RESEARCH UTILIZATION AMONG RURAL AND URBAN ACUTE CARE NURSES

A COMPARISON OF RESEARCH UTILIZATION AMONG RURAL AND URBAN NURSES WORKING IN ACUTE CARE SETTINGS

By PAULA LISA MASTRILLI, RN, BScN, MScN

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AUTHOR: Paula Mastrilli, RN, BScN, MScN (University of Toronto)

SUPERVISOR: Professor D. Ciliska

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ABSTRACT

The purposes of this study are to compare the differences in research utilization among rural and urban nurses working in acute care hospitals and to examine the individual and contextual factors that may be associated with the differences. A quantitative research designed was used to compare the responses of 220 nurses (109 rural and 111 urban) working in a Local Health Integrated Network in South West Ontario, Canada. Data were collected using a modified version of Estabrooks' (1997) self-report, mail-in, Research Utilization Survey. Results from the data analysis are discussed. Rural and urban nurses reported similar conceptual, instrumental, and persuasive research utilization (RU), with conceptual RU being the most commonly used form. However, rural nurses reported using overall RU significantly less than their urban counterparts did.

Rural nurses reported having less access to organizational champions and resources, such as library research journals and computers, than nurses in urban practice had. An analysis of the association between the individual and contextual variables and overall RU indicates that approximately 26% of variance in nurses' overall RU scores can be predicted from the variance in scores of the following variables: (a) positive RU attitude, (b) organizational relationships supportive of RU, (c) level of competence, and (d) location of nurses. The findings support a multi-dimensional conceptualization of RU and the merits of exploring individual factors as well as organizational and environmental context in future research, theory development, and implementation of strategies to promote RU among nurses.

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CHAPTER ONE

INTRODUCTION

Statement of the Problem

Within Canada's current health care climate, a strong emphasis is placed on the use of research knowledge to guide practice for the purpose of enhancing health outcomes (Canadian Health Services Research Foundation [CHSRF], 2009; Canadian Institute of Health Research [CIHR], 2004; Government of Canada, 2000). Contemporary knowledge translation theories and studies have identified factors (individual, organizational, and environmental) associated with the utilization of research knowledge in health care delivery (Meijers et al., 2006; Squires, Estabrooks, Gustavsson, & Wallin, 2011). Several conceptual models and frameworks have attempted to explain the relationship between these factors and knowledge translation in nursing. However, the applicability of these conceptual frameworks to rural nursing has not been well examined. Therefore, it is not clear whether the frameworks and the same factors associated with knowledge transfer are applicable in both rural and urban nursing practice settings.

There are studies that have demonstrated that the practice of nurses working in rural environments differed significantly from that of their urban counterparts (MacLeod, Misener, et al., 2008; MacPhee & Scott, 2002; Schofield, Page, Lyle, &Walker, 2006). Furthermore, these studies identified that individual nursing characteristics, organizational structures, and geographic location were amongst the factors that contributed to these practice differences (Andrews et al., 2005; Baumann, Hunsberger, Blythe, & Crea, 2006; Bushy 2005; MacLeod, Kulig, Stewart, & Pitblado 2004). Less

scholarly attention has been given to determining if the same factors may play role in differences in the utilization of research knowledge amongst rural and urban nurses.

The purpose of this study was to compare the extent to which rural and urban acute care nurses utilize research knowledge in their practice, and to explore select factors associated with its use by nurses in two settings (rural and urban). Specifically, this thesis focused on the following factors: (a) select individual characteristics of the nursing participants in this study, and (b) select aspects of their organizational and geographic contexts of practice. The findings enhance what is currently known about rural nurses' use of research knowledge in practice. The study results add to the knowledge available to nursing leaders, educators, and researchers who are interested in designing, testing and using strategies to promote the use of research knowledge in rural nursing practice settings. Increasing the use of research knowledge among rural nurses would contribute to enhancing the health care outcomes for people living in rural communities.

In this chapter, the context for the study is provided through a brief review of the literature related to (a) knowledge translation, (b) the knowledge-to-practice gap described in the literature, (c) the factors associated with knowledge translation and, (e) the factors associated with rural nursing practice. The rationale is presented for the importance of conducting a study to compare research knowledge utilization by rural and urban nurses. The research questions and factors examined are identified. The chapter concludes with a brief outline of the organization of the thesis.

Background

According to Straus, Tetroe, and Graham (2009), considerable confusion surrounds the definition and use of terms that describe the process of putting research knowledge into action. When McKibbon et al. (2010) attempted to create a search filter, they identified more than 90 terms that signified the *use of research knowledge* in health care. Commonly used terms included *implementation science*, *research utilization, dissemination and diffusion of knowledge, research use, knowledge transfer and exchange, and knowledge translation*. McKibbon and her colleagues also noted differences in how terms were used among publications from the United States, Canada, the United Kingdom, and Europe. In the Canadian literature, the terms knowledge transfer and exchange (KTE) and knowledge translation (KT) have been commonly used to signify the process of incorporating scientific findings into health care practice. CIHR (2004) defined KT as "a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system" (p. 4). Descriptive studies in this field have indicated that the KT phenomenon may involve many complex interrelated factors and processes (Cummings, Mallidou, & Scott-Findlay, 2004; Dobbins, 1999; Estabrooks, Scott, et al., 2008; Fineout-Overholt, Melnyk, & Schultz, 2005; Grol, Bosch, Hulschel, Eccles, & Wensing, 2007; Grol & Grimshaw, 2003; Hogan & Logan, 2004; Kitson, 2009; Newhouse, Dearholt, Poe, Pugh, & White, 2005; Rycroft-Malone & Stetler, 2004; Squires, Estabrooks, Gustavsson, et al., 2011; Thompson, Estabrooks, & Degner, 2006). Several theoretical frameworks

have emerged in the literature to enhance our understanding of this complex phenomenon (Dobbins, Ciliska, Cockerill, Barnsley, & DiCenso, 2002; Rosswurm & Larrabee, 1999; Rycroft-Malone, 2004; Stetler, 2001). In most of these models, the *use of research knowledge* in practice occurs in the implementation phase of the KT process. This study examined select factors associated with the use of research knowledge; therefore, the term *research utilization* (RU) was used to signify nurses' use of scientific knowledge.

