital.

> *"…[T]hey placed Maxxtext, so we did not bother using the cellphones because it was a much better form of communication with the doctors. However, there was a time that Maxxtext had a [feedback] problem, so the [software] contract was not renewed. What they did instead was to give cellphones per unit."* (Hospital 1-Participant 4, H1P4, Nurse Supervisor)

Absent or Insufficient Unit Phones

In all issues discussed, this was the one where most of the participants were highly vocal which showed its importance and relevance. This is understandable since most of the participants came from hospitals where unit phones were mostly not provided to nurses. On the other hand, although some of the hospitals provided unit phones, most of the participants believed that the number of unit phones were insufficient. Overall, the absence or insufficiency

of unit phones made nurse administrators allow nurses to use smartphones for work purposes.

Absence of Unit Phones

Focus groups with the participants revealed that all government hospitals (i.e., Hospital 3, Hospital 14, and Hospital 16) did not provide unit phones and a few private hospitals provided them (e.g., Hospital 1 and Hospital 13). Interestingly, all government hospitals fell under quadrants two and four since these hospitals had few nurses who used a unit phone. Alternatively, those in quadrants one and three were all private hospitals. Although Figure 6.1 showed that some staff nurses were using a unit phone, such as in the case of nurses from government such as Hospitals 13 and Hospital 16, the participants clarified that those mobile phones were not hospital provided but were donated either by their nursing superiors or by doctors.

Considering that most of the hospitals did not provide mobile phones to their nurses, participants from those hospitals shared that the smartphones of their staff nurses were very useful, and they allowed its use for work purposes. For instance, one participant shared that she allowed her nurses to use their smartphones "*to do research on the case of the patient"* since she believed that it is *"the fastest way for them to look for information regarding the case of the patient that they are handling"* (Hospital 5-Participant 1, H5P1, Nurse Manager). Similarly, another participant shared that her area was not provided with a unit phone, thus she allowed her nurses to use their smartphones considering its usefulness for communication purposes:

> *"From the ambulatory care, I allow the use of their personal mobile phone because a unit phone is not provided by our hospital. They use it to inform doctors if there are admissions."* (Hospital 8-Participant 3, H8P3, Head Nurse)

Aside from its usefulness that made nurses become productive at work, some participants also shared that smartphones contributed to improving the quality of care rendered to patients. This occurred when smartphones helped nurses immediately cater to patient needs. As a result, this served as a cue for

the participants to support their nurses' use of smartphones for work purposes. For example, one participant stated that "*the patient benefits from it because they [nurses] can facilitate immediate interventions to the patient"* (Hospital 14-Participant 2, H14P2, Infection Control Nurse). Moreover, one participant shared that although mobile phones can be *"a double-edged sword"* he argued that:

> *"From a clinical standpoint, if you will use it in the interest of caring for patients, it will be very very beneficial and efficient.*" (Hospital 5-Participant 4, H5P4, Head Nurse)

Nurses would need to find ways for them to provide the best possible service to their patients despite resource constraints. This meant even using their smartphones just to accomplish their task. According to some participants, their nurses' use of smartphones for work purposes is a manifestation of their capability to adapt in a situation where such technology is not provided by their hospitals. For instance, one participant explained that their work in the intensive care unit is *"very very technical"* (i.e., patients in the intensive care unit are often hooked in complicated and technical life support and medical devices) yet access to clinical information (e.g., interpretation of results from medical devices and laboratory findings) is limited since they "*do not have access provided by the institution"* (Hospital 5-Participant 4, H5P4, Head Nurse). As a response to the absence of a unit phone, he allowed his staff nurses to use personal smartphones because it is a way for them *"to gather technical or clinical information outside of our norm or usual routine"* (Hospital 5-Participant 4, H5P4, Head Nurse). Moreover, another participant also explained how nurses adapt to perform their work in the absence of unit phones:

> *"If the organisation is unable to provide their needs [like unit phones], it talks about the adaptability of the people working under them. So, of course, if you want to finish your task immediately, you [would] opt to use your own cellular phone."* (Hospital 5-Participant 5, H5P5, Nurse Manager)

Although most of the participants supported nurses' use of smartphones for work purposes due to the absence of unit phones in their

workplace, a few of them recognised that, in the longterm, hospitals should provide unit phones so that nurses would not use their smartphones. This sentiment is best described by a participant from Hospital 5 since he believed that his nurses need a unit phone and having it would result to an outcome where ***"****the personal phone [of the nurses] can be kept away and the unit phone is the one outside to be used"* (Hospital 5-Participant 3, H5P3, Head Nurse). More importantly, another participant expressed that providing her nurses with unit phones would be "*for the good of the patient*" (Hospital 16-Participant 1, H16P1, Head Nurse). She added:

> *"It will save us since we can verify and clarify [doctors' orders] much faster. Patients would not get angry with us that we are not doing anything for them."* (Hospital 16-Participant 1, H16P1, Head Nurse)

Interestingly, the participants also provided details on what mobile phone should hospitals provide to nurses as a unit phone. For instance, participants were divided on whether a smartphone or a feature phone should be provided. For some participants, providing a feature phone was ideal since it is more durable than a smartphone and it is not susceptible to theft considering its low value. To date, a feature phone can cost as low as PHP 850 (approximately USD 17; Macanas, 2017). For instance, one participant shared that her area in the operating theatre needs *"just a keypad cellphone. Like this [points to a feature phone]. It would not get easily destroyed or lost."* (Hospital 10-Participant 1, H10P1, Nurse Manager). In addition, feature phones could cover most of the nurses' need because they frequently used their smartphones to make calls and send text messages to colleagues. For instance, a participant stated that:

> *"A good situation is for each unit to have one [unit phone]. Just only a keypad phone [refers to feature phone], just for text and call. No camera. No applications. Just a keypad [phone]"* (Hospital 3-Participant 1, H3P1, Nurse Manager)

More importantly, feature phones are less tempting to be used for non-work purposes. According to one participant, she prefered a feature phone because this cannot be used to access social media or play mobile games:

> *"Maybe we just need the ones with just keypads [feature phone]. You cannot really avoid that others might use it for FB [Facebook] or games. If it its only keypads, its only for call and text. They are limited to that because it's the only thing they need in the ward. That should be for all [areas]."* (Hospital 17-Participant 3, H17P3, Head Nurse)

On the contrary, some participants would like to have a smartphone as their unit phone since they plan to use it for documentation purposes. For these participants, being able to take pictures as a means of documentation can reduce their workload and provide visual evidence of certain conditions or events that need to be shown to colleagues. For instance, one participant shared that "*we prefer a touchscreen [unit phone] because we have referrals that involve pictures and we send them*" (Hospital 17-Participant 5, H17P5, Head Nurse). Moreover, a participant shared the importance of having a smartphone for documentation in the emergency room:

> *"We need something for documentation because it is important for us. For instance, the patient comes from ER [emergency room]. We endorse the patient in the [other] unit without any bedsore; it needs to be documented, so we need to take a picture of it."* (Hospital 1-Participant 3, H1P3, Head Nurse)

Insufficient Unit Phones

Among the focus group sites, only two private hospitals in quadrant one (i.e., Hospital 1 and Hospital 13) provided most of their nursing area with a unit phone. These phones were all feature phones that were limited to making voice calls and text messages. However, despite the presence of unit phones in these hospitals, some participants shared that there were instances that their nurses needed to use their smartphones because not all of them can use the unit phone at the same time. For example, one participant shared that she has more than 17 nurses in the telemetry unit and "*nurses could not use the unit phone at the same time. That's why they use their personal phone"* (Hospital 1-Participant 1, H1P1, Head Nurse). Likewise, another participant argued that nurses' smartphones are much more accessible to use than unit phones:

> *"We need not share it [their own smartphone]. If the doctor responded, you can easily respond to it without going back to the unit*

[nurses' work station] to answer the call from the doctor that you contacted." (Hospital 1-Participant 2, H1P2, Head Nurse)

Considering that Hospital 13 also had problems with insufficient unit phones in their hospital, one participant suggested that three nurses can share a unit phone:

"It depends on how many are on duty. Sometimes there are three of them because two [staff nurses] plus the charge nurse, so three [nurses per unit phone]." (Hospital 13-Participant 1, H13P1, Head Nurse)

Likewise, when asked how many unit phones might be sufficient for government nurses, one participant also indicated the "three nurses per one unit phone" ratio when she stated that "e*very shift, we are six [staff nurses and nurse administrators]. Maybe have two cellphones"* (Hospital 16-Participant 4, H16P4, Nurse Supervisor).

Insufficient Unit Phone Credits

Although Hospital 1 and Hospital 13 provided unit phones as a strategy to reduce nurses' reliance on their own smartphones, participants from these hospitals noted that their hospitals do not necessarily provide them with sufficient credits to use the unit phone. In most cases, unit phones were under prepaid subscription and credits should be added if consumed completely. Without any credits, unit phones become useless to contact colleagues. As a result, nurse administrators from Hospital 1 and Hospital 13 allowed their nurses to use their own smartphones when their unit phones ran out of credits.

"*There are times that our load [credits of the unit phone] is already used up, so I allow my nurses to use their own [smartphone]."* (Hospital 13-Participant 1, H13P1, Head Nurse)

Similarly, another participant shared that since they are working in the emergency department, they need an immediate response from doctors. Unfortunately, their unit phone *"does not always have a load [credits]. It is seldom that it has a load. So, we use our own cellphone"* (Hospital 1-Participant 3, H1P3, Head Nurse).

Participants noted that their hospitals only provided credits through prepaid cards every start of the month, and all of them expressed that this arrangement is not feasible since they can easily consume the credits within a couple of weeks. In most situations, some participants used their own money to purchase credits for the unit phone. One participant describes how she used her own money when their unit phone's credits were depleted:

> *"I shoulder the load [credits] for unlicalls [unlimited calls]. I use 95 pesos [About USD 2] per unlicall and text' that is valid for seven days. After seven days, need to load again. Like that. Really expensive."*
> (Hospital 1-Participant 3, H1P3, Head Nurse)

An important reason on why credits are consumed quickly is that they often called a member of the healthcare team (mostly doctors) who had a different service provider. According to one participant, *"it is expensive if you are subscribed in Globe to call someone who is subscribed to Smart"* (Hospital 1-Participant 2, H1P2, Head Nurse). Unlike service providers in other Southeast Asian countries where there is a flat rate for making local voice calls, such as in Singapore and Malaysia, service providers in the Philippines charge more when users make voice calls to other service provides. For example, as of August 2018, the published rates on the websites of Philippines service prioviders, Globe Telecom[5] and Smart Communicaitons[6], were PHP 6.50 per minute for calling those within the same network and PHP 7.50 per minute to other networks. To avoid potential costs, some participants would ask whom among their nurses has a smartphone that has the same service provider with the one used by the colleague. In this situation, participants allowed their nurses to use smartphones. For example, one participant shared that they "*use the cellphone provided by the management but sometimes we use our own cellphone because the line [service provider] is different"* (Hospital 13-Participant 2, H13P2, Head Nurse).

[5] http://www.globe.com.ph/prepaid/products-services?jsid=1517988662816
[6] https://smart.com.ph/Prepaid/sim-and-phones

Unrealistic Policies

All nine hospitals had policies on the use of mobile devices which were written in hospital memos. Accordingly, hospitals can be divided based on the level of restriction placed on mobile devices. The first group is composed of four hospitals (i.e., Hospital 5, Hospital 10, Hospital 13, and Hospital 17) that implemented a ban on the use of any mobile devices (whether for work or non-work purposes) during working hours. It is interesting to note that all these hospitals were private institutions and only Hospital 13 provided most of their nurses with unit phones. On the other hand, the second group was composed of five hospitals (i.e., Hospital 1, Hospital 3, Hospital 8, Hospital 14, and Hospital 16) where the use of smartphones is banned for non-work purposes but is allowed for work purposes.

Making Exemption

Although Hospital 5, Hospital 10, Hospital 13, and Hospital 17 placed a ban on the use of any mobile devices, participants from these hospitals stated that they made an exemption by allowing nurses to use personal smartphones for work purposes. This is for the fact that such policy was unrealistic considering that their hospitals did not provide nurses with relevant work-related technologies, such as mobile phones. According to one participant, although their hospital banned the use of any mobile devices, she shared that *"you cannot avoid not to use it [smartphones] because it is a big help for nurses in terms of communication, especially when the doctors are not here"* (Hospital 13-Participant 1, H13P1, Head Nurse). Similarly, another participant shared that *"we allow [the use of smartphones] if [it is] related to work, but it is not allowed if you would just use Instagram"* (Hospital 17-Participant 5, H17P5, Head Nurse).

For most participants, a blanket ban on smartphone use is difficult to implement since these devices were useful and necessary at work. One participant emphasised this point by arguing that *"it is not absolute that we cannot use our phone"* considering that *"there is a need for us to use the phone [for work purposes]"* (Hospital 5-Participant 3, H5P3, Head Nurse). Moreover, another participant shared that a blanket ban on smartphones *"is not realistic even there is a memo because it is difficult to enforce it"*

(Hospital 17-Participant 2, H17P2, Nurse Supervisor). In Hospital 10, although they strictly implemented a ban on using mobile devices at work (this hospital has one of the lowest mean scores for perceived organisational support), a participant from that hospital argued that:

> "*You cannot avoid not to use [smartphones for work purposes] especially during emergency cases. The ban for us is mostly for personal use.*" (Hospital 10-Participant 3, H10P3, Head Nurse)

Overall, there was a consensus among participants that the only time that they can implement a blanket ban on the use of mobile devices is when hospitals can provide sufficient technologies for nurses, to the extent that they need not use their smartphones for work purposes.

> *"We need more [unit] phones so that they [nurses] can avoid using their personal phone. That is the time that they can fully implement a policy about no use of personal phone in the unit during duty hours."* (Hospital 1-Participant 1, H1P1, Head Nurse)

Similarly, another participant shared the same sentiment regarding the need for unit phones so that a blanket ban on mobile devices can be implemented in their hospital:

> *"I hope there will be a time that all clinical units will be provided with a cellphone so that they can use that [unit phone] and not their personal mobile phone. The one in the hospital will be used so that there will be strict compliance to its use for work purposes only."* (Hospital 14-Participant 5, H14P5, Nurse Manager)

Ban on Smartphone Use Only for Non-Work Purposes

On the contrary, five hospitals (i.e., Hospitals 1, Hospital 3, Hospital 8, Hospital 14, and Hospital 16) had memos where the use of smartphones for non-work purposes is banned for non-work purposes but is allowed for work purposes. Of these hospitals, two are private (Hospital 1 and Hospital 8) and three are government hospitals (Hospital 3, Hospital 14, and Hospital 16).

Interestingly, although private ones, such as Hospital 1 and Hospital 8, provided most of their nurses with unit phones, participants noted that their policies still allowed nurses to use their smartphones for work purposes. Even though the participants described that their memos do not provide a definite

list on how it should be used for work purposes, nurses could use their smartphones when there is an urgent need to communicate with colleagues (e.g., sending text messages or making calls to colleagues). For example, one participant noted that their hospital issued a *"Doctor's Notification Protocol*" (Hospital 8-Participant 1, H8P1, Head Nurse) as a basis for them to use their smartphones for work purposes. A colleague of that participant clarified that this protocol allowed nurses to use their smartphones to *"inform doctors thru text [messages]"* since the hospital revised the old protocol *"by including SMS messaging"* as part of the notification protocol (Hospital 8-Participant 3, H8P3, Head Nurse).

In Hospital 1, although unit phones were provided, a participant expressed that their nurses can still use their smartphones *"if there are important calls or emergencies"* related to work (Hospital 1-Participant 4, H1P4, Nurse Supervisor). Besides, another participant from Hospital 1 shared a policy that allows them to use their smartphones aside from unit phones in the emergency room:

> "*The hospital requires that our refferal needs to be answered [by the doctors] within 15 minutes. So, it is important to for us to call [using own smartphone]. Texting is not reliable because sometimes it [the referral] is received late."* (Hospital 1-Participant 3, H1P3, Head Nurse)

Considering that government hospitals lack adequate technologies for nurses to use, participants from Hospital 3, Hospital 14, and Hospital 16 noted that their hospital allowed the use of smartphones work purposes and only prohibits its use for non-work purposes. Although some participants noted that this is not an ideal policy and is the result of their hospitals' lack of budget for health information technologies, they noted that it is a policy that is meant for healthcare staff to properly perform their duties to their patients despite resource constraints. One participant explained how their hospital's policy prohibits the use of mobile phones for personal use but allows its use for work purposes as a means of providing service to patients.

> ***"****Actually, we have a memo from our chief nursing officer that using cellphone is prohibited particularly for personal use. But, definitely, our nurses can use the cellphone in referring our patients particularly*

> *in emergency cases. Now, let us say we caught them using their cellphone, we know that they are not using it for their personal consumption but definitely for referring our patients."* (Hospital 14-Participant 1, H14P1, Nurse Supervisor)

Overall, restrictive policies on mobile devices in hospitals can only be implemented properly if there are sufficient work-related technologies that can be used by nurses. Unfortunately, the findings indicate that most of the hospitals in this study did not have sufficient technologies for nurses not to use their smartphones for work purposes, and a total ban on mobile devices is difficult for nurse administrator to implement. Although some hospitals enforced unrealistic policies, nurse administrators recognised that their workplace lack sufficient technologies and this made them circumvent unrealistic policies by allowing nurses to use smartphones for work purposes.