Over the past three decades, both scholars and expert clinicians have contributed to developing the body of research knowledge available to guide changes in nursing practice (Estabrooks, 2004; Grimshaw, Santesso, Cumpston, Mayhew, & McGowan, 2006; Stetler, 1994). Evidence in the literature has supported the positive impact of translating research findings into the delivery of nursing care. The health outcomes directly affected by nursing care include clients' functional status, self-care, symptom control, safety/ lack of adverse occurrences, satisfaction, and health care costs (Fulmer et al., 2002; Irvine-Doran, Sidani, Keatings, & Doidge, 2002; Irvine-Doran, Sidani, & McGillis-Hall, 1998; Reilly, McIntosh, & Currie, 2002; Sidani & Epstein, 2003; Stetler, Ritchie, Rycroft-Malone, Schultz, & Charns, 2007). The use of research knowledge by interdisciplinary teams and policy development groups, in which nurses participate, has demonstrated to have positive effects on such client outcomes as decreased morbidity, mortality, length of stay, and readmission rates (Bradley, Schlesinger, Webster, Baker, & Inouye, 2004; Dykes, 2003; Heater, Becker, & Olson, 1988; Titler, Everett, & Adams, 2007; Titler et al., 2009; Titler, Mentes, Rakei, Abbott, & Baumler, 1999).

Despite the increased availability of research knowledge and the documented importance of translating this knowledge into practice, a significant knowledge-to-practice gap persists (Bonner & Sando, 2008; Graham & Tetroe, 2007; Kitson & Bisby, 2008; McCleary & Brown, 2003; Olade, 2004a; Rycroft-Malone, Harvey, et al., 2004). As a result, several nursing scholars have turned their attention towards addressing this gap (Cummings et al., 2004; Damshroder et al., 2009; Dopson, 2007; Estabrooks, Midodzi, Cummings, & Wallin; 2007; Estabrooks, Squires, Adachi, Kong, & Norton, 2008; Goode & Piedalue, 1999; Rassool, 2005; Stetler, 2003; Stetler, Ritchie, Rycroft-Malone, Schultz, & Charns, 2009; Titler et al., 1994). This focus of research has contributed to the development of theoretical models that identify the factors, processes, and strategies that may contribute to enhancing the translation of research knowledge in nursing (Mitchell, Fisher, Hastings, Silverman, & Wallen, 2010; Thompson, Estabrooks, Scott-Findlay, Moore, & Wallin, 2007). In a recent systematic review of the literature, Mitchell et al. (2010) identified 47 theoretical models that have been proposed to enhance understanding of the RU phenomenon among nurses. However, these models have been based on research that has been conducted primarily in university-affiliated and urban-based acute care settings. Few studies have explored research use or factors associated with its use among rural nurses. In those studies where regional samples have included rural nurses or health care professionals, little attention was given to examining differences that may have been reported by rural and urban participants. (Davies et al., 2007; Estabrooks, Kenny, Adewale, Cummings, & Mallidou, 2007; Estabrooks, Midodzi, et al., 2007; Estabrooks, Scott, et al., 2008).

Data collected on rural nursing indicated that approximately 12 % of all nurses in Canada live and work in rural settings (Canadian Institute for Health Information [CIHI], 2010), where individual nursing characteristics, and geographic and socio-cultural factors in the rural environment differ significantly from those of urban settings (Andrews et al., 2005; Bushy, 2005; Edge, 2006; Hunsberger, Bauman, Blythe, & Crea , 2009; Kulig et al., 2006; MacLeod, Kulig, Stewart, Pitblado, & Knock, 2004; Montour, Baumann, Blythe, & Hunsberger, 2009; Stewart et al., 2005).

A closer examination of the rural nursing literature suggests that many of the factors that have been associated with the knowledge-to-practice-gap in nursing (based primarily on the study of urban nurses) are prevalent among rural nurses. However, few studies have examined whether these factors are associated with lower RU among rural nurses. For example, it has been reported that rural nurses were less likely to possess a baccalaureate preparation and have less opportunities to participate in continuing education than nurses working in urban settings (CIHI, 2002; MacLeod, Kulig, Stewart, & Pitblado, 2004). Both of these factors have been reported as being significantly associated with lower levels of reported RU in the nursing literature because both are barriers to providing nurses with access to the knowledge and skills needed to become critical consumers of research findings (Czerwinski, Cesario, & Holt-Ashley, 2004; McCleary & Brown, 2003; McCloskey, 2005; Olade, 2004b; Tsai, 2003). However, little is known about the levels of RU among rural nurses or if these two factors are indeed significant barriers that are negatively associated with its use by rural nurses.

Rural nurses have been described as being more likely to have been born and raised within the communities, in which they work, often sharing the same history, attitudes, beliefs, and values as others living in their communities. As a result, rural nurses may have an intimate and indepth understanding of the health needs of their individual communities (Bushy, 2002; CIHI, 2002; Hegney, McCarthy, Rogers-Clarke & Gorman, 2002). One common concern voiced by rural nurses is the lack of understanding among administrators and policy-makers of the realities of rural practice. MacLeod, Kulig, Stewart, and Pitblado (2004) reported that "[t]oo frequently, rural and remote front-line nurses [felt] that they [were] peripheral to the decision making that [went] on about their work and work environments" (p.18). Because most of the current research was generated in urban-based research programs in collaboration with affiliated universities, with minimal consultation with rural nurses, they may be reluctant to discard their usual practices for new ones based on such evidence.

In contrast, the chronic shortage of physicians and other allied health professionals in most rural communities has contributed to reports of rural nurses becoming more resourceful, autonomous, and self-reliant than their urban counterparts when planning and delivering care (Andrews et al., 2005; Bushy, 2002, 2005; Estabrooks, Chong, Brigidear, & Profetto-McGrath, 2005; Kulig et al., 2006; Lee & Winters, 2004, 2006; MacLeod, Kulig, Stewart, & Pitblado, 2004; McCarthy & Hegney, 1998; McIntyre, Thomlinson, & McDonald, 2006; Tilleczek, Pong, & Caty, 2005). Autonomy and opportunity for decision making within nurses' professional roles are factors that have been positively associated with RU in the general evidence based literature (Bonner & Sando, 2008;

Estabrooks, Chong, & Birdsell, 2003; Forbes, Bott, & Taunton, 1997; McCloskey, 2005). Although several key differences associated with rural and urban contexts have been noted, further studies are needed to determine if similar associations exist between these factors and the translation of research knowledge into practice by nurses working in rural settings.

Significance of the Study

Since the positive impact of knowledge translation in promoting quality nursing care has been demonstrated, and since rural nurses have been identified as often being the initial point of contact and the primary health care provider, it is important to ascertain the relationship between the use of research-based knowledge into practice and the factors associated with rural nurses and their practice. Gains in knowledge and theory development about research utilization in nursing practice have been based primarily on studies conducted in urban contexts. Results from this study contribute to determining if differences exist among rural and urban nurses. The findings will help guide the development of strategies to enhance the use of research knowledge by nurses and determine if different approaches are required for nurses practicing in rural and urban acute health care settings. Additionally, recommendations for future theory development, research, and strategies for addressing research-to-practice gaps will contribute to promoting the quality of nursing care delivered in rural settings.