Theme 2: Issues that Inhibited Support

This theme refers to issues that inhibited nurse administrators to support nurses' use of smartphones for work purposes. Simply, the presence of these issues acted as cues that made nurse administrators restrict their nurses to use their smartphones for work purposes. These issues include (1) smartphone use for non-work purposes and (2) misinterpretation by patients.

Smartphone Use for Non-Work Purposes

Although participants allowed nurses to use their smartphones for work purposes, they were equally concerned that some nurses were abusing such considerations by secretly using it also for non-work purposes. As expressed by all participants, this was one negative aspect when nurses were allowed to use their smartphones at work. Although this issue was recognised by all participants, those from private hospitals were more serious about this during discussions than those from government hospitals. As noted by participants from private hospitals, they observed that nurses could take time to use their smartphones for non-work-purposes (e.g., accessing social media or making personal calls and text) since there are fewer patients to handle in private hospitals than in government hospitals. Discussions with participants

from government hospitals supported the statement made by participants from private hospitals. Specifically, participants from government hospitals shared that their nurses would not have much time to use their smartphones for non-work purposes since they are already too busy taking care of so many patients.

Feelings of Frustration and Unprofessionalism

When participants discussed details on nurses' use of smartphones for non-work purposes, most of them showed a facial expression akin to frustration. This is expected since participants mostly shared statements that reflected frustration when discussing this issue. For instance, one participant shared her frustration when nurses use their smartphones for non-work purposes:

> *"If you allow them to use cellphone [for work purposes], some are abusive". Sometimes they will tell you that they are trying to contact the doctor, however, what they are really doing is using it for FB [Facebook], playing games, [or] Instagram."* (Hospital 17-Participant 2, H17P2, Nurse Supervisor)

Aside from feelings of frustration, some participants felt that such behaviour did not look what a nurse ought to be during the performance of his or her duty. As mentioned by one of the participants, although it is fine for nurses to use smartphones for work purposes, its use for non-work-purposes *"does not look professional"* (Hospital 14-Participant 1, H14P1, Nurse Supervisor).

Negative Outcomes

Concerns regarding nurses' use of smartphones for non-work purposes can lead to negative outcomes. As a result, some participants shared that there were times that they did not want their nurses to use their smartphones at all. This sentiment is described by one participant:

> "*There are times that I do not want them to use their phone because, in just a moment, they have time to chat and [play mobile] games."* (Hospital 13-Participant 5, H13P5, Head Nurse).

Another outcome that participants were concerned regarding the use of smartphones for non-work purposes is reduced work productivity. This concern was reasonable since all of them believed that smartphone use for non-work purposes is highly distracting and can result in productivity loss. One participant shared a vivid explanation on how the use of smartphones for non-work purposes resulted in productivity loss.

> *"When you see [them], you will think that they are just looking for something [that is related to work] but they are just playing games. It is not very good when it comes to work. Of course, if we are in the ward, we need to work. That is one bad impact of it. That is true because it slows down their work."* (Hospital 3-Participant 2, H3P2, Nurse Manager)

For some participants, its use for non-work purposes also reduced the quality of care since smartphones take away the attention that should have been given to patients. One culprit for this is the use of social media during working hours.

> *Today, they are not sleeping anymore, but they are using social media, [like] Facebook, during graveyard shift [10pm-6am]. Later, you do not realize that you enjoy browsing and that you forgot that the patient has a due [order]. The work gets delayed, other routines for the patient get delayed. So, the quality of care is affected."* (Hospital 1-Participant 1, H1P1, Head Nurse)

Disciplinary Actions

Participants noted that they enforced disciplinary actions when they caught nurses using their smartphones for non-work purposes. For most of the participants, the first thing that they did was to give verbal reminders that included some counselling. For instance, one participant shared that *"if I caught them playing games, I remind them that we have a memo that using cellphone is not allowed in the operating theatre"* (Hospital 10-Participant 1, H10P1, Nurse Manager). Similarly, another participant mentioned that she usually calls the attention of her nurses and reminds them that they "*have a policy that cellphones are not allowed during their tour of duty"* (Hospital 17-Participant 2, H17P2, Nurse Supervisor).

Consequently, some participants shared that they implemented preventive measures, such as asking nurses to place their smartphones inside lockers or cabinets. By asking nurses to put it inside lockers, this prevented them from placing it in their pockets which then reduced the tendency for it to be used for non-work purposes. For instance, one participant mentioned that *"their phone should not be even in their pockets. It should be in the locker"* (Hospital 1-Participant 1, H1P1, Head Nurse). In situations that there is a need for nurses to use their smartphones, they can get it in their locker.

> *"We do not allow their own cellphone inside the OR [operating theatre]. They need to place it inside the locker. But sometimes, their phone rings and they need to pick it up, then they go to pick it up."* (Hospital 13-Participant 2, H13P2, Head Nurse)

To some extent, some participants shared that their hospital ordered nurse administrators to implement harsh disciplinary actions. Accordingly, if verbal reminders were not enough for repeat violators, nurse administrators can confiscate the smartphone as the next step.

> *"I usually call their attention [upon seeing nurses using smartphones for non-work purposes]. Then I ask them to work on our stocks [materials in the operating theatre]. To some extent, for repeat violators, we confiscate their cellphones and we give it back after duty."* (Hospital 5-Participant 5, H5P5, Nurse Manager)

Aside from confiscation, participants in Hospital 10 asked nurses to pay a fine when caught using smartphones for non-work purposes. As mentioned by one from hospital 10, "*we have a fine of 100 pesos [about USD 2] then we confiscate the cellphone. They can get that after duty"* (Hospital 10-Participant 1, H10P1, Nurse Manager). Nonetheless, the hospital also made a record of such violations by asking nurses to file an incident report. For instance, another participant from Hospital 10 shared that *"in our area, there is [a need to file] an incident report"* (Hospital 10-Participant 2, H10P2, Head Nurse). These findings somewhat indicate why Hospital 10 had one of the lowest perceived organisational support scores among all hospitals in Study I.

Finally, there were instances that nurses were suspended from work since they were caught using smartphones for non-work purposes. As recalled by a participant in Hospital 5, although there have been no cases of nurses

getting terminated from work because of using smartphones for non-work purposes, "*there was an instance where the chief nurse caught some of our nursing staff watching something on their mobile phone and disciplinary action was given. It was work suspension. Three days for each [nurse]"* (Hospital 5-Participant 4, H5P4, Head Nurse).

Misinterpretation by Patients

Most of the participants shared that they cautioned nurses when using smartphones in front of patients since there is a tendency for patients to interpret that nurses use their smartphones for non-work purposes. This issue was expressed mostly by participants from private hospitals since they cater to "pay patients." Accordingly, pay patients tend to expect a higher standard of service than patients admitted in government hospitals where most patients are subsidised. This means that patients in private hospitals are relatively observant on how nurses conduct their work. For instance, one participant in Hospital 17 (a private hospital) shared that:

> *"It is normal in my ward that a patient becomes angry because they thought that our staff [nurses] are texting [for personal use]. However, in that case, the nurse was only using it to count the drops of the IV [intravenous] fluids."* (Hospital 17-Participant 2, H17P2, Nurse Supervisor)

On the contrary, patients who are sick or in pain are generally sensitive and they may easily complain when they feel neglected, especially when nurses use their smartphones. For example, one participant shared that her patients in the delivery room *"are in labor…in pain, so they are really sensitive"* (Hospital 5-Participant 5, H5P5, Nurse Manager). As a result, *"if they see that you are holding your cellphone and you did not immediately address their need, these result in complaints"* (Hospital 5-Participant 5, H5P5, Nurse Manager).

Although it is difficult for the participants to oblige their nurses not to use their smartphones considering how necessary it is in their work, they advised them to use it discretely and outside the view of patients. The aim of this advice is to avoid making patients feel that they are being neglected when nurses use their smartphones even it is for work purposes. For instance, one

participant adviced her nurses to use their smartphones *"not in front of the patient"* and should there be a need to use it, "*they should hide so that the patient would not see them."* (Hospital 14-Participant 3, H14P3, Nurse Supervisor). Also, another participant shared a vivid explanation of some considerations when nurses use their smartphones for work purposes:

> *"What I advise them is to use it discretely and not obvious especially when there are other people walking and you look like doing nothing but just using the cellphone. If there are [work-related] calls, I would ask them to hide either in the CR [comfort room] or in our dressing room. Sometimes, nurses are doing work then the phone rings. They are not allowed to answer it since they are in front of other people. So, they need to hide."* (Hospital 10-Participant 5, H10P5, Head Nurse)

Overall, although nurses used their smartphones at work to improve patient care, some patients may not interpret such action as something that is beneficial for them. Given that patients tend to negatively view nurses who are using their smartphones, it is crucial for nurse administrators to remind nurses not to use smartphones for non-work purposes and avoid unintentionally ignoring patients when using smartphones for work purposes.

Discussion

Drawing inspiration from Organisational Support Theory (Eisenberger et al., 1986), issues related to nurses' use of smartphones were those that encouraged and inhibited nurse administrators to support it. Table 6.4 shows a summary of the results.

Table 6.4. Summary of Themes and Sub-themes

Themes (section)	Sub-themes (section)
Issues that encouraged support (p. 106)	❖ Problems with existing workplace technologies (p. 106) ➢ Problems with landline telephones (p. 106) ➢ Problems with the intercom system (p. 106) ➢ Problems with the desktop-based text messaging software (p. 107) ❖ Absent or insufficient unit phones (p. 109) ➢ Absence of unit phones (p. 110) ➢ Insufficient unit phones (p. 113) ❖ Insufficient unit phone credits (p. 114) ❖ Unrealistic policies (p. 116) ➢ Making exemption (p. 116) ➢ Ban on smartphone use only for non-work purposes (p. 117)
Issues that inhibited support (p. 119)	❖ Smartphone use for non-work purposes (p. 119) ➢ Feelings of frustration and unprofessionalism (p. 120) ➢ Negative outcomes (p. 120) ➢ Disciplinary actions (p. 121) ❖ Misinterpretation by patients (p. 123)

Issues that Encouraged Nurse Administrators to Support Nurses' Use of Smartphones for Work Purposes

Issues that encouraged nurse administrators to support to nurses' use of smartphones for work purposes include (1) problems with existing workplace technologies, (2) absent or insufficient unit phones, (3) insufficient unit phone credits, and (4) unrealistic policies. One of the key findings that are reflected by these issues is that a hospital's lack of adequate health information technologies can drive (or force) nurses to be resourceful in using an existing technology that they can use in their work regardless of policy constraints. This is somewhat expected in most, if not all, hospitals in the Philippines since the deployment and implementation of even the most basic forms of health information technologies (e.g., electronic health records) there is lagging (Ongkeko et al., 2016).

In the context of the study, problems encountered by nurse administrators on existing hospital communication technologies served as a

justification for them to allow their nurses to use smartphones for work purposes. For instance, landline telephones and intercom systems, although generally available in most hospitals, were perceived to be an inefficient and indirect means of communication than smartphones. In addition, although desktop-based text messaging software can be used for sending work-related messages to colleagues, this technology was perceived to be unreliable than smartphones, especially during emergency situations. As a result, this led nurse administrators to support the use of smartphones for work purposes to overcome problems associated with existing workplace technologies. This is expected considering that nurses have a moral responsibility to take care patients and technologies, such as mobile phones, can serve as a bridge to address healthcare gaps (Hampshire et al., 2017).

Aside from problems with existing workplace technologies, the absence of unit phones, and its credits, served as another reason for nurse administrators to allow nurses to use smartphones for work purposes. This is expected as all nurse administrators found such devices to be useful and if this is not provided by their hospital, they tend to support the use of their nurses' smartphones. Similarly, when unit phones lack the necessary credits to be functional, nurse administrators have no choice but to allow their nurses to use their smartphones.

Based on the findings, the support to use smartphones for work purposes was highly noticeable among nurse administrators from government hospitals. As supported by data collected in Study I, nurses from government hospitals had higher perceived organisational support on the use of smartphones for work purposes than nurses from private hospitals ($M_{government}$ = 3.81, $M_{private}$ = *3.52*, t = 3.43. p = .001). Based on Figure 6.1, two of the three government hospitals in the study (i.e., Hospital 3 and Hospital 16) were in quadrant 2 which are hospitals with high organisational support and a low percentage of nurses with a unit phone (i.e., hospital-provided mobile phone). Besides, although one government hospital was placed in quadrant 2 (i.e., Hospital 16), its level of organisational support is near the cut-off point to be classified as having high organisational support. A potential reason for allowing nurses to use their own smartphones for work purposes is that government hospitals do not have the budget to provide nurses with unit

phones. As a result, they were more permissive on nurses' use of smartphones for work purposes than private hospitals. Although the issue regarding the absence of unit phones is expected in most hospitals in developing countries (Hampshire et al., 2017), it is interesting to note that studies conducted in countries where health information technologies are expectedly robust, such as in Australia (Sharpe & Hemsley, 2016), and Taiwan (Chiang & Wang, 2016), also showed that nurses there used their smartphones for work purposes because such technology is not provided to them by the hospital. Overall, the findings indicate that smartphones are now essential in the work of nurses and nurse administrators would allow its use especially when hospitals do not provide adequate unit phones and credits to their nurses.

Another key finding of this study is that a blanket ban policy on mobile devices did not deter nurse administrators' decision on allowing nurses to use smartphones for work purposes since such policy was perceived to be unrealistic. This is apparent for some hospitals in this study under quadrant 3 (i.e. Hospital 17) and quadrant 4 (i.e., Hospital 10) where organisational support is low for using smartphones for work purposes (see Figure 6.1). Interestingly, although Hospitals 5 and Hospital 15 had such restrictive policies, the level of organisational support were high since they were in quadrant 2 and quadrant 1 (see Figure 6.1). This might suggest that their nurse administrators, despite such restrictions, were supportive of nurses using smartphones for work purposes. In general, the findings are contrary to previous studies where nurse administrators tend to be unsupportive of nurses' use of smartphones (Brandt et al., 2016; Gilles-Smith et al., 2017; McNally et al., 2017), considering that nurse administrators in this study were generally supportive of smartphone use as long as it is used solely for work purposes. Although allowing nurses to use smartphones for work purposes contradict a hospital's blanket ban policy on mobile devices, the findings indicate that such policy can only be implemented if there is sufficient context that it can be implemented. Specifically, a blanket ban policy can only be implemented realistically if a hospital provides nurses with adequate technologies to the extent that there is no need for nurses to use smartphones at all. Unfortunately, this is not the case in most hospitals in the Philippines considering that investments in health information technologies there is relatively low

(Ongkeko et al., 2016). Recognising the limitations present in their workplace, the findings showed that nurse administrators tend to take a pragmatic approach to such policies by implementing the ban only for smartphone use for non-work purposes.

It is interesting to note that a blanket ban on mobile phones tend to occur in most private hospitals since government hospitals, due to lack of resources, have realistic policies which allow nurses to use their smartphones for work purposes. This is somewhat reflected in Figure 6.1 where there are three private hospitals (i.e., Hospital 8, Hospital 10, and Hospital 17) and only one government hospital in this study that were in quadrant 3 and quadrant 4 (i.e., quadrants with low organisational support). Based on the findings, hospitals that implement a blanket ban on mobile devices that do not provide adequate technologies to their nurses will have a difficulty implementing such policy, and it is expected that there will be a disconnect between policy and practice (Brandt et al., 2016). As argued by Johansson et al. (2014), the use of smartphones by nurses is a means to support their practice and is not primarily an outcome of policies implemented by hospitals. Although the findings are generally reflective of developing countries, the disconnect between policy and practice regarding smartphone use among nurses is also a concern in developed countries, such as in the U.S. (Brandt et al., 2016; Flynn et al., 2018), U.K. (Mobasheri et al., 2015), Canada (Giles-Smith et al., 2017), Australia (Sharpe & Hemsley, 2016), and Taiwan (Chiang & Wang, 2016). As argued by Flynn et al. (2018), the disconnect between policy and practice implies that hospital administrators should develop and implement realistic policies that recognises the increasing role of smartphones in clinical practice.

Although a realistic policy (such as allowing nurses to use their smartphones for work purposes if such technology cannot be provided by the hospital) can be implemented, it is also crucial to consider how it should be implemented in accordance to existing ethical and legal standards. For instance, nurses are bound to do good and prevent harm to patients (Kelly, 2011), and this needs to be put into action when using smartphones for work purposes. By allowing nurses to use their smartphones to improve the delivery of healthcare services to patients (an act of beneficence), nurse administrators also have a role to prevent any harm arising from the use of such technology

in clinical practice. For instance, the most crucial harm that can result from the use of smartphone for work purposes is unintentional breaches to privacy and confidentiality (Mobasheri et al., 2015). Specifically, nurses might accidentally transmit health information to people outside the healthcare team. This presents a huge security risk considering that patient information is mostly comprised of sensitive personal data (National Privacy Commission, 2012). Therefore, certain guidelines should be established in order to reduce potential harm to patients. Aside from upholding the ethical principles of beneficence and nonmaleficence, the Philippine's Data Privacy Act of 2012 can also be used by nurse administrators as a basis to develop guidelines to protect patients' health information in situations where secure technologies cannot be provided by the hospital (National Privacy Commission, 2012). For instance, it delineates that organisations should implement reasonable and appropriate measures to protect personal information against any accidental or unlawful destruction, alteration, and disclosure.