Research Questions

1. Are there differences in research utilization between acute care nurses working in rural and urban settings?
2. Are there differences in individual and contextual factors associated with research utilization among acute care nurses working in rural and urban settings?
3. What is the relationship between identified individual and contextual factors and research utilization among acute care nurses working in rural and urban settings?

Organization of the Thesis

The thesis has been organized into five chapters. The first chapter provides a background and rationale in support of the importance of this study. Chapter Two summarizes the literature related to the theoretical frameworks of RU in nursing practice, factors associated with RU, and factors associated with rural nursing. Instruments for measuring RU are also reviewed. The Promoting Action on Research Implementation in Health Services (PARiHS) model, which will serve as the conceptual framework for this investigation, is presented in order to explain the links between RU and the selected variables examined in this study (Kitson & Bisby, 2008). In Chapter Three, the following components of the research methodology are presented: study design, sample selection, procedures, the instrument used for data collection, data analysis, and ethical considerations. Chapter Four describes the participants and presents findings relevant to the study's three research questions. The descriptive statistics comparing rural and urban

nurses' responses, as well as inferential statistics (multiple regression analysis) are presented to examine differences in RU and the factors reported among rural and urban nurses. The final chapter (Chapter Five) explores the relevance of the findings to current knowledge translation theories, as well as potential strategies for promoting RU in rural nursing practice settings, and future research among nurses working in those settings. In addition, the study's strengths, limitations, and generalizability of results are discussed.

CHAPTER TWO:
LITERATURE REVIEW, THEORETICAL FRAMEWORK, AND DEFINITONS OF VARIABLES

Literature Review

In this chapter, the literature reviewed for this thesis is presented. It is important to note that the factors associated with RU, the conceptual framework, and the instrument used in this study were selected based on literature available prior to the study proposal approval and the data collection phase of this study (March- June 2009). An additional literature review of publications was conducted after data were collected (between April 2009 to July 2012). This literature was used to inform discussion of the conceptual framework, instrument and the study findings in the final chapter.

This critical review included studies on (a) RU theoretical frameworks related to nursing, (b) rural nursing, (c) factors associated with RU among nurses, (d) RU among rural nurses, and (e) instruments that measure RU. Details of the search strategies and terminologies applied to locate the literature relevant to this review are outlined in Appendix A. The search for literature was conducted in the following databases: Medline, CINAHL, Proquest, Proquest Dissertations and Thesis, Medline, and Health and Psychosocial Instruments. The reference lists of relevant studies were also manually searched in an effort to identify key articles for this review.

Since the focus of this study was to explore the importance of environmental context (rural/urban) in RU and factors associated with RU among nurses, the review was restricted to the nursing literature with the understanding that many of the theories and

frameworks that had been used in nursing had been developed or adapted from other disciplines. Additionally, many of the factors identified as significantly associated with RU in the non-nursing disciplines had also been studied in nursing. Therefore, the review of literature for rural nursing and for nursing RU contributed sufficiently to identifying the individual and contextual factors likely to be relevant to exploring the differences in RU among nurses working in rural and urban settings.

The Concept of Research Utilization

Estabrooks (1997,1999a) reported that much of the RU literature in nursing represented a poorly defined or unidimensional conceptualization of RU that encompassed only the use of research in direct delivery of patient care, such as adherence to research-based protocols and guidelines. Weiss (1979) and Larsen (1980) suggested a more comprehensive conceptualization of RU. They raised the possibility that at least three different types or ways existed in which research knowledge could be utilized in practice: instrumental (direct), conceptual (indirect), and symbolic (persuasive). Stetler (1994, 2001) adapted Weiss's and Larsen's work for use in nursing by postulating that these three types of RU occur in nursing practice. Estabrooks (1997) further proposed that measures of each type of RU predict measures of nurses' overall RU. Using an exploratory factor analysis to test her hypothesis, Estabrooks (1999a) found that the three types of RU were distinct but co-variant constructs that contributed to the measurement of an over-arching concept (construct) of overall RU. Her results demonstrated that the three types of RU combined to predict 70% of the overall RU reported by nurses in the study. Estabrooks' conceptualization of research use has been applied in numerous nursing

studies that support her original findings (Birdsell, Thornley, Landry, Estabrooks, & Mayan, 2005; Cummings, Estabrooks, Midodzi, Wallin, & Hayduk, 2007; Estabrooks, Chong, et al., 2003; Estabrooks, Kenny, et al., 2007; Estabrooks, Scott, et al., 2008; Meijers et al., 2006; Milner, Estabrooks, & Humphrey, 2005; Profetto-McGrath, Hesketh, Lang, & Estabrooks, 2003). In a systematic review of studies reporting on RU among nurses, Squires, Hutchinson, et al. (2011) indicated that in studies examining these various types of RU, conceptual RU has been identified as the dominant way in which nurses use research. This finding suggested that the use of research-based knowledge may have contributed to changing the way nurses thought about their practice, but not necessarily their actions.

Research Utilization Frameworks

Conceptual frameworks associated with RU in nursing have been useful for identifying universal elements and relations among elements in order to promote an understanding of the phenomenon. Many frameworks used in nursing to examine RU have been deductively and/or inductively developed based on existing research evidence and clinical expertise, and by adapting and/or combining theories from a variety of disciplines (Kitson, et al., 2008). Mitchell et al. (2010) identified 47 conceptual frameworks and models that have been developed to enhance understanding of the factors and processes associated with RU in nursing. The intent of their thematic analysis was to facilitate nurses' selection of a model that could guide activities in knowledge translation. The authors organized the frameworks into four categories: (a) evidence-based practice and knowledge transformation processes, (b) knowledge exchange and synthesis, (c)

designing and interpreting dissemination research, and (d) and strategic change to promote the adoption of new knowledge.

Frameworks that Mitchell et al. (2010) identified within the evidence-based knowledge transformation grouping incorporated a series of steps designed to accomplish the following: (1) identify a question/topic/problem in health care; (2) retrieve evidence that is relevant to that focus; (3) critically appraise the level and strength of the evidence; and (4) synthesize and apply the evidence to improve clinical outcomes. [These] frameworks emphasize the process by which knowledge is transformed from primary research findings to a format (e.g. clinical practice guidelines, technology assessment, standards of care) that has utility for decision making in clinical practice. (p. 288)

The theoretical models within this category focused on increasing the meaningfulness of research findings in clinical decision making for individual providers and health care organizations (Mitchell et al., 2010; Rosswurm & Larrabee, 1999; Stetler, 2001). Although the environment was cited as a consideration in many of these frameworks, little attention was paid to identifying the relevant factors or their influences on RU; therefore, these frameworks are less useful for exploring factors associated with RU in nursing in diverse environmental settings (i.e., rural or urban).

In a different category (knowledge exchange and synthesis), Mitchell et al. (2010) included those frameworks that "emphasize the ongoing exchange process among practitioners, researchers, policymakers, and consumers to facilitate both the generation and application of new knowledge" (p. 289). These models included an "emphasis on the engagement of [researchers and consumer and stakeholder groups] in bidirectional

collaborations across the translational continuum" (Mitchell et al., 2010, p. 289). Such frameworks focused on strategies that promote engagement and collaboration in the various phases of generating and implementing research (Armstrong, Waters, Roberts, Oliver, & Popay, 2006; Baumbusch, et al., 2008; Graham, et al., 2006; Leykum, Pugh, Lanham, Harmon, & McDaniel, 2009). Various factors associated with predicting, influencing, or mediating the engagement process among key stakeholders were identified as essential elements of these frameworks (Jacobson, 2000). Therefore, these models provide only a limited lens for examining and comparing the relevant factors associate with RU in various nursing settings.

In their third category (designing and interpreting dissemination research), Mitchell et al. (2010) included those "models that emphasize the effectiveness of interventions that could be deployed, modified or tailored for target audiences to make them aware of, receive, accept, and use scientific information/interventions" (p. 291). Several of the models within this category served as conceptual frameworks for experimental and quasi-experimental studies measuring the effectiveness of intervention strategies in promoting RU (Bhattacharyya, Reeves, Garfinkel, & Zwarenstein, 2006; Elliott et al., 2003; Improved Clinical Effectiveness through Behavioural Research Group [ICEBeRG], 2006; Ogilvie, Craig, Griffin, Macintyre, & Wareham, 2009). The perspective of the RU phenomenon emphasized in these frameworks suggests that significant factors associated with RU can be identified regardless of context. These factors explain, predict, interact, mediate, or moderate a target audience's RU (Mitchell et al., 2010). Models in this category support the premise that effective interventions can be developed for widespread

application to promote RU and propose that summation of the presence or absence of significant factors will dictate the effective strategy for promoting RU among nurses. The conceptualization of contextual variables within these frameworks appears to be limited to conducting an inventory of factors within a specific situation or location. Little consideration is given to the possibility that some factors may be more or less significant within different nursing settings.

Lastly, Mitchell et al. (2010) identified a category of frameworks (strategic change to promote the adoption of new knowledge) that described "the mechanisms by which individuals, small groups and organizational contexts affected diffusion, up-take, and adoption of new knowledge and innovation" (p. 289) These models (e.g., Dobbins, et al., 2002; Kitson, Harvey, & McCormack, 1998; Kitson, et al., 2008; Logan & Graham, 1998; Rogers, 1995; Rycroft-Malone, 2004) conceptualized context as a set of unique factors including organizational structure, culture, interactions, and resources arising from within specific settings that predict or influence RU. These context-focused frameworks have been developed to promote a comprehensive understanding of "the contextual factors [that have] important roles in the success or failure of RU efforts and that should be taken into consideration in all stages of the [RU] process" (Sudsawad, 2007, p. 7).

The influence of setting or place on a variety of phenomena also has been supported by studies conducted in the social sciences. For example, Macintyre, Ellaway, and Cummins (2002) postulated that "place effect" includes (a) the characteristics of individuals who live and work within a community [place]; (b) the characteristics of local physical and social environments; and (c) the social-cultural and historical aspects that

have influenced the "shared set of norms, traditions, values and interests" (p. 130) within a community.

The notion of context as setting is relevant to understanding RU in nursing practice. In Kitson et al.'s (1998) model, context was defined as "the environment or setting in which the proposed change is to be implemented" (p.1 50). Although the concept of context in their model has undergone refinement over time, the notion of setting remains a significant factor in understanding nurses' utilization of research knowledge.

As previously noted, Macintyre et al. (2002) proposed that individual, organizational, and environmental characteristics are subsets of "place effect" or settings. From a systems perspective, factors associated with various levels of a setting are interrelated, influencing and being influenced by each other (Dopson, 2007). Authors such as Rogers (1995), Dobbins et al. (2002), and Stetler (2001) observed that there was merit in considering the contributions of both individual and contextual (organizational and environmental) factors that play a role in an individual's decision to adopt an innovation. Therefore, it can be suggested that studies that take into consideration the individual characteristics of the nurse as well as the nursing practice setting within different environments will contribute to what is known about nursing RU.

As discussed earlier, studies that have explored nurses' RU have focused on the urban acute care nursing practice setting and, therefore, primarily on urban nurses. Yet not all nurses work in urban hospital centres; many are employed in rural hospital settings (CIHI, n.d.). Moreover, the literature has suggested that nursing work in a rural acute care setting differs from that in an urban acute care setting (Andrews et al., 2005; Baernholdt,

Jennings, Merwin, & Thornlow, 2010; Bauman et al., 2006; Bushy, 2002, 2005; CIHI, 2002; Kulig et al., 2006; MacLeod, Kulig, Stewart, Pitblado & Knock, 2004; McCarthy & Hegney, 1998; Montour et al., 2009; Stewart et al., 2005). Nurses, themselves, working in rural versus urban settings have also demonstrated different individual characteristics (Bushy, 2002, 2005; CIHI, 2002; Estabrooks, Chong, et al., 2005; MacLeod, Kulig, Stewart, & Pitblado, 2004; McIntyre et al., 2006; Pitblado, Medves, & Stewart, 2005; Tilleczek et al., 2005). Perhaps these differences also apply to the phenomenon of nursing RU. The few regional or national studies that have included rural nurses within the sampling criteria have generally not examined how RU or factors associated with its use may differ among rural nurses (Cummings et al., 2007; Estabrooks, Kenny et al., 2007; Milner et al., 2005). In order to appreciate RU as it applies to different contexts within nursing, it is important that nurses who are working in rural acute care areas are also studied.

Factors Associated with Nursing Research Utilization

A review of the literature demonstrated that certain individual, organizational, and environmental factors were relevant when looking at RU by nurses. Since the late 1980s, there has been a steady increase in the number of descriptive studies of factors that influence nursing RU. Some researchers focused on identifying the individual characteristics of nurses who are more likely to engage in RU (Estabrooks, 1997; Estabrooks, Floyd, Scott-Findlay, O'Leary, & Gushta, 2003, Squires, Estabrooks, Gustavsson, et al., 2011). Others acknowledged the significant role of the organizational and environmental factors in RU (Dobbins, 1999; Dobbins et al., 2002; Fineout-Overholt

et al., 2005; Hogan & Logan, 2004; Newhouse et al., 2005; Rycroft-Malone, Kitson, et al., 2002; Rycroft-Malone & Stetler, 2004). Although the RU phenomenon in nursing practice is not clearly understood, scholars currently agree that RU results from complex and interactive processes involving numerous elements (Cummings et al., 2007; Meijers et al., 2006).