Issues that Inhibited Nurse Administrators to Support Nurses' Use of Smartphones for Work Purposes

Although nurse administrators can be responsive to the needs of their nurses by supporting their use of smartphones for work purposes, there were two issues that inhibited such support: (1) using smartphones for non-work purposes and (2) misinterpretation by patients.

The first issue that can inhibit nurse administrators to support nurses' use of smartphones for work purposes is nurses' use of smartphones for non-work purposes. Consistent with previous works, although nurses used their smartphones for work purposes, it is inevitable that some of them would use it for non-work purposes, such as playing mobile games, making personal calls and text messages, and accessing social media (e.g., Brandt et al., 2016; Giles-Smith et al., 2017; McBride et al., 2015a; McNally et al., 2017). Based on the findings, a typical reaction by nurse administrators to this issue is frustration. This is understandable since nurse administrators, especially those in private hospitals where there is a blanket ban on mobile devices, felt betrayed after placing their trust on their nurses that they will only use their smartphones for work purposes. On the other hand, some nurses also felt that such behaviour is

unprofessional. According to scholars (Brandt et al., 2016; McNally et al., 2017), the prospect of nurses using their smartphones for non-work purposes is unprofessional since it does not align with the ethical and legal standards that define the profession.

Nonetheless, for nurse administrators, the use of smartphones for non-work purposes is an important issue since it is a prime source of distraction that can reduce productivity and the quality of care rendered to patients. This finding supports Study I since non-work-related use of smartphones was found to be negatively associated with perceived quality of care. Of the many ways that nurses can use it for non-work purposes, the findings are consistent with previous works where accessing social media and playing mobile games were deemed to be highly distracting and can put patients at risk to injury, thus reducing the quality of care to patients (Brandt et al., 2016; McNally et al., 2017). Given these negative outcomes, it is expected that nurse administrators are not supportive of nurses' use of smartphones when it is used for non-work purposes.

The negative outcomes resulting from nurses' use of smartphones for non-work purposes also led nurse administrators to enforce disciplinary actions against offenders. Like in the work of Brandt et al. (2016), most nurse administrators made verbal reminders and counselling. Moreover, consistent with Brandt et al. (2016), similar disciplinary actions were implemented, such as placing smartphones inside the locker, confiscation, and to a certain extent, suspension. However, what is interesting in the study was the implementation of fines since no previous work has documented such form of disciplinary action. Although a fine of PHP 100 (about USD 2) might seem little, this is a significant amount of money for nurses in the Philippines because it can constitute about one-fifth of their daily salary. The results only showed that nurse administrators do not tolerate the use of smartphones for non-work purposes and they implement various forms of disciplinary actions to deter non-work-related use of smartphones.

Another issue found in this study is that nurse administrators were conscious of patients misinterpreting nurses' use of smartphones. Such concern had been reflected in previous studies in the U.S. (Stephens et al., 2017), Canada (Giles-Smith et al., 2017), and Sweden (Johansson et al., 2014).

Although this issue did not lead nurse administrators to ban the use of smartphones among their nurses, they advised nurses not to use it in front of patients to reduce the chances of receiving complaints related to the use of smartphones. A potential reason for giving such advice is that nurse administrators must maintain a good nurse-patient relationship. According to Pullen and Mathias (2010), an essential aspect of this relationship is the preservation of mutual respect between the nurse and the patient. Considering that nursing is a patient-facing work (Stephens et al., 2017), it is important for nurse administrators to make sure that nurses give patients the highest possible level of respect.

One way to convey respect to patients is being attentive to their needs in a timely manner. Unfortunately, although nurses can use smartphones to facilitate the necessary care to their patients (e.g., referring patient details to the doctor), its use can take away the attention from patients. As what previous studies suggest (Giles-Smith et al., 2017; Johansson et al., 2014; Stephens et al., 2017), patients do not expect nurses to use their smartphones at work, so the sight of a nurse using it is a sign of disrespect. Moreover, nurses who use their smartphones for work purposes might accidentally ignore patients since their attention might be focused on the need to respond to a colleague's concern via the smartphone, especially during emergencies. Such situations can be characterised as phubbing. According to Roberts and David (2016), phubbing refers to snubbing a person as a result preoccupation with mobile phone use. Although recent studies found that phubbing can reduce the quality of romantic relationships between partners (e.g., Roberts & David, 2016; Wang, Xie, Wang, Wang, & Lei, 2017), this study found a similar finding where phubbing can reduce the quality of the nurse-patient relationship. Accordingly, nurses who use their smartphones for work purposes might unintentionally snub patients and this can make patients feel unattended. This has great implications to nurse administrators since patients can lodge complaints when they experience such situations. As a result, it is expected that nurse administrators would advise nurses to be mindful of using smartphones in the presence of patients.

Summary

Study II answered RQ2 by identifying organisational issues that influence nurse administrators' support to nurses' use of smartphones for work purposes. To answer this RQ, nine focus groups were conducted with 43 nurse administrators from nine tertiary-level general hospitals in the Philippines. Issues that encouraged nurse administrators to support nurses' use of smartphones include problems with existing workplace technologies, absent or insufficient unit phones, insufficient unit phone credits, and unrealistic policies. On the other hand, issues that inhibited nurse administrators to support nurses' use of smartphones for work purposes include the use of smartphones for non-work purposes and misinterpretation by patients. Overall, the findings can be used as a basis to develop recommendations on nurses' use of smartphones for work purposes. The next chapter discusses these recommendations.

CHAPTER SEVEN KEY RECOMMENDATIONS ON NURSES' USE OF SMARTPHONES IN HOSPITAL SETTINGS

This chapter presents key recommendations on nurses' use smartphones in hospital settings based on the findings of Study I and Study II. Overall, these recommendations can be used by hospital administrators as a basis to design policies related to nurses' use of smartphones in their institutions. To a certain extent, these recommendations can also be used by health authorities to inform their policies or guidelines on healthcare professionals' use of mobile devices in hospital settings.

Recommendation 1: Improve Existing Technologies to Reduce Smartphone Use

In principle, nurses should use existing technologies available at their workplaces because hospitals have the responsibility to provide such health information technologies (Buntin et al., 2011). Based on the findings of Study II, a common problem with these technologies (e.g., landline telephones, intercom systems, and desktop-based messaging applications) is that they were insufficient to meet the communication and information seeking needs of nurses. According to Stephens (2018), typical communication technologies in the hospital are stationary and these tend to hinder the mobile nature of nurses' work when facilitating patient care with other mobile healthcare colleagues. The problems associated with these stationary technlogies become reasons on why nurse administrators allow nurses to use smartphones for work purposes (see pp. 106-109). Besides, as shown in Study I (see Figure 5.3), nurses have the skills and capabilities (i.e., perceived behavioural control) to use smartphones for work purposes, and considering that they are willing (i.e., intention) to use it just to complete their task within a short period, it is not surprising they would prefer to use smartphones over these technologies. This is more pertinent during emergency situations where immediate communication among the healthcare team is crucial to save a patient's life.

Based on the findings of this research, one way for hospitals to reduce (if not eliminate) nurses' use of smartphones for work purposes is to improve existing technologies. There are several ways to do this. First, hospitals should have landline telephones and intercom systems for each nursing area. Having these technologies readily available to nurses can help reduce the need to use smartphones for voice calls to contact colleagues within hospital premises, particularly during routine and non-emergency situations. Moreover, hospitals can upgrade the functionality of their landline telephones by using cordless telephones and by allowing nurses to make mobile phone calls in it. In most situations, landline telephones are stationary and are limited to voice calls to other telephones within the hospital; however, using cordless telephones (landline phones with wireless handsets) – although bulky and less functional compared to mobile phones (Stephens, 2018) – can provide the flexibility to be used on the go. Moreover, as shown in Study II, nurses administrators in Hospital 8 found that being able to call a mobile phone using a landline telephone was useful to contact doctors that are outside hospital premises (see pp. 106-107). Although the study showed that this might not be a reliable means of communication during emergency situations, being able to contact a doctor using a cordless phone that has the function to call mobile phone numbers can be beneficial for routine and non-urgent communication. To a certain extent, by providing these features, it can potentially reduce nurses' need to use their own smartphones for voice calls. Although these simple technologies should be present in hospitals, it is likely that some hospitals might find it difficult to obtain them for nurses considering that setting up such telecommunication systems is costly in the Philippines (Sipin, Espiritu, & Malabanan, 2014). Nonetheless, hospitals can work with vendors to obtain these technologies within budget.

Second, hospitals can explore using desktop-based messaging applications. Although this is only limited to text messaging and has usability issues as shown in Study II (e.g., difficulty receiving messages, unreliable during emergencies; see pp.108-109), it can somewhat help nurses communicate with colleagues through text messaging. By combining landline telephones for voice calls and desktop-messaging applications for text messaging, nurses can reduce the need to use their smartphones for work

purposes. Considering that installing a messaging application requires an Internet-connected desktop computer, hospitals can also improve the functionality of their desktop computers by providing Internet access so that nurses can use it for information seeking. To ensure appropriate use of the Internet, access to unwanted websites, such as social media websites (e.g., Facebook, Youtube, Instagram, Twitter, etc.) should be restricted considering that nurses have the tendency to use such technology for non-work purposes (see pp.119-123).

Although providing Internet-connected desktop computers can be a solution to limit nurses' use of smartphones for communication and information seeking purposes, it is essential to recognise that this recommendation might not be feasible for most hospitals in the Philippines considering that even simple technologies, such as landline telephones and intercom systems, are already difficult to provide. Furthermore, aside from having one of the slowest Internet speeds in Asia, Internet access in the Philippines is one of the most expensive globally (Diaz, 2017), thus presenting cost constraints. Nonetheless, hospitals should consider providing internet-connected desktop computers in the future since the government is currently modernizing the country's health information system by requiring healthcare facilities to have such technology where electronic health records can be installed (Ongkeko et al., 2016).

Figure 7.1 provides a summary of the key research findings leading to the first recommendation.

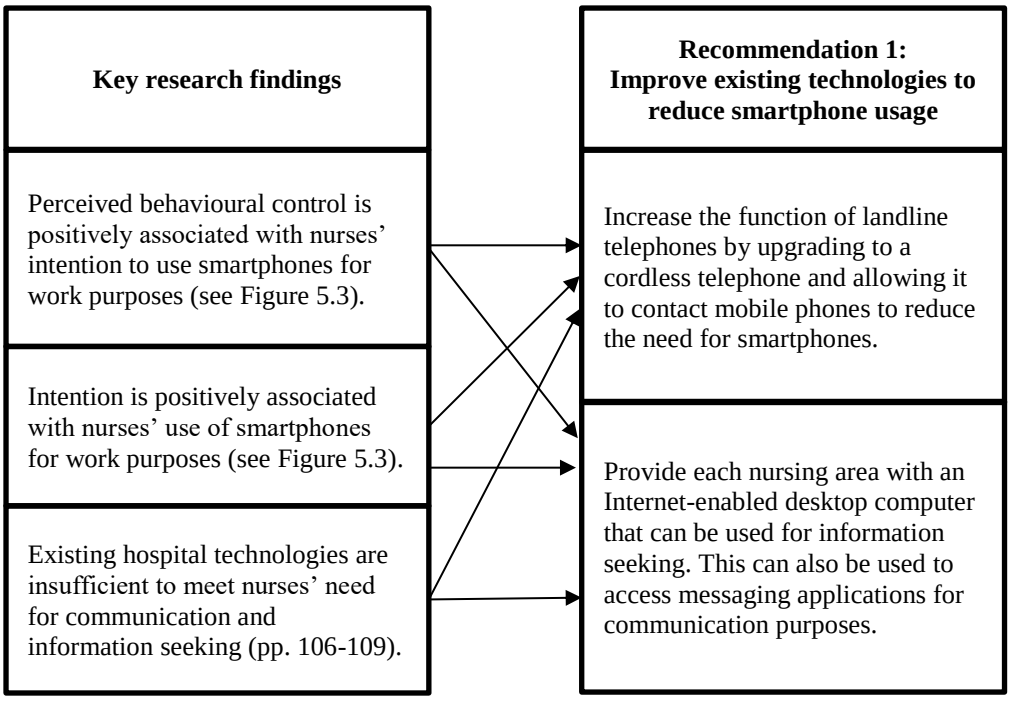

Figure 7.1. Key Research Findings and Recommendation 1

Recommendation 2: Provide Adequate Unit Phones and Credits

Aside from providing nurses with landline telephones (that are cordless and can contact mobile phone numbers), intercom systems, and desktop-based messaging applications, another option for hospitals is to provide unit phones so that nurses can use these instead of their smartphones. In this research, unit phones refer to mobile phones that are provided by the hospital. Results of Study I (see p. 84) suggest that the presence of a unit phone is negatively associated with intention to use smartphones for work purposes. To date, hospitals can provide a unit phone that is either a feature phone or smartphone. Based on Study II (see pp. 112-113), some nurse administrators would like feature phones since it is cheap, durable, and, more importantly, it is less likely to be used for non-work purposes (e.g., mobile games and social media). Besides, some also noted that feature phones were sufficient to meet nurses' needs because they usually just use their smartphones for work purposes by making voice calls and text messages. Study I supports this claim considering that nurses frequently used their smartphones to exchange voice calls and text messages with fellow nurses and doctors (see Table 5.4). On the contrary, others would like to have a smartphone since they would like to use it not only for communication purposes but also for information seeking (e.g., access the

Internet for clinical information) and documentation (take pictures of patient-related outcomes or events) purposes (see pp. 112-113). Although nurses' preferences can be considered when selecting a unit phone, hospitals would likely decide based on their budget. For example, those with a large budget can opt for smartphones but those with a small budget can opt for feature phones. However, providing smartphones can greatly limit the use of nurses' smartphones in the future considering that this device can be used for communication, information seeking, and documentation purposes. In general, providing units phones might be a solution to existing communication and information barriers faced by mobile healthcare professionals considering that stationary technologies provided by hospitals (e.g., landline telephones and even cordless ones) are insufficient in meeting their needs for microcoordination and for providing quality of care to patients (Stephens, 2018).

Another aspect that needs to be considered is the appropriate number of unit phone to be shared by nurses. Based on Study II (see pp. 113-114), nurse administrators observed that their nurses preferred to use personal smartphones instead of waiting for others who are using the unit phone. Although providing a unit phone is straightforward, coming up with an appropriate number of unit phone to provide is challenging. Nonetheless, the findings of Study II indicate that a unit phone can be shared by three nurses and this can be adopted as a preliminary basis for the number of unit phones to be given (see pp. 113-114). However, considering that each nursing unit is different in terms of function (provision of general or specialised care) and size (number of patients and nurses), it is up to nurse administrators to determine if a certain number of unit phones would completely meet nurses' needs. Ultimately, the decision on how many would be provided rests heavily on the hospital's budget.

Aside from providing unit phones to nurses, hospitals should also give adequate credits so that the unit phone can be used when needed. Based on Study II (see pp. 114-115), nurse administrators allowed their nurses to use smartphones because their unit phone did not have any credits, or they are afraid to entirely consume the remaining credits in situations where a colleague who uses a different service provider needs to be contacted. To

reduce, if not eliminate, the need for nurses' smartphones, hospitals should provide adequate credits to the extent that there is no need to consider the type of service provider. Considering that a definite amount of credits is challenging to be deemed as adequate, hospitals should consult nurse administrators to propose a monthly budget for unit phone credits in their respective area of assignment.

Nonetheless, the adequacy of unit phone credits relies on the type of subscription. Although Study II showed that credits were usually given monthly under prepaid subscription (see pp. 114-115), hospitals can also consider postpaid subscription. Although prepaid subscription offers a fixed amount of credits to be used per month, providing a postpaid subscription might offer more flexibility since most service providers in the Philippines can tailor fit their postpaid services based on the needs of an organisation.[7] Besides, postpaid subscription usually comes bundled with a mobile phone (usually a smartphone) that can be used as a unit phone. On the practical side, customers of postpaid subscription have access to a report that shows the extent of mobile phone use (e.g., determine mobile numbers where calls were made, and text messages were sent). This report will be useful for nurse administrators when auditing if the unit phone was used only for work purposes and not for personal means. Nonetheless, the decision on which type of subscription to select still depends on the available budget that a hospital can allocate. Accordingly, those with a large budget can opt for postpaid subscription but those with a small budget can opt for prepaid subscription.

Figure 7.2 provides a summary of the key research findings leading to the second recommendation.

[7]Postpaid services by Globe Telecom (https://mybusiness.globe.com.ph/mobile/mybusiness-postpaid/#theplan) and Smart Communications (https://smart.com.ph/Enterprise).