Several systematic reviews examining the evidence to support the individual, organizational, and environmental factors associated with RU among nurses were identified in the literature. The Assessment of Multiple Systematic Reviews (AMSTAR) tool was used to analyze the findings and quality of these reviews in order to determine the state of current knowledge regarding factors associated with RU (Shea et al., 2007; Shea et al., 2009). This tool was created to help critically evaluate the quality of systematic reviews. Its development "builds on previous tools, empirical evidence and expert consensus" (National Collaborating Centre for Methods and Tools, 2011, p. 2). More specifically, the instrument was designed to evaluate the quality and comprehensiveness of the literature search strategy, data extraction process, minimization of bias, and reported cumulative evidence (Shea et al., 2009). The AMSTAR tool has been subjected to both reliability and validity testing (Kung et al., 2010; Shea et al., 2007; Shea et al., 2009).

Individual factors. Two systematic reviews were identified that examined the individual factors associated with RU. Squires, Hutchinson, et al. (2011) conducted an updated review using a methodology similar to the one that Estabrooks, Floyd, et al. (2003) originally applied. Both reviews will be presented here in order to identify the

state of the evidence and the methodologies that have been applied in critically reviewing this evidence. Estabrooks, Floyd, et al. (2003) critically analyzed research reports on individual nursing characteristics through a systematic review of 20 English language studies. They proposed six categories of individual determinants (factors) of RU: "positive beliefs and attitudes towards RU; active involvement in research activities; information seeking behaviours; level of education; professional characteristics and other social economic factors" (p. 506). The only factor they reported to have had sufficient evidence of being a predictor of nursing RU was nurses' positive beliefs and attitudes towards RU. Insufficient numbers of studies and inconclusive findings related to design and methodological challenges were provided as the rationale for the inability to identify other significant individual characteristics.

When the AMSTAR tool was used to critically assess this systematic review, three strengths were identified. First, the authors provided a detailed description of the inclusion criteria and search strategy used to locate research reports for the review, along with a rationale for excluding reports found in the grey literature. Second, the studies were evaluated independently by more than one researcher. Finally, a table was included in the review that described the theory, research design, and measurements used in data collection, including the reliability and validity of these measures. However, insufficient information was reported regarding the scoring criteria that the authors developed and used (possible 14 points) to evaluate the methodological quality of the reviewed studies. As a result, it is not possible to determine the reliability and validity of the scoring process used to distinguish between weak, moderate, and strong methodological studies.

Additionally, the exclusion of non-published reports in the grey literature and studies published in non-English language journals may have biased their findings by possibly inflating the significance of individual variables associated with RU.

Squires, Estabrooks, Gustavsson, et al. (2011) updated the systematic review using the same methodology that Estabrooks, Floyd, et al. (2003) applied, but adding 31 more recent publications inclusive of and beyond English language texts. Their intent was to update the previous work in order to determine if additional individual characteristics (factors) related to nursing RU had been identified. Squires, Estabrooks, Gustavsson, et al. found that many of the same design and methodological issues cited earlier continued to have an impact on the ability to distinguish significant individual characteristics. Despite these methodological concerns, the authors reported that:

> The larger body of evidence supported the following individual determinants (i.e. related to an increase) of nurses' use of research in their practice: positive attitudes towards research; attending conferences and/or in services; having a graduate degree (compared to a bachelors' degree or diploma); current nursing role (i.e. leadership and/or advanced practice compared to staff nurse); clinical specialty (i.e. work in critical care areas compared to general hospital units); and job satisfaction. (p. 15).

Although Squires, Estabrooks, Gustavsson, et al. identified critical thinking as an additional factor in promoting nursing RU, they contended that insufficient studies had been undertaken to support this variable's inclusion in the category of individual factors impacting nursing RU.

Using the AMSTAR tool to critically analyze this systematic review revealed that including non-English publications and a search of grey literature resulted in the incorporation of more international studies (e.g., Europe and Africa) and contributed to the decrease in potential publication bias (Loiselle, Profetto-McGrath, Polit, & Beck, 2007). This systematic review addressed some of the methodological issues identified in Estabrooks, Floyd, et al.'s (2003) earlier review. Squires, Estabrooks, Gustavsson, et al. (2011) also provided a supplementary file that included details of the criteria and scoring process they applied to evaluate the methodological quality (i.e., sampling, measurement, and statistical analysis) of each study they reviewed. They also reported on the descriptors of categories for excluding studies from the review and on the number of studies in each category. One methodological issue pertaining to this review is that only one reviewer was used to critically analyze the methodological quality of the included studies. Using two reviewers has been recommended in order to determine inter-rater reliability in the review process (Kung et al., 2010; Shea et al., 2007; Shea et al., 2009).

A few of the studies in Squires, Estabrooks, Gustavsson, et al.'s (2011) systematic review included rural subjects within their regional sample of nurses. However, several of these studies did not analyze the rural/ urban differences in their findings (Cummings et al., 2007; Estabrooks, 1999a, 1999b; Estabrooks, Kenny, et al., 2007). The few studies that did examine rural/urban as a factor did not report significant findings (Bonner & Sandos, 2008; Conners, 2006). Only one study reported a significantly lower rate of overall RU among rural nurses (Estabrooks, Chong, & Birdsell, 2003).

Contextual factors. Several researchers have proposed that individual nurses do not apply research findings in isolation, but do so within the context of a health care setting; therefore, their RU is impacted by organizational and environmental factors. It has been suggested that there is a delay in the translation of research into practice, which may be associated with organizational and environmental contexts within health care practice settings (Dopson, 2007; Ferlie, Fitzsgerald, & Wood, 2000; Marchionni & Ritchie, 2008; McCormack et al., 2002; Rycroft-Malone, 2008; Scott-Findlay & Golden-Biddle, 2005; Sleutel, 2000). However, there is a lack of clarity within the literature in the conceptualization and use of the term *context.* This term has been used interchangeably with *social environment, social context, job environment, job context, nursing practice environment, clinical practice environment, organizational environment, organizational climate, organizational culture, and organizational context*. As a result, identifying contextual (organizational and environmental) factors influencing RU has been challenging (Meijers et al., 2006; Sleutel, 2000).

Meijers et al. (2006) conducted the only systematic review of studies in the nursing literature that explored contextual factors associated with RU. Their review, which included all relevant studies published in the English language, identified a total of 19 studies. They adapted McCormack et al.'s (2002) definition of contextual factors for their study and defined context as "the environment or setting in which research is to be implemented and suggested that context has four components: context, culture, leadership and evaluation" (Meijers et al., 2006, p. 623). Meijers et al. grouped the identified determinants (factors) of RU into the following six categories:

> Role of the nurse [including quality assurance and RU responsibility in the job description], multi-faceted access to resources [including research findings and the time to review and analyzes these finding], organizational climate [a setting where the importance of RU is acknowledged and supported], multi-faceted support [financial and behaviours demonstrating that research and RU is valued], time for research activities, and provision of education [related to building research capacity]. (p. 622)

Although Meijers et al.'s review was limited to English language publications, the inclusion of a detailed description of the keywords and subject terms used to conduct an online search of literature in multiple databases, and the inclusion of multiple strategies for searching the grey literature contributed to reducing the potential influence of publication bias in the review. The methodology of this review was further strengthened by using two researchers to extract the data from each study. Although the authors did not provide details regarding the level of agreement between the two researchers, they did report that consensus was achieved in "most cases" (p. 626) and that the opinions of other members of the research group were sought when required. The design and methodological concerns about the included studies that Meijers et al. identified were similar to those noted by Estabrooks, Floyd, et al. (2003) and Squires, Estabrooks, Gustavsson, et al. (2011).

A key limitation identified for Meijers et al.'s (2006) review was that they did not use the terms context, contextual, and environment from their keywords and subject search strategy. These omissions may have diminished the identification of studies with a

focus on contextual factors not associated with the organizational context. Meijers and her colleagues concluded that the six categories may not have represented the most important or comprehensive list of contextual factors. Moreover, as a result of the excluded keywords in the search strategies, it is likely that the identified list represented only factors within the organizational context. For example, it was also noted that none of the studies reviewed examined the potential association between rural /urban locations or any other environmental factors with research use.

In reviewing the literature, it was also noted that factors associated with organizational environment were commonly used to refer to contextual factors (Cummings, Hutchinson, Scott, Norton, & Estabrooks, 2010; Estabrooks, Squires, et al., 2008; Rycroft–Malone, Harvey, et al., 2002; Rycroft-Malone, 2008; Scott-Findlay & Golden-Biddle, 2006; Sleutel, 2000). However, in addition to defining context as "the environment or setting in which the proposed [research based] change is to be implemented" (McCormack et al., p. 96), McCormack et al. (2002) indicated that context is also "the setting in which people receive health care services" (p. 96). Further, they postulated that health care is delivered in settings that represent a wide variety of services, communities, and cultures that are "all influenced by (for example) economic, social, political, fiscal, historical and psychosocial factors" (McCormack, 2002, p. 96). Additionally, Stetler (2001) proposed that "both internal and external factors can influence an individual's and group's view on the use of evidence" (p. 274). She further elaborated that "RU is influenced not only by scientific criteria, but also by characteristics

of the individual user(s) and the related environments both local and external to the setting" (p. 274).

As noted previously, the socio-cultural-political nature of the practice setting, as arguably closely related to its geographic location (place), appears to have been subsumed into the nature of the organization itself (Meijers et al., 2006; Rycroft-Malone , Kitson, et al., 2002). However, literature that explored nursing in different geographic environmental locations (such as rural vs. urban settings, each of which have distinct socio-cultural-political characteristics) suggested that environment is more than the attributes of the organization. This literature suggested that the environmental location of nurses and their practice may influence nurses' RU (Lenz & Barnard 2009; Olade, 2004a; Winters, Besel, Dea, Jorgensen, & Lee, 2006).

Comparison of Rural and Urban Nurses

The two environments that define the scope of this study are the rural and the urban acute care hospital setting. As previously noted, studies related to the individual and contextual factors associated with nursing RU have tended to focus on the urban setting. Therefore, this study will explore the relationship between RU and the unique individual characteristics and contextual factors (organizational and environmental) associated with rural nursing practice as distinct from that in urban areas.

Urban is defined in Merriam-Webster's online dictionary as "relating to, characteristic of, or constituting a city" ("Urban," n.d.). Typically, the most commonly applied criteria for urban centres relate to population volume and density (Census Canada, n.d). By extension, urban centres often constitute an environment where this

volume of people and the resources to support them are concentrated into a particular geographic location that has some importance ("Urban," n.d) in many ways, such as commercially, intellectually, or politically.

According to Census Canada (n.d), "All territory outside urban areas is classified as rural" (para. 1). However, Pitblado (2005) observed that definitions of rural varied greatly and that there were "almost as many definitions of rural as there are researchers in this area" (p. 163). He indicated, however, that despite the many differences, most definitions were reflective of either a technical/ geographic or a social conceptualization of the term. The technical/ geographic definitions of rurality were based on population size and distribution, geographic distance, or travel time from resources. For example, in MacLeod, Kulig, Stewart, Pitblado, & Knock's (2004) study of the nature of nursing practice in Canada, rural communities were defined as those "existing outside of commuting zones of urban centers with populations of greater than 10,000 people" (p. 28). Although, the technical/ geographic conceptualizations of rurality lend themselves to the formulation of clear and empirically measurable definitions, they do not reflect any sense of the experiences of living or working within rural communities (Pitblado, 2005). The social conceptualization of rurality is more difficult to quantify, but more relevant to a comparison of nurses working in rural and urban settings in this study. Research informs nursing practice (DiCenso, Guyatt, & Ciliska, 2003) with the goal of optimizing the delivery of quality client care (Registered Nurses Association of Ontario [RNAP], n.d.). It is not clear the extent to which nurses working in rural as compared to urban

settings apply research evidence to their practice and the role of different geographic environments in RU.

Factors Associated with RU

Several of the documented differences between rural and urban nurses and their practice are similar to those that have been observed as differences associated with levels of RU among nurses, even though this literature was focused primarily on RU by urban nurses or it did not evaluate the potential differences between nurses working in rural and urban locations. The factors examined in the current study were selected from those that were found in both the literature that distinguished rural from urban nursing practice and the literature that identified factors associated with nursing RU. The factors from which this study's questions were derived are discussed here.

The role of the nurse. Rural acute care hospitals are located in communities that provide acute care services to small populations dispersed over a wide geographic area (Joint Policy and Planning Committee [JPPC], 2006). As a result, rural hospitals tend to be smaller in size than urban hospitals, but are required to offer the same types of services (e. g., emergency, medical, surgical, and obstetrics care, etc.). Several common strategies have been adopted within rural hospitals to meet their nursing service obligations to their communities. These strategies appear to contribute to differences that distinguish the work of rural acute care nurses from those that practice in urban hospital settings.