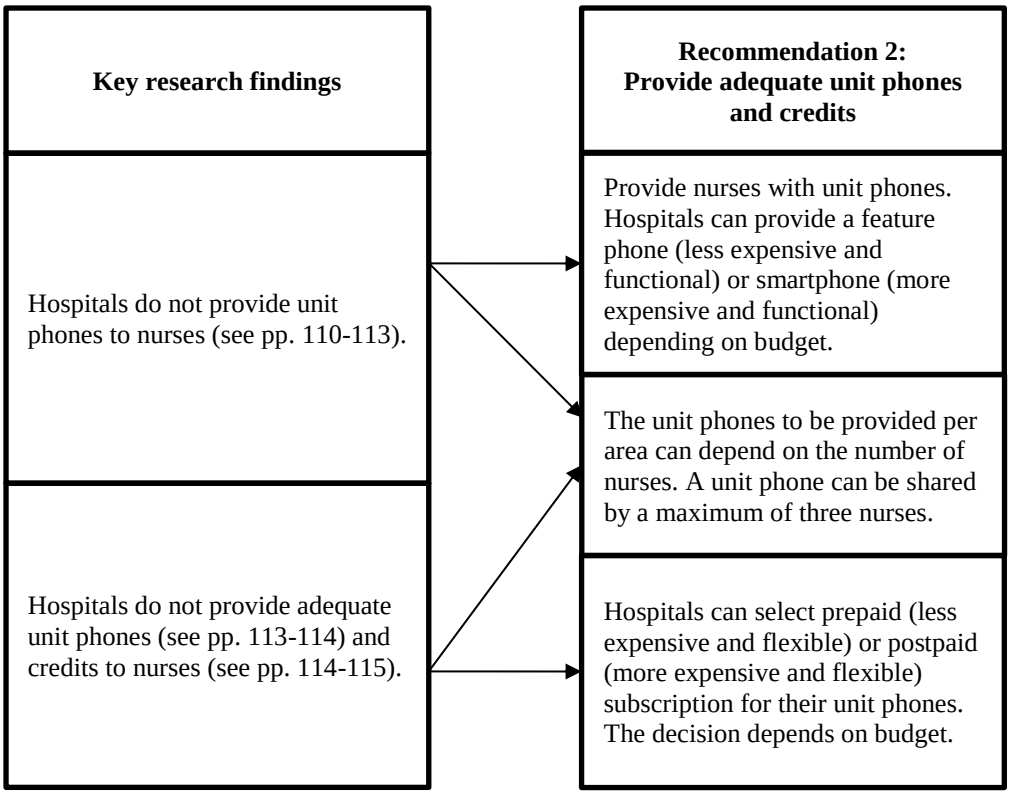

Figure 7.2. Key Research Findings and Recommendation 2

Recommendation 3: Implement Realistic Policies

Policies govern the use of health information technologies, and they are needed to maximise its benefits and limit its risks to patients (Alkraiji, Jackson, & Murray, 2013). Furthermore, such policies need to be realistic based on the context of where it will be implemented (Diamond, & Shirky, 2008). Just like other health information technologies, it is crucial for hospitals to define how, when, and where nurses can use their smartphones at work (Brandt et al., 2016). To do this, the first step that hospitals need to be clear with is whether they would allow nurses to use their smartphones at work. Based on Study II (see p. 116), most private hospitals implement a ban on mobile devices despite not providing a unit phone to their nurses. On the contrary, due to lack of technological resource, most government hospitals are relatively lenient with the use of smartphones at work if it is only used for work purposes.

The results suggest that if hospitals were to implement a complete ban on any mobile devices at work, they would need to ensure that adequate technologies are in place for nurses to use. As mentioned earlier, such

technologies should include landline telephones (that are cordless and can be used to call mobile phones), Internet-enabled desktop computers (that can be used to send text messages), and intercom systems. More importantly, these should also include unit phones (feature phone or smartphone) with sufficient credits since relying only on upgrading existing stationary technologies (e.g., landline telephones, desktop computers, and intercom system) may be insufficient for nurses to facilitate crucial microcoordination with other healthcare professionals in and out of the hospital to provide the best possible quality of care to patients (Stephens, 2018).

As shown in Study II (see pp. 116-117), nurse administrators from hospitals that implement a policy that bans the use of mobile devices think that such policy is difficult to implement considering that their hospitals do not have the adequate technologies and resources for nurses not to use their smartphones for work purposes. Scholars (e.g., Stephens, 2018; Stephens & Ford, 2016) argue that organisations that do not provide adequate technologies to staff and implement a restrictive policy that prevents workers from using their mobile phones for work purposes can result in reduced work productivity and overwhelming tasks and burdens for supervisors. Such restrictive policy, in combination to failure to provide relevant workplace technologies, can also become a barrier to provide better patient service since smartphones (possibly the only technology that is available to them) could enable nurses to improve the quality of care even at their own cost (Chiang & Wang, 2016; Hampshire et al., 2017). Results of Study I support these claims since nurses' use of smartphones for work purposes is positively associated with perceived quality of care (see Figure 5.3). Therefore, hospitals should consider their capacity to provide adequate technologies before shifting to a policy that completely bans the use of smartphones for work purposes.

A potential solution, especially to hospitals that do not have adequate technologies and resources, is to explicitly indicate in their policy that mobile devices such as feature phones or smartphones can be used at work. Besides, results of Study I (see Table 5.2) and Study II (see pp. 117-119) showed that the use of smartphones for work purposes is pervasive among healthcare staff (i.e., mean of 3.92 out of 5 for descriptive norm) and there is an expection to use it for work purposes (i.e., mean of 3.44 out of 5 for injunctive norm).

However, as noted in Study II (see pp. 117-119), this policy needs to emphasise that it should only be used for work purposes and not for non-work purposes (e.g., making personal calls and text messages, accessing social media, and playing mobile games).

Although some hospitals in Study II already had policies allowing the use of mobile phones for work purposes, a pertinent finding is that these were not specific enough beucause examples of work and non-work purposes were not listed (see pp. 117-119). Although using a strategically ambiguous policy (i.e., just stating that it should only be used for work purposes and not for non-work purposes) can provide flexibility in terms of interpretation, such policy tends to be confusing and can result to conflicts (Stephens & Ford, 2016). For instance, although some of the participants think that using a smartphone's camera for photography or videography can help with documenting clinical records, events, or outcomes (see pp. 110-113), its use–even it is for work purposes–should not be allowed considering that these actions may risk patient privacy and confidentiality (Brandt et al., 2016; Royal College of Nursing, 2016). Furthermore, hospitals that would like to create a policy that allows nurses to use their smartphones for work purposes should specify that it can be used only for communication (e.g., making calls, sending text and instant messenger messages) and information seeking (e.g., searching for clinical information on websites, apps, and e-books) purposes. Activities such as accessing social media, watching videos, and mobile gaming should be prohibited considering that they are non-work-related use of smartphones, and can lead to decreased quality of care (see p. 84). Although these are suggestions, nurse administrators could further deliberate on what other uses of smartphones can be allowed or prohibited at work.

Another aspect that needs to be clarified in the policy is when and where to use smartphones for work purposes. Based on the findings of Study II (see pp. 123.124), the policy needs to emphasise that nurses should always attend to their patients first and smartphones should not be used in front of them or their representatives (e.g., relatives, legal guardian, and significant others) unless there is an urgent need to do so. Ideally, nurses should only use their smartphones in the nurses' station since it is where they usually perform communication and information seeking tasks (Gum et al., 2012). Specifying

when and where to use smartphones for work purposes also needs to be reflected in the policy to avoid instances of phubbing (intentionally or unintentionally snubbing a person due to mobile phone use; Roberts & David, 2016) that can compromise the nurse-patient relationship (Cohen, Shappell, Reeves, & Boquet, 2018). To minimise potential complaints, nurses should also assure patients that their use of smartphones is to facilitate prompt nursing care. Moreover, additional safeguards need to be implemented in areas such as in intensive care and operating theatre. For instance, smartphones should not be brought into the sterile areas of operating theatres to reduce the spread of harmful microorganisms (Brady et al., 2009). Also, for nurses assigned in intensive care units, smartphones should not be used within a meter from medical devices (e.g., mechanical ventilators, infusion pumps) to prevent potential malfunction due to electromagnetic interference (Ettelt et al., 2006).

The policy also needs to indicate corresponding disciplinary actions when nurses commit violations on the use of smartphones at work. This needs to be stated so that all nurses are aware of the repercussions associated with the irresponsible use of smartphones at work. Although this may vary from one hospital to another, hospitals routinely enforce these disciplinary actions when nurses commit violations (starting from the least to the highest severity): verbal reprimand, written reprimand, suspension, and termination (Kelly, 2011). Although Study II found that some nurse administrators enforced fines and confiscation as disciplinary actions (see 6.3.1c), such punishments are not ideal since they are not part of routine disciplinary actions for other violations committed by nurses (e.g., medication errors; Kelly, 2011). On the other hand, imposing fines will only add to the financial burden that nurses are currently experiencing (see Hapal 2017). Punishments for such violations need to be consistent with routine disciplinary actions that are implemented in most healthcare institutions, and punishments such as fines and confiscation should be avoided.

Overall, a realistic and specific policy needs to be created and implemented so that hospitals can regulate nurses' use of smartphones at work and mitigate confusion brought by ambiguous policies. This policy also needs to align with the Philippine's Data Privacy Law of 2012 (National Privacy Commission, 2012) to mitigate privacy and confidentiality risks associated

with the use of smartphones for work purposes. For instance, hospitals can specify when should nurses delete patient data in their smartphones after its purpose has been achieved (e.g., when to delete after patient information has been used for patient referral to the doctor). It can also be used as a basis to remind nurses on be mindful of only sending a patient's health information to authorised personnel (i.e. members of the healthcare team). However, hospitals need to recognise that a policy that supports nurses' use of smartphones for work purposes is a temporary solution on meeting the technology needs of nurses. While using smartphones for work purposes is an act of beneficence on the part of nurses for patients, it cannot guarantee full privacy and confidentiality security. A long-term plan which involves acquiring technologies that can reduce–if not eliminate–smartphone use should be considered since the use of personal devices in hospital settings presents several costs (e.g., nurses use their own money to use smartphones for work purposes; Hampshire et al., 2017) and security concerns (e.g., privacy and confidentiality risks to patient information shared using personal devices; Marshall, 2014). Moreover, hospital policymakers should acknowledge that before implementation, a draft of the policy needs to be presented to different stakeholders (e.g., staff nurses, nurse administrators). Acquiring feedback from stakeholders is necessary so that the policy is appropriate (ethically and legally) to the work setting and acceptable to the majority. This will also help make sure that the policy would be implemented appropriately.

Figure 7.3 provides a summary of the key research findings leading to the third recommendation.

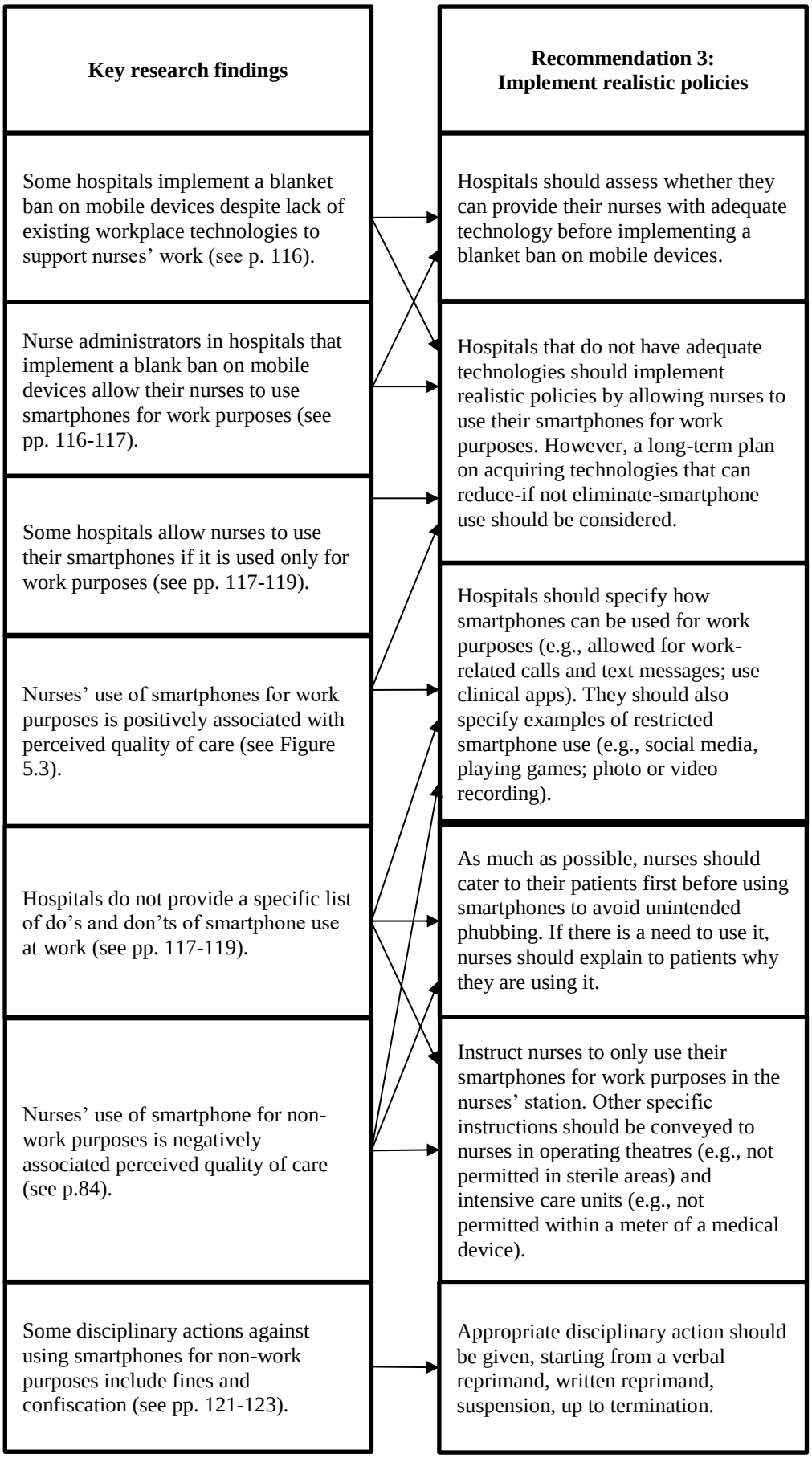

Figure 7.3. Key Research Findings and Recommendation 3

Recommendation 4: Educate Nurses on the Implications of Using Smartphones at Work

Although policies can delineate how, when, and where smartphones should be used at work, it is essential that nurses are given the opportunity to internalise details in these policies. Simply implementing a policy without educating nurses on the implications of using smartphones at work might not result in intended outcomes (e.g., use of smartphone for work purposes only, non-usage of smartphone camera for photos or videos). Besides, educating nurses about the contents of the policy is an effective communication strategy that can help with appropriate policy implementation (White, Wells, & Butterworth, 2014).

One way to educate nurses is to hold information sessions regarding the implications of using smartphones at work. For instance, using the findings of the entire research, hospital administrators can hold workshop or lecture sessions to inform nurses that using smartphones for work purposes can improve the quality of care rendered to patients (see Figure 5.3). More importantly, it should also be emphasised that the opposite of these outcome is bound to happen when smartphones are used for non-work purposes (see p. 84). Educational sessions can also be a good venue to emphasise what would qualify as the use of smartphones for work and non-work purposes. Considering that hospitals tend not to provide a list of do's and don'ts of smartphone use at work (see pp. 117-119), a lecture can be conducted to instruct nurses that smartphones can be used for communication and information seeking purposes since it resembles its use for work purposes. On the other hand, the lecture should emphasise that using smartphones for non-work purposes such as accessing social media and playing mobile games are prohibited. Finally, such sessions can be a platform where hospitals administrators can obtain feedback to revise the policy before implementation.

Aside from sessions through face-to-face interactions, infographics can also be used to convey details of the policy. The use of infographics can help communicate key policy details in a summarised, concise, and engaging manner (Otten, Cheng, & Drewnowski, 2015). Besides, previous studies showed that healthcare professionals prefer infographics than text summaries when reading key information from research outcomes (Crick & Hartling,

2015; Turck, Silva, Tremblay, & Sachse, 2014). To increase the reach of the infographics, these can be disseminated not only by posting them in relevant areas of the hospitals but by also sending them in email accounts of nurses. Thus, infographics can be used as an additional strategy to educate nurses on the implications of using smartphones at work.

Figure 7.4 provides a summary of the key research findings leading to the fourth recommendation.