Rural hospitals must rely on a smaller pool of nursing staff as the first point of contact in providing patient care. These nurses are expected to be independent and self-reliant when assessing and delivering care to clients with a broad range of health issues

(Hunsberger et al., 2009; MacLeod, Kulig, Stewart, & Pitblado, 2004; Scharff, 2010; Winters et al., 2010). In Hunsberger et al.'s (2009) study, nurses reported that on some shifts, only two to four nurses may be working in the entire hospital. Nurses explained that they "need to be able to deal with any trauma that comes in the door" (p. 20), including making decisions about when to order diagnostic imaging or when laboratory technicians or physicians should be called into work. Nurses indicated that they were required to be "extremely independent and self-confident" (p. 20) and that they had a high degree of authority related to clinical decision making. It could be argued that rural nurses' description of independence and self-reliance, and the variety of health phenomena to which they have to respond, require them to possess a high level of critical thinking skills. Critical thinking and authority in practice are factors that have recently been associated in the RU literature with higher use of RU (Squires, Estabrooks, Gustavsson et al., 2011). Therefore, it could be expected that environmental factors may contribute to high RU among rural nurses.

Rural nurses also provide care to a broad range of client age groups with a varying scope of health issues and concerns. This trend has been identified both nationally and internationally amongst nurses working in rural geographic areas (Burn, Dudjak, & Greenhouse 2009; Hegney & McCarthy, 2000; Hegney, et al., 2002; MacKinnon, 2011; MacPhee & Scott, 2002; Schofield et al., 2006). Therefore, rural nurses may require a more extensive general knowledge and skill set than urban nurses, whose practice is usually focused on a particular area of expertise (Baernholdt, et al., 2010; Montour et al., 2009; Troy & Lee, 2010). A common distinguishing feature of rural nurses is that they

see themselves as "generalists" rather than "specialists" (McIntyre et al., 2006, p. 292). According to several authors, rural nurses reported that the generalist nature of their practice was both stressful and rewarding (Hunsberger et al., 2009; MacLeod, Kulig, Stewart, Pitblado, & Knock, 2004).

Rural nurses expressed concern and a sense of uncertainty related to the expectation that they possessed the knowledge and skills required to respond to a wide range of patient needs. These concerns may have been off-set by a sense of satisfaction associated with successfully managing complex patient care situations (Chaboyer, Williams, Corkill, & Creamer, 1999; Hunsberger et al., 2009; Litchfield & Ross, 2000) and demonstrating the ability to provide care without access to all of the resources available to nurses working in urban settings (Hunsberger et al., 2009). The literature suggested that there was greater RU amongst nurses working in a clinical specialty area (reflective of the urban setting), where the required expertise was more focused (Squires, Estabrooks, Gustavsson, et al., 2011). Therefore, contrary to the previously discussed characteristics (greater autonomy among rural nurses) it could be argued that the potential lack of specialization may be associated with lower levels of RU amongst rural nurses.

Nursing position. Nursing position was identified in several studies as being significantly associated with RU (Bostrom & Suter, 1993; Butler, 1995; Rutledge, Greene, Mooney, Nail, & Ropka, 1996; Tsai, 2000; Wallin, Bostrom, Wikblad, & Ewald, 2003). These studies indicated that nurses who worked in positions in which they were responsible for promoting the quality of practice were more likely to be aware of and apply research findings. In the literature, RU has been most commonly demonstrated by

nursing educators, managers, and nurses working in advanced practice roles (i.e., clinical nurse specialist/ advanced practice nurses). One study (Estabrooks, Chong, et al., 2003) specifically examined a nurse's position (staff nurse, manager, and nurse educator) and its relationship to RU in both urban and rural settings. Of the three positions studied, nurse educators (both rural and urban) demonstrated significantly higher RU than either nursing managers or staff nurses. However, as previously noted, the nurse educator position (i.e., a specialist advanced practice role) is atypical in rural settings. This finding lends support to the argument that RU in the rural nursing setting may be less prevalent than in the urban setting.

Basic education and ongoing education. Since 2005, nurses seeking registration (to practice as a registered nurse) in most jurisdictions within Canada have required a baccalaureate degree (Black, et al., 2008). Prior to this date, the accepted level of education for entry to nursing practice was a nursing diploma. Nursing diploma curricula did not address research utilization. Baccalaureate nursing education provides nurses with the knowledge and skills to comprehend and analyze research findings and introduces them to a nursing culture that values the use of research evidence in practice. At the graduate level, nursing education programs further develop these skills and knowledge by having nursing students participate in research activities as well as by promoting an enhanced appreciation of research and its impact on nursing practice (Canadian Association for Graduate Studies, 2006; Giallonardo, 2011). Therefore, it could be expected that baccalaureate (or higher) prepared nurses would have more of a propensity for RU than those whose highest level of education is a nursing diploma.

According to the literature, fewer nurses working in rural settings have been prepared at the baccalaureate or higher level in comparison to their urban counterparts (Andrew et al., 2005), which suggests that comparatively fewer rural nurses engaged in RU. However, Squires, Estabrooks, Gustavsson, et al. (2011) could identify no significant relationship in RU between nurses prepared at the baccalaureate and those prepared at the diploma level. They did determine that a positive association existed for RU among nurses with graduate degrees. Few rural nurses, however, possess a graduate degree, which may contribute to less RU in rural nursing practice settings.

Participating in ongoing education, according to Squires, Estabrooks, Gustavsson, et al. (2011), included attendance at in-services and conferences and have found that these activities were positively associated with nursing RU in general (Fineout-Overholt & Johnston, 2006; Meijers et al., 2006; Squires, Estabrooks, Gustavsson, et al., 2011). MacLeod, Kulig, Stewart, and Pitblado (2004) observed that opportunities for continuing education (which they said may include in-service and/or conference attendance) were limited for nurses working in rural settings. Rural nurses cited distance, travelling time, expense, and weather conditions associated with the geographic rural environment as barriers to attending conferences or continuing education opportunities (Andrews et al., 2005; Barnason & Morris, 2011; Baumann et al., 2006; Burns, Dudjak, & Greenhouse, 2009; Hunsberger, et al., 2009; MacKinnon, 2011; MacLeod, Kulig, Stewart, & Pitblado, 2004; McCoy, 2009). These challenges have not been identified by nurses working in urban acute care settings. The reported environmental barriers that inhibit rural nurses'

participation in continued learning activities may also be associated with less RU amongst these nurses.

Attitudes and beliefs about RU. The factor that has been most commonly assessed in RU studies among nurses and most consistently associated with RU is nurses' attitudes and beliefs about RU. (Estabrooks, Floyd, et al., 2003; Squires, Estabrooks, Gustavsson, et al., 2011) There is evidence that a positive attitude towards research knowledge contributes significantly to RU amongst nurses in general (Conner, 2006; Estabrooks, Chong, et al., 2005; Estabrooks, Floyd, et al., 2003; Estabrooks, Squires, et al., 2008; Kenny, 2002; McCleary & Brown, 2003; Melnyk et al., 2004; Melnyk, Fine-Overholt, Stetler, & Allan, 2005). Bonner and Sando's (2008) multi-variate analysis of data demonstrated that a positive attitude towards RU contributed to 18% of the observed variance in RU by nurses. However, as previously discussed, the focus of these studies was on nurses working in urban settings. Estabrooks, Chong, et al.'s (2003) study was the only one that examined differences between Canadian urban and rural nurses' use of research knowledge in practice. Their data revealed that a positive attitude towards RU was significantly associated with RU amongst nurses working in both urban and rural environments.