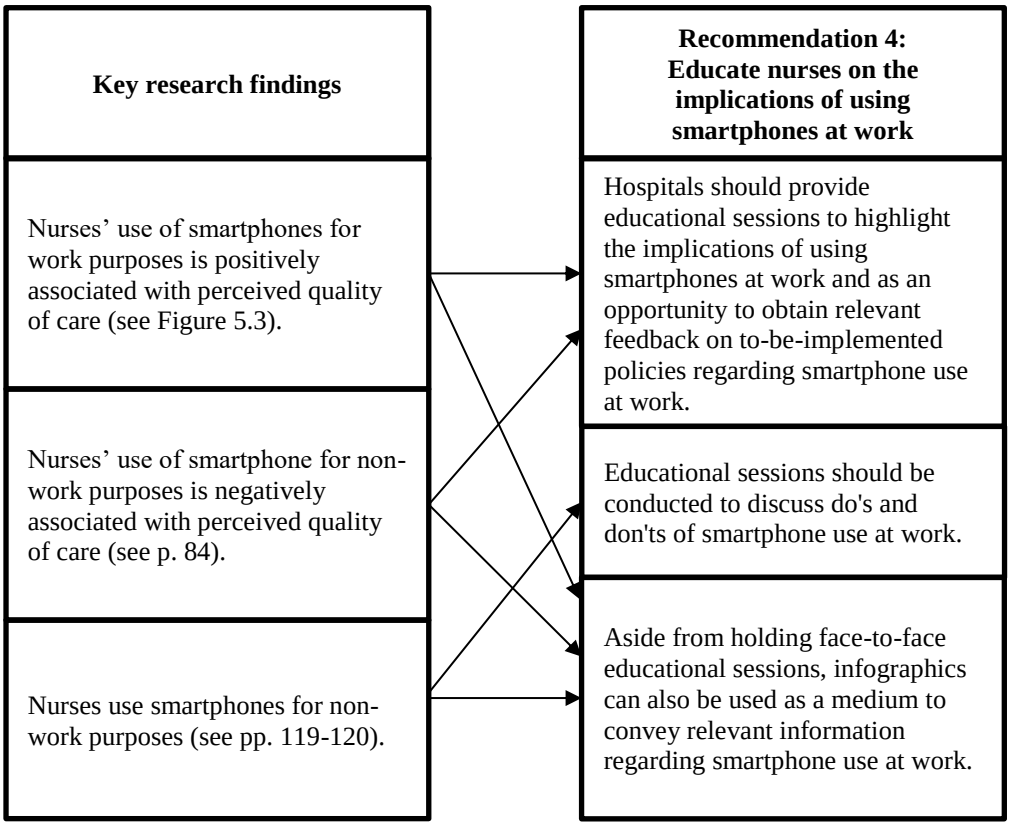

Figure 7.4. Key Research Findings and Recommendation 4

Summary

This chapter presented several recommendations based on the findings of Study I and Study II. These recommendations include improving existing technologies to reduce smartphone usage, providing adequate unit phones and credits, implementing realistic policies, and educating nurses on the implications of using smartphones at work. Collectively, these recommendations can be used a basis to create or revise policies that govern the use of mobile devices in hospital settings. Nonetheless, these recommendations can provide guidance for organisations who wanted to support their nurses as they use smartphones to facilitate patient care. Although the recommendations are targeted for nurses, these can also be used to guide policies targeted to other members of the healthcare team. To a certain extent, such recommendations can be adopted by non-healthcare organisations.

CHAPTER EIGHT CONCLUSION

Research Summary

This research examined factors and organisational issues related to nurses' use of smartphones for work purposes based on a theoretical framework constructed using behavioural and organisational theories, such as the Theory of Planned Behaviour, Organisational Support Theory, and IT Consumerisation Theory. Conducting this research was bourne out of the need for a more theory-based examination of the role of smartphones in the work of nurses–the largest group of healthcare professionals in a hospital. Nurses are an interesting group of healthcare professionals since most of their time is spent on taking care of patients and their work relies on efficient communication with members of the healthcare team. As a result, communication and information technologies, such as smartphones, play a crucial role in nurses' work. This is more notable among nurses in developing countries, such as those in the Philippines, where nurses use their smartphones for work purposes to compensate for the lack of technological and human resources.

The Exploratory Study was initially conducted to determine how nurses in the Philippines use their smartphones for work purposes, and if the factors and organisational issues discussed in the theoretical framework were relevant in the Philippines. In-depth interviews were conducted among 23 staff nurses employed in six government and seven private tertiary hospitals in Metro Manila, Philippines. Aside from staff nurses, seven nurse administrators (e.g., three charge nurses and four nurse managers) were also interview to obtain an administrator's perspective of nurses' use of smartphones for work purposes. Results showed that nurses used their smartphones at work for communication, information seeking, and documentation purposes. Consistent with the theoretical framework, several behavioural (i.e., instrumental and affective attitudes, injunctive and descriptive norm, perceived behavioural control, and intention) and organisational (i.e., perceived organisational support) factors were found to be relevant to nurses' use of smartphones for work purposes in the Philippines. Moreover, a potential outcome of nurses'

use of smartphones for work purposes include enhanced quality of care to patients. The findings also showed some organisational issues (i.e., absence of hospital provided mobile phone, inconsistent policies) that can influence support to nurses' use of smartphones for work purposes. Overall, the results of the Exploratory Study served as a foundation to conduct Study I and Study II.

Study I addressed H1-H12 and RQ1. Specifically, the study examined the predictors and outcome of nurses' use of smartphones for work purposes. Based on a theoretical framework developed in Chapter Three, a research model derived from theories such as the Theory of Planned Behaviour (i.e., intention, instrumental and affective attitudes, injunctive and descriptive norm, perceived behavioural control), Organisational Support Theory (i.e., perceived organisational support), and IT Consumerisation Theory (i.e., perceived quality of care) was tested. Model testing used data collected from 517 staff nurses employed in five government and 14 private tertiary-level general hospitals in Metro Manila, Philippines. Results showed that intention was associated with nurses' use of smartphones for work purposes. Moreover, intention was found to be a function of injunctive norm, and perceived behavioural control. Interestingly, perceived organisational support directly predicted instrumental and affective attitudes, injunctive and descriptive norms, and perceived behavioural control. Perceived organisational support also indirectly predicted nurses' intention to use smartphones for work purposes through injunctive norm and perceived behavioural control. On the other hand, results showed that nurses' use of smartphones for work purposes was positively associated with perceived quality of care.

Study II addressed RQ2. Specifically, the study identified several organisational issues that influence nurse administrators' support to nurses' use of smartphones for work purposes. Compared with the Exploratory Study where in-depth interviews were conducted with only seven nurse administrators, Study II conducted nine focus groups with 43 nurse administrators employed in nine randomly selected hospitals. Conducting focus groups primarily with nurse administrators was ideal because they could influence the extent that nurses use their smartphones for work purposes (as suggested in the theoretical framework and shown in Study I) and the issues

that they identify could have policy implications. Drawing from Organisational Support Theory, issues were classified based on those that encouraged and inhibited nurse administrators to support nurses' use of smartphones for work purposes. Issues that encouraged nurse administrators to support nurses' use of smartphones for work purposes include problems with existing workplace technologies, absent or insufficient unit phones, insufficient unit phone credits, and unrealistic policies. On the other hand, issues that inhibited nurse administrators to support nurses' use of smartphones for work purposes include smartphone use for non-work purposes and misinterpretation by patients.

Subsequently, the findings of Study I and Study II were used to develop key recommendations on nurses' use of smartphones in hospital settings. These recommendations include improving existing technologies to reduce smartphone usage, providing adequate unit phones and credits, implementing realistic policies, and educating nurses on the implications of using smartphones at work. Although these recommendations were developed in the context of nurses' use of smartphones in hospital settings, these can also be used to guide mobile phone policies for other healthcare staff and non-healthcare workers.

As of May 2019, data collected for this research have resulted to five journal articles and nine conference presentations (see Appendix L for the list of outputs). Of the nine conference presentations, three received awards.

Implications of the Research

Theoretical Implications

This research has several theoretical implications.

First, the study contributed to scholarly interests in smartphone use of nurses in hospital settings. As shown in Chapter Two, research on the utilisation of mobile devices for healthcare delivery focused on local healthcare workers (e.g., midwives, traditional birth attendants, community health workers) in community settings (e.g., Agarwal et al., 2015; Braun et al., 2013; Goel et al., 2013) that were provided with mobile phones to perform their work (Lemay et al., 2012; Little et al., 2013; Lori et al., 2012; MacLeod et al., 2012). On the other hand, while there were similar studies conducted

among healthcare workers in hospital settings, these studies mostly focused on doctors or medical students (e.g., Ganasegeran et al., 2017; Ozdalga et al., 2012; Payne et al., 2012). Overall, this research contributed to the literature by answering to the call of While and Dewsbury (2011) towards the need for more research on the impact of various technologies on nursing practice. By selecting nurses as the target population, this research added relevant literature on healthcare professionals' use of smartphones for work purposes in hospital settings.

Second, this research contributed a clear conceptualisation and operationalisation of the construct *"nurses' use of smartphones for work purposes.*" Contrary to the Exploratory Study where this construct was presumed to characterise nurses' use of smartphones through communication, information seeking, and documentation purposes at work, results of the confirmatory factor analysis in Study I showed that this construct is best characterised by 15 items that reflect communication and information seeking purposes only. In addition, the results also showed that these items belong in one of five distinct dimensions that characterise nurses' use of smartphones for work purposes (i.e., *communication with clinicians via call and text; communication with doctors via instant messaging; information seeking; communication with nurses via instant messaging;* and *communication with patients via call and text*). Although the items were developed to measure nurses' use of smartphones for work purposes, these are directly applicable when measuring other healthcare professionals' use of smartphones for work purposes. Interestingly, the items (or portions of it) can also be administered to non-healthcare workers since it provides a generic list of items on how smartphones were used for work purposes. For instance, items under factors like *communication with clinicians via call and text* and *communication with patients via call and text* can be modified to denote *communication with "coworkers" via call and text* and *communication with "customers" via call and text*, respectively. To date, relevant studies on the use of smartphones for work purposes among non-healthcare workers only measured general mobile phone use without identifying the specific functions used for work purposes (Derks & Bakker, 2014; Derks, Duin, Tims, & Bakker, 2015). Overall, the definition and items for nurses' use of smartphones for work purposes can

help researchers validly define and operationalise the use of smartphones for work purposes and statistically determine several factors associated with it.

Third, this research contributed to the field of health informatics by applying behavioural and organisational theories to examine a routinely used health information technology. As mentioned in Chapter Two, scholars (e.g., Fanning et al., 2017; Xue et al., 2015) argued that most studies in this field were atheoretical and there is a need to apply theories to examine the implications of health information technologies better. Specifically, this research extended the applicability of the Theory of Planned Behaviour by using it as a basis to determine behavioural predictors of nurses' use of smartphones for work purposes. Moreover, it also extended Organisational Support Theory since perceived organisational support was found to be a strong predictor of factors derived from Theory of Planned Behaviour (i.e., instrumental and affective attitudes, injunctive and descriptive norms, and perceived behavioural control). Similarly, the research also provided a mechanism by which perceived organisational support could indirectly affect nurses' intention to use smartphones for work purposes through behavioural antecedents, such as injunctive norm and perceived behavioural control.

More importantly, this research also contributed to literature by highlighting the use of IT Consumerisation Theory to predict the relationship of nurses' use of smartphones for work purposes and perceived quality of care. Although previous studies have proposed that nurses' use of smartphones for work purposes can enhance the quality of care rendered to patients (Chiang & Wang, 20016), it was unclear if there is statistical association between these variables. Although this study only used nurses' perceptions of such an outcome, this research contributed to the literature by showing a statistical association between them. Consequently, this research calls for more application of behavioural and organisational theories when examining healthcare professionals' use of health information technologies.

Fourth, this research also contributed to literature by demonstrating how Organisational Support Theory can be used to categorise organisational issues related to nurses' use of smartphones for work purposes. Aside from being a useful theory in Study I to examine the role of perceived organisational support on nurses' use of smartphones for work purposes,

Study II also used it as a guide to classify issues whether they encouraged or inihibted nurse administrators to support nurses' use of smartphones for work purposes. The research expanded the use of this theory by utilising it to understand the role of organisational support in the context of nurses' use of smartphones for work purposes. Therefore, future works can incorporate theories, such as Organisational Support Theory, when classifying issues issues related to the use of health information technologies.

Fifth, this research demonstrated the advantages of using a mixed-method design to investigate nurses' use of smartphones for work purposes. To date, most studies that have explored this phenomenon obtained their findings based on one research design (e.g., McBride et al., 2013, 2015a, 2015b; Mobasheri et al., 2015). In contrast, this research utilised a mixed-method design to gain in-depth insights and address research gaps in studies related to nurses' use of smartphones for work purposes (Cameron, 2009). For instance, although the Exploratory Study was helpful in describing nurses' use of smartphones for work purposes and identifying potential factors associated with it, there was a need to conduct Study I to empirically test the association of these factors with a large-sample (N = 517), theory-based research model. Similarly, the Exploratory Study provided preliminary details on relevant organisational issues related to nurses' use of smartphones for work purposes. However, since the findings were based on few nurse administrators (seven charge nurses and nurse managers), there was a need to perform a follow-up study to overcome such limitation. For Study II, focus groups were conducted with 43 nurse administrators to obtain more insights on key issues relevant to nurses' use of smartphones for work purposes. It also extends the result of Study I by showing how certain organisational issues can encourage support for nurses' use of smartphones for work purposes. Overall, future studies can use a mixed-method research design as an in-depth approach to examine the role and implications of health information technologies to healthcare professionals.

Sixth, while this research focused on nurses' use of smartphones for work purposes, the results provided theoretical contributions to the larger field of organisational and mobile communication, especially on the relationship of mediated communication and labour. For instance, this research highlights the

mediating role of smartphones in facilitating work that is also applicable in non-healthcare settings. According to a qualitative work of Stephens (2018), mobile devices have a transformative role for employees since it is a device that empowers them to facilitate work. Similar qualitative research also shows that mobile technology provides affordances to managers, professionals, and frontline employees in non-healthcare organisations (Cousins & Robey, 2015; Hislop & Axtell, 2011). These prior findings go along with the concept of IT Consumerisation Theory, and the results of Study I expand on these studies by showing that the use personal devices for work purposes, such as smartphones, has a positive association with perceptions of work performance (i.e., perceived quality of care rendered to patients).

Moreover, the findings contributed to theory by demonstrating how Organisational Support Theory can be used to augment the Theory of Planned Behaviour to better explain the relationship between organisational support and behavioural antecedents in the use of personal devices in the workplace. Although previous studies have acknowledged the importance of organisational support in the use of smartphones for work purposes (e.g., Abejirinde, Ilozumba, Marchal, Zweekhorst, & Dieleman, 2018; Chiang & Wang, 2016; Stephens, 2018; Stephens et al., 2017), this research is one of the first to situate perceived organisational support as a predictor of behavioural antecedents of using mobile devices in the workplace (see Figure 5.3). Aside from that, Organisational Support Theory was also instrumental as a theoretical lens to determine how several organisational issues affect organisational support in Study II. Identifying these issues are important since they become a basis whether organisational agents (e.g., nurse administrators) support such technology, which then becomes a basis for employees' (nurses') perceived organisational support on the use of mobile devices for work purposes. Overall, the findings of this research provide theoretical implications on the interplay of mobile technologies, labour, and organisations in healthcare and non-healthcare settings.

Finally, this research contributed to the scarce literature on the role of informal mHealth (use of personal mobile devices for healthcare; Hampshire et al., 2017) in the work of healthcare professionals in developing countries. Currently, most studies on nurses' use of smartphones for work purposes were

mainly from developed countries (e.g., McBride et al., 2015a, 2015b, Mobasheri et al., 2015). Thus, this research contributed additional knowledge to this phenomenon by showing how nurses in the Philippines leverage on informal mHealth to perform their duties. Although the findings provided a glimpse of the utilisation of informal mHealth in Southeast Asia, more studies are needed to determine its implications in the work of healthcare professionals in developing and developed countries.

Practical Implications

Aside from theoretical implications, this research has several practical implications.

First, this research provided a list of items that hospital administrators can use to determine the extent on how their nurses and other healthcare staff are using their smartphones for work and non-work purposes. Aside from using the items for a self-reported survey, these can be modified for observational studies to obtain objective measures of smartphone use at work. The resulting scores from these items can be used as a basis to make well-informed policies and guidelines on smartphone use in hospital settings.

Second, this research also provided hospital administrators insights on how nurses respond to hospital policies regarding mobile phone use. Hospital administrators should be mindful that a blanket ban policy on mobile phones is difficult for nurse administrators to implement unless adequate technologies are provided to nurses. More importantly, they should be mindful that nurses' decision to use smartphones for work purposes is more of a behavioural (i.e., willingness) rather than an organisational consideration, so an unrealistic policy, such as a total ban on smartphones, would not be useful to curb smartphone use in hospitals.

Third, this research proposed several recommendations that hospital administrators can use as a basis to create or revise policies on mobile phone use among healthcare staff. Although these recommendations were based on findings related to nurses' use of smartphones for work purposes, these can be customised for regulating other healthcare professionals' use of mobile devices at work. To a certain extent, these recommendations can also be useful

for non-healthcare institutions that are reflecting on implementing BYOD policies.

Finally, the findings of this research can be used by nursing training officers in hospitals as a basis to design educational sessions regarding the role and implications of mobile technologies in clinical practice. Specifically, training officers should highlight that it is crucial for nurses to understand that although smartphone use for work purposes could enhance the quality of patient care, its use for non-work purposes can lead to opposite results. Moreover, providing educational sessions can also be a way to emphasise what qualifies as the use smartphones for work and non-work purposes. To a certain extent, some findings of this study can also be included in educational sessions meant for other healthcare and non-healthcare staff in a hospital.

Strengths and Limitations of the Research

Research Strengths

This research has several theoretical and methodological strengths that scholars can use to guide future research.

First, this research drew on a theoretical explanation of nurses' use smartphones for work purposes by using a combination of behavioural (i.e., Theory of Planned Behavior) and organisational theories (i.e., Organisational Support Theory and IT Consumerisation Theory). The use of theory to explain nurses' use of smartphones for work purposes was a major strength of this research considering that earlier work on this topic is relatively atheoretical and merely focused on describing the ways that nurses used their smartphones for work purposes (e.g., McBride et al., 2015b; Mobasheri et al., 2015).

Aside from contributing theoretical knowledge that explains the role of new media technologies in nursing practice, this study provided insights on the implications of IT consumerisation in the field of organisational communication. Contrary to previous works where the focus is on organisation-provided technologies, such as electronic health records (e.g., Meehan, 2017) and email (e.g., Sarbaugh-Thompson & Feldman, 1998), this study elucidated the nuances when consumer technologies (i.e., nurses' own smartphones) interacts with existing organisational technologies (i.e., telephone landlines, intercom system) to facilitate employee-employee (e.g.,

nurse-doctor communication) and employee-customer (e.g., nurse-patient communication) communication in an organisational setting (i.e., hospitals).

Beyond theoretical strengths, this research also demonstrated methodological rigour. Specifically, this research embarked on using a mixed-method approach to examine nurses' use of smartphones for work purposes. This is a strength considering that this research was able to derive conclusions based on a combination of qualitative and quantitative viewpoints that were key to arrive at an in-depth understanding of the phenomenon (Schoonenboom, & Johnson, 2017). For instance, the Exploratory Study was used to identify factors related to nurses' use of smartphones for work purposes and these factors were statistically examined in Study I. Subsequently, Study II was built upon the findings of the Exploratory Study and Study I to explore certain issues that facilitated organisational support regarding nurses' use of smartphones for work purposes.

Aside from using a mixed-method approach, the results were also methodologically robust since data were collected from nurses employed in various hospitals in Metro Manila, Philippines. For instance, the 517 survey respondents in Study I came from 19 hospitals that were stratified based on ownership (private and government), bed capacity (< 300 and ≥ 300) and location (north, central, south). Besides, the 43 participants that form nine focus groups in Study II came from a subset of nine hospitals from Study I. Collecting data from several hospitals ensure the research's findings are relatively generalisable, and the resulting policy recommendations are relatively applicable to most hospitals in the Philippines.

Constraints, Limitations, and Future Research Directions

Despite its strengths, it is important to recognise that this research had several constraints and limitations, and these can guide future research directions. One of the constraints of this research was the means of selecting respondents for Study I. Despite using probability sampling methods in the selection of hospitals, respondent selection at the hospital level was limited to purposive sampling since hospitals do not provide a list of nurses that can be used as a sampling frame (this is especially true for researchers that are not affiliated with the hospital). This presents a certain degree of selection bias.

Future studies can reduce bias by utilising random sampling methods when selecting nurses within a hospital. This can be performed by gaining access to the list of nurses in a hospital, which can be done through close partnerships with hospitals in conducting such research.

There were also constraints in measuring some of the variables in Study I. For instance, nurses' use of smartphones for work purposes was measured by asking nurses to report various ways of using smartphones for work purposes during the past month. Ideally, if this was intended to be a behavioural construct based on the Theory of Planned Behaviour, respondents should have answered that portion of the survey in the future after the intention items where answered (Ajzen, 1991). However, this was not feasible since there was only one opportunity to obtain survey data from the respondents and it was not possible to do a follow-up considering that the survey was anonymous. Besides, nurses work in shifts and that would make follow-ups unfeasible given the limited time allotted for data collection. Therefore, a future research direction is to conduct a longitudinal study that measures nurses' use of smartphone for work purposes in two time periods (e.g., time 1 measures intention while time 2 measures actual use).

Another constraint is the means of measuring perceived quality of care in Study I. Perceptions are relatively easy to measure, but they do not necessarily correspond with actual conditions. Since the study used self-reports quality of care provided to patients, the results are limited to perceptions of such outcome. Future studies can be conducted to measure these outcomes using more objective measures. For instance, a time-motion research design (Westbrook & Ampt, 2009) can be utilised to measure smartphone use and several work outcomes objectively.

Finally, the policy insights derived from Study II were limited to focus groups with nurse administrators. Ideally, such insights should come from a variety of hospital stakeholders (e.g., healthcare professionals, administrators, and patients). Although it was initially planned to include other members of the healthcare team (e.g., pharmacists, doctors, and other allied healthcare staff) in the focus groups, several constraints during early research trips were encountered that prevented their inclusion. One of these constraints includes the lengthy process of acquiring permission from different departments within

a hospital (again, this is especially true for researchers that are not affiliated with the hospital). More importantly, as mentioned by some hospital personnel during the research trips, arranging a schedule where personnel from various departments will attend a focus group was unfeasible due to unpredictable work conditions (e.g., last minute changes in the schedule due to understaffing). As a recommendation, future studies can be geared towards including other healthcare professionals when it comes to discussing policy insights on nurses' use of smartphones for work purposes.

Concluding Remarks

The smartphone is an instrumental device that can be used to facilitate personal and work-related tasks. For healthcare professionals, such as nurses, it is an essential device that they are willing to use to overcome their hospital's lack of health information technologies and human resources. Based on the results of this research in the context of the Philippines, hospitals that do not provide nurses with adequate technologies can support nurses in their work by creating policies that would allow them to use smartphones for work purposes. Although this might not be an ideal recommendation considering that smartphone use also presents certain drawbacks (i.e., tendency for non-work-related use and patient misinterpretation), a pragmatic decision to allow nurses to use it for communication and information seeking purposes might help enhance the quality of care rendered to patients. Nonetheless, hospitals should find this recommendation as a temporary solution, and they should strive to come up with a long-term solution of providing nurses with appropriate technologies that can reduce nurses' reliance on their smartphones. Until this happens, it will be inevitable for nurses not to use their smartphones for work purposes considering that they have the necessary skills to use it to facilitate work and improve the quality of care rendered to patients.

This research sheds light on how and why nurses use their smartphones for work purposes. It also uncovered issues and an outcome of its use based on the perspective of staff nurses and nurse administrators. Overall, the theory-based findings and recommendations of this research can be used to better inform policies on the use of smartphones among those working in healthcare and non-healthcare occupations.

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APPENDICES

Appendix A. Exploratory Study IRB Approval

NANYANG TECHNOLOGICAL UNIVERSITY

Research Support Office

Reg. No. 200604393R

IRB-2015-05-013

30 June 2015

Assistant Professor Lin Tsui-Chuan, Trisha
Wee Kim Wee School of Communication and Information

NTU INSTITUTIONAL REVIEW BOARD APPROVAL
Project Title: An exploratory study on the role of mobile phones to nursing practice in the Philippines: Understanding motivators, usage and impact
(Amount Approved: SGD$300; to be funded by Faculty Starfund)

I refer to your application for ethics approval with respect to the above project.

The Board has deliberated on your application and noted from your application that your research involves collecting behavioral data from participants through interviews.

You have also confirmed that informed consent will be obtained from the participants and you have guaranteed the confidentiality of your participants' biodata obtained from them.

The documents reviewed are:

a) NTU IRB application form dated **11 May 2015**
b) Participant information sheet and consent form: version 1 dated **11 May 2015**
c) Data collection form: version 1 dated **11 May 2015**

The Board is therefore satisfied with the bioethical consideration for the project and approves the ethics application under **Expedited** review. The approval period is from **30 June 2015** to **29 June 2016**. The NTU IRB reference number for this study is **IRB-2015-05-013**. Please use this reference number for all future correspondence.

The following protocol and compliances are to be observed upon NTU IRB approval

1. All research involving procedures greater than minimal risk on minors (individuals who are less than the legal age of 21 years old) requires IRB approved written Parental Consent and assent from the participant to be obtained before any research protocols can be administered. Minimal risk refers to an anticipated level of harm and discomfort that is no greater than that ordinarily encountered in daily life, or during the performance of routine educational, physical, or psychological examination.

2. Only the approved Participants Information Sheet and Consent Form should be used. It must be signed by each subject prior to initiation of any protocol procedures. In addition, each subject should be given a copy of the signed consent form.

Blk N2.1, B4-01, 76 Nanyang Drive, Singapore 637331 Nanyang Avenue, Singapore 639798
Tel : +65 6791 9857, Fax: 6793 2019
www.ntu.edu.sg

3. Consent forms are important documents therefore they should be stored in the strictest arrangement. Loss of consent form would result in disciplinary action.

4. No deviation from, or changes of, the protocol should be initiated without prior written NTU IRB approval of an appropriate amendment.

5. The Principal Investigator should report promptly to NTU IRB regarding:
   a. Deviation from, or changes to the protocol.
   b. Changes increasing the risk to the subjects and/or affecting significantly the conduct of the trial
   c. All serious adverse events (SAEs) which are both serious and unexpected.
   d. New information that may affect adversely the safety of the subjects of the conduct of the trial.
   e. Completion of the study.

6. Continuing Review Request/ Notice of Study completion form should be submitted to NTU IRB for the following:
   a. Annual review: Status of the study should be reported to the NTU IRB at least annually using the Continuing Review Request/ Notice of Study completion form.
   b. Study completion or termination: Continuing Review Request/ Notice of Study completion form is to be submitted within 4 to 6 weeks of study completion or termination.

7. All Principal Investigators should comply with existing legislation that would have an impact on the domain of their research.

Professor Lee Sing Kong,
Chair, NTU Institutional Review Board
encl.

cc Chair, Wee Kim Wee School of Communication and Information
Members, NTU Institutional Review Board

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Appendix B. Informed Consent Form for Exploratory Study

Wee Kim Wee School of Communication and Information IRB Reg. No: IRB-2015-05-013

INFORMED CONSENT FORM

Dear {interviewee}:

We are researchers from the Wee Kim Wee School of Communication and Information at Nanyang Technological University. Our study aims to understand how nurses use their mobile phone for work purposes in the Philippines. We will ask for your cooperation for an interview. Your time spent on the interview will be around one to two hours. We will audio record your interview to accurately capture your remarks. No part of this audio file will be presented to the public. We may have follow-up with you for clarification regarding what you have said in this interview.

Data collected from your interview will be used for research purposes only. Only our research group will have access to the data. Although your statements may be quoted as answers to the research questions in research presentations or publication, please be assured that your identity and the hospital where you are currently working will be kept confidential. There are no foreseen risks associated with participating in this study. As the participation is voluntary, you have the right to terminate the interview at any time when you feel uncomfortable. As a sign of appreciation for you time, we will provide you with a Starbucks gift certificate worth PHP200 at the end of the interview.

Further Information:
This study is approved by the NTU-Institutional Review Board (IRB). If you have any questions about the study or your rights as a participant, feel free to contact the researchers (John Robert R. Bautista or his supervisor, Dr. Trisha T. C. Lin) or a representative of the IRB (irb@ntu.edu.sg, or at +65 65922495).

Thank you so much for your time and effort. We highly appreciate your great help in this research project. If you have any question/concern, please contact the researcher/interviewer:

Asst. Prof. Trisha T.C. Lin, PhD
Assistant Professor
Wee Kim Wee School of
Communication and Information
Nanyang Technological University

Email: TRISHALIN@ntu.edu.sg
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Office: 02-02

John Robert R. Bautista, RN, MPH
PhD Student
Wee Kim Wee School of
Communication and Information
Nanyang Technological University

Email: JOHN0028@e.ntu.edu.sg
Phone: (+65) 6790 6451
Office: 04-19

Statement of Consent:
By signing below, I acknowledge that I have read the above information and I am willing to participate in this study.

Name of Participant: _____

Email Address: _____

Signature & Date: _____

Appendix C. Interview Guide for Exploratory Study

I. For staff nurses

A. General mobile phone use

1. What kind of mobile phone do you use? (Smartphone or Feature phone)
2. How many years have you been using a mobile phone?
3. On average, how much do you spend for your subscription every month?
4. Does your mobile phone have data plan to get on internet? If yes, describe your usage of the mobile internet. If not, why not? And do you use WiFi to get online via mobile? How is your usage?
5. What kinds of mobile phone activities that you use most? How? (Below is the list of mobile activities for reference):
    a. Sending/receiving SMS messages?
    b. Sending/receiving messages from instant messaging apps (e.g., Viber, Line, Whatsapp, etc.)
    c. Accessing the internet to search for information?
    d. Sending/receiving email?
    e. Checking social media (i.e., Facebook, Instagram, Twitter, etc.)?
    f. Listening to music (online and offline)?
    g. Watching videos (online and offline)?
6. How dependent are you to the mobile phones as a whole? You rely on it more for personal or professional purposes? Kindly explain why?

B. Mobile phone use for work purposes while on-duty

1. Does your hospital provide any mobile technology for nurses to use? If there is any, can you share some information about it?
2. Do you carry your own mobile phone while on duty (e.g., placed in one's pocket)? Is this allowed by the hospitals? Why?
3. Please share with me your experiences of using mobile phone for work purposes while you are on duty?
    a. Explore potential clinical communication among fellow nurses and other members of the healthcare team.
    b. Explore potential communication to patients
    c. Explore use for obtaining relevant information (e.g., drug information, lab details, etc.)
    d. Explore use of apps for patient care (e.g., calculator, nursing e-books; ask permission to see related apps that are installed in their mobile phone)
    e. Explore other experiences if needed
4. Among them, which mobile phone activities do you use most for work purposes? How? Please elaborate.
5. What motivates you to use mobile phones for work purposes while on duty? Kindly elaborate them.
    a. Explore characteristics of mobile phone (relative advantage, compatibility, complexity, observability, and trialability)
    b. Explore use of other nurses
    c. Explore facilitation of timely communication (urgency)
6. Ask for other motivators: Is there anything that makes you reluctant or unwilling to use mobile phones for work purposes while on duty? Kindly elaborate them.
    a. Explore distraction
    b. Explore infection control
    c. Explore privacy concerns
    d. Explore unsupportive hospital policy
    e. Ask for other barriers
7. In general, do you think that using your mobile phone for work purposes while on duty has the potential to improve:
    a. Job satisfaction (please elaborate)
    b. Work management (please elaborate)
    c. Patient safety (please elaborate)
    d. Other factors (please elaborate)

8. Are you familiar with guidelines or policies about using mobile phones at work in your hospital? What are the rationales behind the rules?
9. What are the responses of nurses toward the mobile phone usage policies?
10. Did you notice any nurse who broke the rules? If yes, why? What is your attitude toward it?
11. Anything in the policy to be improved?
12. Will you continue (increases the usage or reduce the usage) to use your mobile phone for work purposes while on duty? Why?
13. Do you have any other insights that you want to share with me? Please feel free to share anything.
14. Do you have any comments or suggestions about this interview?

Thank you for your time!

II. For charge nurses and nurse managers

1. Please share with us any existing mobile technologies/infrastructure utilised in your hospital? If none, do you have any plans to acquire such technologies?
2. Does your hospital provide any mobile technology for nurses to use? If there is any, can you share some information about it?
    a. If nothing, ask for future plans.
2. Can you tell me if there is a policy on mobile phone use of nurses while they are on duty? If there is any, can you share some information about it? (If nothing, ask for future plans.)
   If yes, then:
    a. What kinds of guidelines and policies of using mobile phones at work in your hospital? What are the rationales behind the rules?
    b. To what extent can nurses use their mobile phones for work in your hospital?
    c. In your observation, what kinds of mobile activities (e.g., texting, search information) do they use most and how? Please share your observation.
    d. What are the responses of nurses toward the mobile phone usage policies? Any resistance or complaint? Why?
    e. Did you notice any nurse who broke the rules? If yes, why? What is your attitude toward it?
    f. Anything in the policy that can be improved?
3. As staff nurses' superior, what are some implications when nurses use mobile phones for work purposes?
    a. Job performance (efficiency, effectiveness, productivity, satisfaction)
    b. Work management (please elaborate)
    c. Patient safety (please elaborate)
    a. Explore distraction
    b. Explore infection control
    c. Explore privacy concerns
    d. Any other implications (positive and negative)
4. What do you think are some instances that it is acceptable/unacceptable for nurses to use mobile phones while they are on duty? Please share a situation that it occurred in the hospital.
5. Do you have any other insights that you want to share with me? Please feel free to share anything.
6. Do you have any comments or suggestions about this interview?

Thank you for your time!

Appendix D. Study I and Study II IRB Approval

NANYANG TECHNOLOGICAL UNIVERSITY

Research Support Office

Reg. No. 200604393R

IRB-2016-09-003

08 December 2016

Professor Theng Yin Leng
Wee Kim Wee School of Communication and Information

NTU INSTITUTIONAL REVIEW BOARD APPROVAL
Project Title: Predictors and outcomes of nurses' use of personal mobile phones at work: An empirical study in the Philippines

I refer to your application for ethics approval with respect to the above project.

The Board has considered your application and noted from your application that your research involves collecting behavioral data from participants using surveys and interviews.

You have also confirmed that informed consent will be obtained from the participants and you have guaranteed the confidentiality of your participants' biodata obtained from them.

The documents reviewed are:

a) NTU IRB application form dated **09 November 2016**
b) Participant information sheet and consent form: version 1 dated **09 November 2016**
c) Data collection form: version 1 dated **09 November 2016**

The Board is therefore satisfied with the bioethical consideration for the project and approves the ethics application under **Expedited** review. The approval period is from **08 December 2016** to **31 July 2018**. The NTU IRB reference number for this study is **IRB-2016-09-003**. Please use this reference number for all future correspondence.

The following protocol and compliances are to be observed upon NTU IRB approval

1. All research involving procedures greater than minimal risk on minors (individuals who are less than the legal age of 21 years old) requires IRB approved written Parental Consent and assent from the participant to be obtained before any research protocols can be administered. Minimal risk refers to an anticipated level of harm and discomfort that is no greater than that ordinarily encountered in daily life, or during the performance of routine educational, physical, or psychological examination.

2. Only the approved Participants Information Sheet and Consent Form should be used. It must be signed by each subject prior to initiation of any protocol procedures. In addition, each subject should be given a copy of the signed consent form.

Blk N2.1, B4-01, 76 Nanyang Drive, Singapore 637331 Nanyang Avenue, Singapore 639798
Tel : +65 6791 9857, Fax: 6793 2019
www.ntu.edu.sg

3. Consent forms are important documents therefore they should be stored in the strictest arrangement. Loss of consent form would result in disciplinary action.

4. No deviation from, or changes of, the protocol should be initiated without prior written NTU IRB approval of an appropriate amendment.

5. The Principal Investigator should report promptly to NTU IRB regarding:
   a. Deviation from, or changes to the protocol.
   b. Changes increasing the risk to the subjects and/or affecting significantly the conduct of the trial
   c. All serious adverse events (SAEs) which are both serious and unexpected.
   d. New information that may affect adversely the safety of the subjects of the conduct of the trial.
   e. Completion of the study.

6. Continuing Review Request/ Notice of Study completion form should be submitted to NTU IRB for the following:
   a. Annual review: Status of the study should be reported to the NTU IRB at least annually using the Continuing Review Request/ Notice of Study completion form.
   b. Study completion or termination: Continuing Review Request/ Notice of Study completion form is to be submitted within 4 to 6 weeks of study completion or termination.

7. All Principal Investigators should comply with existing legislation that would have an impact on the domain of their research.

Professor Lionel Lee
Chair, NTU Institutional Review Board
encl.

cc Members, NTU Institutional Review Board

Blk N2.1, B4-01, 76 Nanyang Drive, Singapore 637331 Nanyang Avenue, Singapore 639798
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www.ntu.edu.sg

Appendix E. Informed Consent Form for Study I

Wee Kim Wee School of Communication and Information

INFORMED CONSENT

Please read this consent agreement carefully. You must be 21 or older to participate.

Title of the Project: PREDICTORS AND OUTCOMES OF NURSES' USE OF PERSONAL MOBILE PHONES AT WORK: AN EMPIRICAL STUDY IN THE PHILIPPINES

Purpose of the research: The purpose of this research is to understand how and why staff nurses in the Philippines use their mobile phones at work for work purposes. This research is conducted under the supervision of Dr. Theng Yin Leng and Dr. Sonny Ben Rosenthal of the Wee Kim Wee School of Communication and Information, Nanyang Technological University.

Eligibility: You must be 21 years old and above to take part in this study. You must also be a Registered Nurse working as a full-time staff nurse in a hospital located in Metro Manila, Philippines for more than a year.

What you will do in this study: We will need you to answer several survey questions. A preliminary test of the survey suggests that it will take you about 15 minutes to finish the survey.

Risks: There are no anticipated risks associated with participating in this study.

Compensation: You will receive PHP100.00 for your participation in this study.

Voluntary Withdrawal: Your participation in this study is completely voluntary, and you may withdraw from the study at any time without penalty. However, it is important to us that you fully answer as many questions as possible. You may skip any questions, or you may withdraw by informing the researcher that you no longer wish to participate. You will not be questioned in case you decide to withdraw. Your decision to participate, decline, or withdraw participation will have no effect on your status or relationship with the Nanyang Technological University.

Confidentiality: Your participation in this study will remain anonymous. All data and consent forms will be stored in safe keeping. Results of this study may be presented at conferences and/or published in print or online media.

Further Information: If you have questions about the study or your rights as a participant in this study, please contact John Robert R. Bautista, RN, MPH (john0028@e.ntu.edu.sg) or his supervisors, Dr. Theng Yin Leng (tyltheng@ntu.edu.sg) and Dr. Sonny Ben Rosenthal (sonnyrosenthal@ntu.edu.sg).

Who to contact about your rights in this study:
You can email the School's Research Integrity Point of Contact at WKWSCI-IRB@ntu.edu.sg or call (+65) 6792 7526. Likewise, you can also email the University Research Integrity Point of Contact at IRB@ntu.edu.sg.

Thank you so much for your time and effort. We highly appreciate your great help in this research project.

Agreement:
The purpose and nature of this research have been sufficiently explained and I agree to participate in this study. I understand that I am free to withdraw at any time without incurring any penalty.

Signature: _____ Date: _____

Appendix F. Survey Form for Study I

Control No: _____

Nurses' use of personal mobile phones study

Instructions: Thank you for participating in this study. Please read the instructions carefully and select the response that best describes your answer. Remember that there is no right or wrong answer in this survey. This survey has five parts and you are likely to complete this in about 15 minutes. Please make sure that no questions are left unanswered. *You will receive PHP 100 after completing this survey.*

PART 1. DEMOGRAPHICS

1. Gender: ___ Male ___ Female

2. Age (in years): _____

3. Current educational status:
   ___ BSN degree holder
   ___ Currently enrolled in a master's degree program
   ___ Master's degree holder
   ___ Currently enrolled in a doctoral degree program
   ___ Doctorate degree holder

PART 2. WORK BACKGROUND

4. How many years have you been assigned as a staff nurse in your current hospital? ___ years

5. Kindly indicate the kind of hospital where you work. ____ government _____ private

6. How many patients did you handle during your last shift? _____ patients

7. How much is your net monthly salary (after tax and benefit deductions)?
   ___ Less than PHP 10,000
   ___ PHP 10,000 – 14,999
   ___ PHP 15,000 – 19,999
   ___ PHP 20,000 – 24,999
   ___ PHP 25,000 and above

8. Details on your current nursing unit/area
   8A. At which nursing unit/area are you currently assigned?
   _____ Wards (general, medical, surgical, ob-gyne, pediatric, infectious disease, etc.)
   _____ Outpatient, ancillary or ambulatory care
   _____ Emergency department
   _____ Intensive or critical care unit (adult, cardiovascular, neurological, etc.)
   _____ Operating room, recovery room, post-anesthesia care unit, delivery room
   _____ Other, please specify: _____

   8B. Kindly indicate if your hospital management provides you with the following devices in your current nursing unit/area:

1. Feature phone (a phone that has a small screen with physical keypad; not touchscreen)	NO	YES
2. Smartphone (a touchscreen phone that runs on Android, iOS or Windows OS)	NO	YES

9. Please select the answer that best describes your perception of the following statements:

	Poor	Fair	Good	Very Good	Excellent
1. In general, how would you describe the quality of nursing care delivered to patients in your unit?	1	2	3	4	5
2. How would you describe the quality of nursing care that you have delivered on your last shift?	1	2	3	4	5
3. The quality of care that you have provided over the previous year has been…	1	2	3	4	5

PART 3. MOBILE PHONE OWNERSHIP

10. You currently own… ___ 1 mobile phone ___ 2 or more mobile phones

11. What is/are your current mobile phone(s)?
    ___ Feature phone (a phone that has a small screen with physical keypad)
    ___ Smartphone (a touchscreen phone that runs on Android, iOS or Windows)

12. What is/are your current mobile phone subscription(s)?
    ___ Prepaid subscription ___ Postpaid subscription

13. How much is your overall monthly expenses for your mobile phone(s)?
    ___ Less than PHP 500
    ___ PHP 500 – 999
    ___ PHP 1,000 – 1,499
    ___ PHP 1,500 – 1,999
    ___ PHP 2,000 and above

PART 4. MOBILE PHONES USE AT WORK DURING THE PREVIOUS MONTH
Instruction: The following questions ask about your use of **YOUR OWN MOBILE PHONE AT WORK DURING THE PAST MONTH.**

14. How often did you use your own mobile phone at work to engage with **NURSES** for the following communication activities?

	Never	Almost never	Sometimes	Most of the time	All of the time
1. Making work-related calls	1	2	3	4	5
2. Exchanging work-related text messages via SMS[1]	1	2	3	4	5
3. Exchanging work-related text messages via instant messaging apps[2]	1	2	3	4	5
4. Exchanging work-related images via instant messaging apps	1	2	3	4	5
5. Exchanging work-related videos via instant messaging apps	1	2	3	4	5
6. Asking for clinical information	1	2	3	4	5

[1] SMS refers to short message service, the usual way of sending text messages in the Philippines.
[2] Some examples of instant messaging apps include Viber, Facebook Messenger, Line, We Chat, etc.

15. How often did you use your own mobile phone at work to engage with **MEDICAL DOCTORS** for the following communication activities?

	Never	Almost never	Sometimes	Most of the time	All of the time
1. Making work-related calls	1	2	3	4	5
2. Exchanging work-related text messages via SMS	1	2	3	4	5
3. Exchanging work-related text messages via instant messaging apps	1	2	3	4	5
4. Exchanging work-related images via instant messaging apps	1	2	3	4	5
5. Exchanging work-related videos via instant messaging apps	1	2	3	4	5
6. Asking for clinical information	1	2	3	4	5

16. How often did you use your own mobile phone at work to engage with **PATIENTS or PATIENTS' GUARDIAN(S)** for the following communication activities?

	Never	Almost never	Sometimes	Most of the time	All of the time
1. Making work-related calls	1	2	3	4	5
2. Exchanging work-related text messages via SMS	1	2	3	4	5

17. How often did you use your own mobile phone at work to search for clinical information from the following sources?

	Never	Almost never	Sometimes	Most of the time	All of the time
1. Clinical reference apps[1]	1	2	3	4	5
2. Websites[2]	1	2	3	4	5
3. E-books saved on your own mobile phone	1	2	3	4	5

[1]Some clinical reference apps include WebMD, Epocrates, Medscape, etc.
[2]Some websites include Google, WebMD, Medscape, etc.

18. How often did you use your own mobile phone at work for the following clinical documentation activities?

	Never	Almost never	Sometimes	Most of the time	All of the time
1. Using mobile apps to document patient care such as creating notes, reminders or checklists	1	2	3	4	5
2. Taking a picture of patient outcomes like wounds, ECG tracing, X-ray films, skin rashes, etc.	1	2	3	4	5
3. Taking a picture of the patient's chart	1	2	3	4	5

19. How often did you use your own mobile phone at work for the following activities?

	Never	Almost never	Sometimes	Most the time	All of the time
1. Making non-work-related phone calls	1	2	3	4	5
2. Exchanging non-work-related text messages	1	2	3	4	5
3. Browsing websites not related to work	1	2	3	4	5
4. Accessing social media	1	2	3	4	5
5. Playing mobile games	1	2	3	4	5
6. Listening to music	1	2	3	4	5
7. Watching videos not related to work	1	2	3	4	5

PART 5: MOBILE PHONE USE AT WORK DURING THE NEXT MONTH
Instruction: The following questions ask about your use of your own mobile phone at work during the **NEXT MONTH.**

20. How often will you use your own mobile phone at work to engage with **NURSES** for the following communication activities?

	Never	Almost never	Sometimes	Most of the time	All of the time
1. Making work-related calls	1	2	3	4	5
2. Exchanging work-related text messages via SMS	1	2	3	4	5
3. Exchanging work-related text messages via instant messaging apps	1	2	3	4	5
4. Exchanging work-related images via instant messaging apps	1	2	3	4	5
5. Exchanging work-related videos via instant messaging apps	1	2	3	4	5
6. Asking for clinical information	1	2	3	4	5

21. How often will use your own mobile phone at work to engage with **PATIENTS' GUARDIAN(S)** for the following communication activities?

	Never	Almost never	Sometimes	Most of the time	All of the time
1. Making work-related calls	1	2	3	4	5
2. Exchanging work-related text messages via SMS	1	2	3	4	5

22. How often will you use your own mobile phone at work to engage with **MEDICAL DOCTORS** for the following communication activities?

	Never	Almost never	Sometimes	Most of the time	All of the time
1. Making work-related calls	1	2	3	4	5
2. Exchanging work-related text messages via SMS	1	2	3	4	5
3. Exchanging work-related text messages via instant messaging apps	1	2	3	4	5
4. Exchanging work-related images via instant messaging apps	1	2	3	4	5
5. Exchanging work-related videos via instant messaging apps	1	2	3	4	5
6. Asking for clinical information	1	2	3	4	5

23. How often will you use your own mobile phone at work to search for clinical information from the following sources?

	Never	Almost never	Sometimes	Most of the time	All of the time
1. Clinical reference apps	1	2	3	4	5
2. Websites	1	2	3	4	5
3. E-books saved on your own mobile phone	1	2	3	4	5

24. How often will you use your own mobile phone at work for the following clinical documentation activities?

	Never	Almost never	Sometimes	Most of the time	All of the time
1. Using mobile apps to document patient care such as creating notes, reminders or checklists	1	2	3	4	5
2. Taking a picture of patient outcomes like wounds, ECG tracing, X-ray films, skin rashes, etc.	1	2	3	4	5
3. Taking a picture of the patient's chart	1	2	3	4	5

25. Please select a number that most accurately reflects your response to this statement:
Using my own mobile phone at work for work purposes would be…

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1. useful	1	2	3	4	5
2. necessary	1	2	3	4	5
3. distracting	1	2	3	4	5
4. helpful	1	2	3	4	5
5. inexpensive	1	2	3	4	5
6. unhygienic	1	2	3	4	5

26. Please select a number that most accurately reflects your response to this statement:
Using my own mobile phone at work for work purposes would be…

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1. a good idea	1	2	3	4	5
2. professional	1	2	3	4	5
3. pleasant	1	2	3	4	5
4. acceptable	1	2	3	4	5
5. ethical	1	2	3	4	5

27. For the following statements, please indicate how much you agree or disagree.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1. It will be very easy for me to use my own mobile phone at work for work purposes.	1	2	3	4	5
2. If I wanted to, I could easily use my own mobile phone at work for work purposes.	1	2	3	4	5
3. Using my own mobile phone at work for work purposes is completely up to me.	1	2	3	4	5
4. I feel in complete control over using my own mobile phone at work for work purposes.	1	2	3	4	5

28. For the following statements, please indicate how much you agree or disagree that the following people would **ALLOW** you to use your own mobile phone at work for work purposes.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1. Hospital management	1	2	3	4	5
2. Immediate nursing superiors	1	2	3	4	5
3. Fellow staff nurses	1	2	3	4	5
4. Medical doctors	1	2	3	4	5

29. For the following statements, please indicate how much you agree or disagree that the following people would **EXPECT** you to use your own mobile phone at work for work purposes.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1. Hospital management	1	2	3	4	5
2. Immediate nursing superiors	1	2	3	4	5
3. Fellow staff nurses	1	2	3	4	5
4. Medical doctors	1	2	3	4	5

30. How often **DO YOU THINK THAT THE FOLLOWING PEOPLE WILL USE THEIR OWN MOBILE PHONE** at work for work purposes?

	Never	Almost never	Sometimes	Most of the time	All of the time
1. Immediate nursing superiors	1	2	3	4	5
2. Fellow staff nurses	1	2	3	4	5
3. Medical doctors	1	2	3	4	5

THANK YOU FOR PARTICIPATING IN THIS SURVEY!

Appendix G. 3K Grant Award

NANYANG TECHNOLOGICAL UNIVERSITY

Wee Kim Wee School of Communication and Information

26 September 2016

Dear John Robert Razote Bautista:

The Wee Kim Wee School of Communication and Information - Research Office is pleased to inform you that your application for 3K Grant entitled, *Predictors And Outcomes Of Nurses' Use Of Personal Mobile Phones At Work: An Empirical Study In The Philippines*, under the supervision of Prof Theng Yin Leng , has been approved in the amount of $2,995.10. Please refer to the table below for the breakdown:

Item	Amount Requested ($)	Amount Awarded ($)
Manpower	0	0
Materials and Consumables	126.50	126.50
Other Costs	1,868.60	1,868.60
Travel Cost	1,000.00	1,000.00
Total	2,995.10	2,995.10

Please let us know your acceptance of this grant by appending your signature on the attached Letter of Acceptance. You will be duly notified as soon as the account has been activated. Please note that as per University guideline, the account will be created under your supervisor's name. We strongly advise NOT to incur any expenses until you receive a notification of the account activation; otherwise, you will not be reimbursed for your expenses.

Please print and sign the attached Letter of Acceptance and send to the WKWSCI Research Office within three days upon receipt of this email.

Sincerely,

Dr. Benedict P. Agulto
Research Manager
WKWSCI Research Office

Appendix H. Descriptive Results and Factor Loadings

Nurses' use of smartphones for work purposes: Communication *1 (Never) – 5 (All of the time)*	*M*	*SD*	*N*	*Factor loading*
1. Making work-related calls with nurses	3.28	.97	517	.85
2. Exchanging work-related text messages via SMS with nurses	3.36	.98	517	.81
3. Exchanging work-related text messages via instant messaging apps with nurses	2.85	1.15	516	.74
4. Exchanging work-related images via instant messaging apps with nurses	2.37	1.12	517	.86
5. Exchanging work-related videos via instant messaging apps with nurses	1.96	1.03	517	.80
6. Making work-related calls with doctors	3.10	1.20	516	.76
7. Exchanging work-related text messages via SMS with doctors	3.27	1.18	516	.82
8. Exchanging work-related text messages via instant messaging apps with doctors	2.07	1.11	516	.80
9. Exchanging work-related images via instant messaging apps with doctors	1.84	1.00	516	.94
10. Exchanging work-related videos via instant messaging apps with doctors	1.62	.88	517	.85
11. Making work-related calls with patients/guardians	2.02	1.08	517	.91
12. Exchanging work-related text messages via SMS with patients/guardians	1.97	1.10	516	.93
Nurses' use of smartphones for work purposes: Information seeking *1 (Never) – 5 (All of the time)*	*M*	*SD*	*N*	*Factor loading*
1. Asking for clinical information to nurses	2.95	1.08	517	Dropped
2. Asking for clinical information to doctor	2.58	1.22	516	Dropped
3. Clinical reference apps	2.86	1.03	514	.91
4. Websites	2.94	1.06	513	.85
5. E-books saved on your own mobile phone	2.37	1.12	515	.68
Nurses' use of smartphones for work purposes: Documentation *1 (Never) – 5 (All of the time)*	*M*	*SD*	*N*	*Factor loading*
1. Using mobile apps to document patient care such as creating notes, reminders or checklists	2.00	1.01	516	Dropped
2. Taking a picture of patient outcomes like wounds, ECG tracing, X-ray films, skin rashes, etc.	2.19	1.08	516	Dropped
3. Taking a picture of the patient's chart	1.72	.96	516	Dropped
Intention: Communication *1 (Never) – 5 (All of the time)*	*M*	*SD*	*N*	*Factor loading*
1. Making work-related calls with nurses	3.24	.93	515	.85
2. Exchanging work-related text messages via SMS with nurses	3.29	.91	515	.79
3. Exchanging work-related text messages via instant messaging apps with nurses	2.78	1.11	513	.69
4. Exchanging work-related images via instant messaging apps with nurses	2.39	1.09	514	.70
5. Exchanging work-related videos via instant messaging apps with nurses	2.07	1.01	515	.62
6. Making work-related calls with doctors	3.04	1.10	517	.75
7. Exchanging work-related text messages via SMS with doctors	3.10	1.13	516	.77
8. Exchanging work-related text messages via instant messaging apps with doctors	2.16	1.11	515	.92

9. Exchanging work-related images via instant messaging apps with doctors	1.97	1.06	517	.81
10. Exchanging work-related videos via instant messaging apps with doctors	1.80	.98	517	.91
11. Making work-related calls with patients/guardians	2.09	1.09	517	.98
12. Exchanging work-related text messages via SMS with patients/guardians	2.05	1.09	517	.93
Intention: Information seeking *1 (Never) – 5 (All of the time)*	*M*	*SD*	*N*	*Factor loading*
1. Asking for clinical information to nurses	2.79	1.12	514	Dropped
2. Asking for clinical information to doctor	2.49	1.22	517	Dropped
3. Clinical reference apps	2.90	1.06	516	.91
4. Websites	2.96	1.10	516	.86
5. E-books saved on your own mobile phone	2.39	1.13	516	.68
Intention: Documentation *1 (Never) – 5 (All of the time)*	*M*	*SD*	*N*	*Factor loading*
1. Using mobile apps to document patient care such as creating notes, reminders or checklists	2.17	1.12	517	Dropped
2. Taking a picture of patient outcomes like wounds, ECG tracing, X-ray films, skin rashes, etc.	2.21	1.10	517	Dropped
3. Taking a picture of the patient's chart	1.81	.98	517	Dropped
Instrumental attitude *1 (Strongly disagree) – 5 (Strongly agree)*	*M*	*SD*	*N*	*Factor loading*
1. Useful	4.24	.84	517	.85
2. Necessary	3.98	.91	517	.86
3. Distracting (Reverse coded)	3.16	.93	517	Dropped
4. Helpful	4.21	.72	516	.82
5. Inexpensive	2.99	1.00	516	Dropped
6. Unhygienic (Reverse coded)	3.20	.95	514	Dropped
Affective attitude *1 (Strongly disagree) – 5 (Strongly agree)*	*M*	*SD*	*N*	*Factor loading*
1. A good idea	3.72	.85	517	Dropped
2. Professional	3.44	.91	516	.89
3. Pleasant	3.43	.84	516	.85
4. Acceptable	3.77	.82	516	.93
5. Ethical	3.41	.85	517	.72
Injunctive norm *1 (Strongly disagree) – 5 (Strongly agree)*	*M*	*SD*	*N*	*Factor loading*
1. Hospital management	3.14	1.05	512	N.A.
2. Immediate nursing superiors	3.29	1.04	514	N.A.
3. Fellow staff nurses	3.74	.92	514	N.A.
4. Medical doctors	3.61	.96	514	N.A.
Descriptive norm *1 (Never) – 5 (All of the time)*	*M*	*SD*	*N*	*Factor loading*
1. Immediate nursing superiors	3.73	.81	515	N.A.
2. Fellow staff nurses	3.90	.78	516	N.A.
3. Medical doctors	4.13	.79	516	N.A.
Perceived behavioural control *1 (Strongly disagree) – 5 (Strongly agree)*	*M*	*SD*	*N*	*Factor loading*
1. It will be very easy for me to use my own mobile phone at work for work purposes.	3.83	.99	515	.81
2. If I wanted to, I could easily use my own mobile phone at work for work purposes.	3.86	.88	516	.87
3. Using my own mobile phone at work for work purposes is completely up to me.	3.83	.91	516	.67
4. I feel in complete control over using my own mobile phone at work for work purposes.	3.65	1.02	516	.71

Perceived organisational support *1 (Strongly disagree) – 5 (Strongly agree)*	*M*	*SD*	*N*	*Factor loading*
1. Hospital management	3.34	1.12	515	N.A.
2. Immediate nursing superiors	3.43	1.05	516	N.A.
3. Fellow staff nurses	3.86	.85	516	N.A.
4. Medical doctors	3.75	.95	516	N.A.
Perceived quality of care *1 (Poor) – 5 (Excellent)*	*M*	*SD*	*N*	*Factor loading*
1. In general, how would you describe the quality of nursing care delivered to patients in your unit?	4.11	.68	516	.81
2. How would you describe the quality of nursing care that you have delivered on your last shift?	4.19	.66	515	.84
3. The quality of care that you have provided over the previous year has been…	4.04	.64	516	.80
Non-work-related use of smartphones at work *1 (Never) – 5 (All of the time)*	*M*	*SD*	*N*	*Factor loading*
1. Making non-work-related phone calls	2.50	.89	516	.60
2. Exchanging non-work-related text messages	2.66	.90	515	.66
3. Browsing websites not related to work	2.40	.97	515	.92
4. Accessing social media	2.57	1.01	514	.90
5. Playing mobile games	1.75	.87	514	Dropped
6. Listening to music	2.22	1.13	516	Dropped
7. Watching videos not related to work	1.91	.93	516	.71

Appendix I. Informed Consent form for Study II

Wee Kim Wee School of Communication and Information

INFORMED CONSENT

Please read this consent agreement carefully. You must be 21 or older to participate.

Title of the Project: PREDICTORS AND OUTCOMES OF NURSES' USE OF PERSONAL MOBILE PHONES AT WORK: AN EMPIRICAL STUDY IN THE PHILIPPINES

Purpose of the research: The purpose of this research is to come up with several policy recommendations on nurses' use of personal mobile phones at work. This research is conducted under the supervision of Dr. Theng Yin Leng and Dr. Sonny Ben Rosenthal of the Wee Kim Wee School of Communication and Information, Nanyang Technological University.

Eligibility: You must be 21 or older to take part in this study. You must be working as a nurse administrator, medical doctor or hospital management personnel in a hospital located in Metro Manila, Philippines for more than a year.

What you will do in this study: You will need to answer several interview questions through a focus group discussion (FGD) among participants. We request to audio record the FGD to help generate a reliable transcript for data analysis. This FGD session will take about 1 hour.

Risks: There are no anticipated risks associated with participating in this study.

Compensation: You will receive a gift voucher worth PHP 200 for your participation in this study.

Voluntary Withdrawal: Your participation in this study is completely voluntary and you may withdraw from the study at any time without penalty. However, it is important to us that you fully answer as many questions as possible. You may skip any questions, or you may withdraw by informing the researcher that you no longer wish to participate. You will not be questioned in case you decide to withdraw. Your decision to participate, decline, or withdraw participation will have no effect on your status or relationship with the Nanyang Technological University.

Confidentiality: Your participation in this study will remain confidential, and your identity and of your hospital will not be associated with your data. Your responses will not be linked to your real name or other personal identification. All data and consent forms will be stored in safe keeping. Results of this study may be presented at conferences and/or published in print or online media.

Further Information: If you have questions about the study or your rights as a participant in this study, please contact John Robert R. Bautista, RN, MPH (john0028@e.ntu.edu.sg) or his supervisors, Dr. Theng Yin Leng (tyltheng@ntu.edu.sg) and Dr. Sonny Ben Rosenthal (sonnyrosenthal@ntu.edu.sg).

Who to contact about your rights in this study:
You can email the School's Research Integrity Point of Contact at WKWSCI-IRB@ntu.edu.sg or call (+65) 6792 7526. Likewise, you can also email the University Research Integrity Point of Contact at IRB@ntu.edu.sg.

Thank you so much for your time and effort. We highly appreciate your great help in this research project.

Agreement:
The purpose and nature of this research have been sufficiently explained and I agree to participate in this study. I understand that I am free to withdraw at any time without incurring any penalty.

Signature: _____ Date: _____

Appendix J. Focus Group Interview Guide for Study II

Part 1: Demographics and work background

1. Note details about the participants:
    - Gender
    - Age
    - Highest educational attainment
2. Note details on work background of participants:
    - Job position (e.g., nursing supervisor, medical doctor, etc.)
    - Years in current job position
    - Type of hospital category (government or private)

Part 2: Perceptions and attitudes on staff nurses' use of smartphones at work

3. Who among the members of the healthcare team (e.g., nurses, doctors, pharmacists, midwives, radiographers, medical technologists) in your hospital do you frequently see using a mobile phone at work? How do they use it?
4. What were the instances that you have seen staff nurses using their own mobile phones at work? How frequently do they use it at work? Kindly share your experience(s) and reactions about it.

Part 3: Work outcomes

5. What do you think would be the work-related impact of staff nurses' use of smartphones at work? Kindly explain why (explore both positive and negative).
6. Do you think that staff nurses' use of smartphones can affect the quality of care they provide to their patients? Kindly explain why (explore both positive and negative).

Part 4: Organisational support on the use of smartphones at work

7. What are the policies of your hospital about the use of mobile phones at work?
8. What are some issues that arise from the use of smartphones at work by nurses or other healthcare staff? Kindly share your insights about this.
9. Does your hospital provide mobile phones for healthcare staff? Why or why not?
10. Do you think there is a need to provide healthcare staff with shared mobile phones at work? Why or why not?
11. What are your suggestions or recommendations to hospital policies on healthcare professionals' use of smartphones at work?

Part 5: Concluding questions

12. Do you have any other insights that you want to share with me? Please feel free to share anything.
13. Do you have any comments or suggestions about this focus group discussion?

End of Focus Group Discussion

Thank you for your participation

Appendix K. Focus Group Notes Form

FGD Session Details

FGD Number: Number of participants:

_____

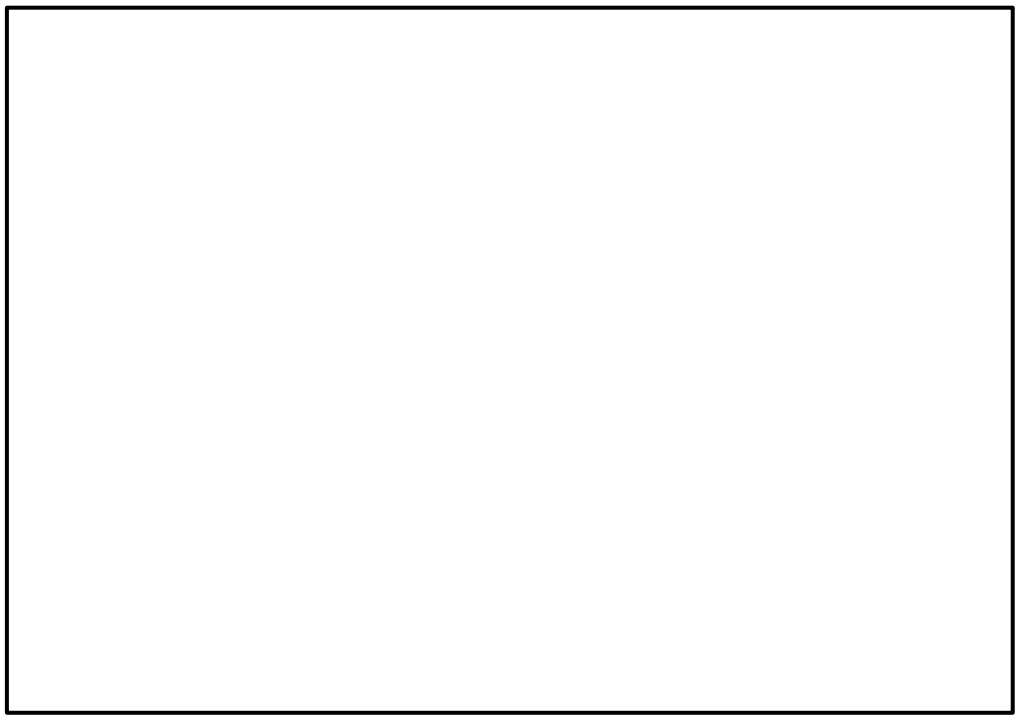
1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 Time start:

_____

Date: _____ Time end:

_____

FGD seating plan:



Notes:

_____

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Appendix L. List of Journal Articles and Conference Papers

Published journal articles (5)

1. **Bautista, J.R.** (2019). Filipino nurses' use of smartphones in clinical settings. *CIN: Computers, Informatics, Nursing, 37*(2):80-89. doi: 10.1097/CIN.0000000000000482 [5YR IF = 1.130]
2. **Bautista, J.R.**, Rosenthal, S., Lin, T.T.C., & Theng, Y.L. (2018). Psychometric evaluation of the *Smartphone for Clinical Work Scale* to measure nurses' use of smartphones for work purposes. *Journal of the American Medical Informatics Association, 25*(8), 1018-1025. doi: 10.1093/jamia/ocy044 [5yr IF = 4.337]
3. **Bautista, J.R.**, Rosenthal, S., Lin, T.T.C., & Theng, Y.L. (2018). Predictors and outcomes of nurses' use of smartphones for work purposes. *Computers in Human Behavior, 84*, 360-374. doi: 10.1016/j.chb.2018.03.008 [5yr IF = 4.417]
4. **Bautista, J.R.** & Lin, T.T.C. (2017). Nurses' use of mobile instant messaging applications: A uses and gratifications perspective. *International Journal of Nursing Practice, 23*(5), e12577. doi: 10.1111/ijn.12577 [5yr IF = 1.304]
5. **Bautista, J.R.** & Lin, T.T.C. (2016). Sociotechnical analysis of nurses' use of personal mobile phones at work. *International Journal of Medical Informatics, 95*, 71-80. doi: 10.1016/j.ijmedinf.2016.09.002 [5yr IF = 3.378]

Conference papers (9)

1. **Bautista, J.R.** (2019, March). Policy recommendations on the consumerization of smartphones in healthcare settings. Presented at the *5th NTU CoHASS Graduate Conference*. Singapore.
2. **Bautista, J.R.** (2019, January). To support or not support: Organizational issues faced by nurse administrators on nurses' use of smartphones for work purposes. Presented at the *41st Pacific Telecommunications Council Conference*. Honolulu, Hawaii. **[Presentation for the 2019 Pacific Telecommunications Council Young Scholar Program]**
3. **Bautista, J.R.**, Rosenthal, S., Lin, T.T.C., & Theng, Y.L. (2018, May). Predictors and outcomes of nurses' use of personal mobile phones for work purposes. Presented at the *68th International Communication Association Annual Conference*. Prague, Czech Republic. [**Top Paper in Mobile Communication]**
4. **Bautista, J.R.**, Rosenthal, S., Lin, T.T.C., & Theng, Y.L. (2018, May). Mobile Phone for Clinical Work Scale-Nurses (MPCWS-N): Development and psychometric evaluation. Presented at the *68th International Communication Association Annual Conference*. Prague, Czech Republic.
5. **Bautista, J.R.**, Theng, Y.L., & Rosenthal, S.B. (2017, July). Nurses' use of personal mobile phones at work: A multihospital study in the Philippines. Presented at the *NTHC@19: Bringing Digital Health Innovations to Scale and Beyond*. Manila, Philippines.

6. **Bautista, J.R.**, Lin, T.T.C., Theng, Y.L., & Rosenthal, S. (2016, November). Predicting hospital nurses' use of personal mobile phones at work: Towards a research model based on Theory of Planned Behavior & Organizational Support Theory. Presented at the *7th Honours Symposium for Asian PhD students in Communication Research*. Hong Kong, China.
7. **Bautista, J.R.** (2016, June). Nurses' use of social media: Perspectives from the Philippines. Presented at the *66th International Communication Association Annual Conference*. Fukuoka, Japan.
8. **Bautista, J.R.** & Lin, T.T.C. (2016, June). Predictors and impact of nurses' use of personal mobile phones at work: An empirical study in the Philippines. Presented at the *66th International Communication Association Annual Conference. Fukuoka, Japan*. **[One of the presentations for the top-ranked plenary proposal at the 2016 ICA Mobile Preconference]**
9. **Bautista, J.R.** & Lin, T.T.C. (2016, June). A sociotechnical analysis of staff nurses' use of personal mobile phones at work: Perspectives from the Philippines. Presented at the *66th International Communication Association Annual Conference*. Fukuoka, Japan.