Despite these findings, experienced rural nurses have reported that the knowledge emerging from the day-to-day delivery of care contributed to the development of an intuitive expertise for resolving commonly occurring health care issues. Rural nurses relied on these experientially learned practices and/or practices that have historical and traditional origins in their communities (CIHI, 2002; Estabrooks, Rutakumwa, et al.,

2005; Kulig et.al, 2006; MacLeod, Kulig, Stewart, & Pitblado, 2004; McIntyre et al., 2006; Tilleczek, et al., 2005).

Rural nurses have been described as sharing the same norms, values, beliefs, and history with community members (Bushy, 2002; Goodridge & Duggleby, 2010; MacLeod, Kulig, Stewart, & Pitblado, 2004; McIntyre et al., 2006; Montgomery, 2003). Common characteristics identified in both rural nurses and community members included sharing a strong sense of community connectedness, self-reliance, and a general sense that researchers, administrators or policy makers external to rural communities lack sufficient understanding of the realities of living and working in rural settings. (Baernholdt et al., 2010; Bushy, 2005; DesMeules et al., 2006; Goodridge & Duggleby, 2010, MacLeod, Kulig, Stewart & Pitblado, 2004). Nurses in rural settings commonly were born in the community or originally from another rural community, which indicated that they were comfortable with the rural way of life and may have had a higher incidence of subscribing to traditional social practices (Kulig et al., 2009). Similar findings of reliance on traditional practice and on connectedness with community have been reported in international studies (Burns et al., 2009; Hegney & McCarthy, 2000; Hegney et al., 2002; Lee & Winters, 2004, 2006; MacPhee & Scott , 2002; Schofield et al., 2006). Therefore, it could be anticipated that where there is a dichotomy between traditional practices and research-based practice, rural nurses may have a higher tendency to adopt practices based on intuitive and traditional knowledge. This would be reflected in a lower level of acceptance and greater reluctance to suspend traditional beliefs related to

practice in order to adopt innovations based on research evidence emerging from scientific studies that had not been conducted in a rural context.

Organizational leadership. Organizational leadership that enables and empowers people by promoting effective communication and democratic decision making, is an important attribute of transformative leadership (Kitson, et al., 2008; McCormack et al., 2002), has been positively associated with RU (Davies et al., 2007; Gifford, Davies, Edwards, Griffin, & Lybanon, 2007; Scott-Findlay & Golden-Biddle, 2005). Alternatively, centralized and autocratic organizational decision-making processes have been associated with lower levels of RU among nursing staff (Estabrooks, Scott, et al., 2008; Kitson, et al., 2008; McCormack et al., 2002). Recent restructuring of some provinces' health care systems has resulted in the establishment of regional, amalgamated models of care delivery. Rural nurses working in smaller communities have reported having limited access to their organizational leaders, who were often stationed at the larger regional centre. Even these leaders have observed that they experienced challenges associated with communicating effectively with their staff (Montour et al., 2009).

In addition, rural nurses have reported that organizational policies, guidelines, and organizational decisions that impacted on their work were often made centrally without local consultation (Hunsberger et al., 2009; MacLeod, Misener, et al., 2008). Thus, they were excluded from an organizational-level democratic decision-making process. Nurses reported that some decisions were not relevant to the actual practice of nurses working in rural satellites (Hunsberger et al., 2009; MacLeod, Misener, et al., 2008).

McCormack et al. (2002) noted that "transformational leaders can alter the prevailing organizational culture and create a context that is more conducive to the integration of evidence and practice" (p. 99). More specifically, the availability of support from managers and administrative leaders, nursing and interdisciplinary colleagues, and RU champions within the work setting is more likely to foster a culture of valuing innovative ideas and people who create them (Adams, 2001; Bonner & Sando, 2008; Ciliska, DiCenso, & Cullum, 1999; DiCenso, Cullum, Ciliska, & Marks, 2000; Eller, Kleber, & Wang, 2003; French, 2006; Kitson et al., 2008; Larrabee, Sions, Fanning, Withrow, & Ferretti, 2007; McCloskey, 2005; Melnyk, 2005; Melnyk et al., 2004; Micevski, Sarkissian, Byrne, & Smirnis, 2004; Olade 2004a; Pepler et al., 2005; Pravikoff, Tanner, & Pierce, 2005; Rodgers, 2000; Royle & Blythe,1998; Rycroft-Malone, Harvey, et al., 2004; Schoonover, 2006). Given that organizational leaders are at a distance in regionally centralized systems, the support required to create such a culture is likely to be removed from the practice setting. It could be argued that the centralization phenomenon may negatively influence rural nurses' RU. However, an exploration of the organizational leaders themselves and their modus operandi in promoting RU is outside the scope of this study.

Interpersonal relationships supportive of RU. People's social and interpersonal experiences are instrumental in developing their values, attitudes, and belief system (Mezirow, 1996). Interpersonal relationships have been identified as key aspects for understanding RU (Dopson, 2007). Rural nurses have reported strong collaboration among colleagues, both within and across disciplines. Consultation among staff and even

key community members was reported as a strategy of choice for addressing unfamiliar patient issues and establishing effective plans of care (MacLeod, Kulig, Stewart, & Pitblado, 2004). Rural nurses have been described as expressing a strong professional and social connectedness to their colleagues, place of employment, and community in a way that differed from nurses in urban settings (Glisson & Schoenwald, 2005; Goodridge & Duggleby, 2010; McLeod, Kulig, Stewart, Pitblado, & Knock, 2004). However, the extent to which these interpersonal relationships (this sense of "connectedness") impact RU is not clear. It could be argued that nursing and interdisciplinary colleagues in rural settings share the same values, beliefs, and attitudes, which may or may not impact on RU. In fact, resistance from co-workers to changing practice (i.e., the incorporation of evidence-based practice) has been cited as a common barrier to RU in general (Solomons & Spross, 2011; Wright, McCormack, Coffey, & McCarthy, 2006).

Organizational resources. Recently, several types of organizational resources have been associated with RU among urban nurses. Estabrooks Squires, Hutchison, et al. (2011) referred to these resources as "organizational slack" and defined them as "the cushion of actual or potential resources which allow an organization to adapt successfully to internal pressure for adjustments or to external pressure for change" (p. 3). Organizational resources such as the provision of time (to review research, implement changes in practice, and participate in research studies), material resources, and financial support for research-related activities have been identified as factors associated with RU in general (Birdsell et al., 2005; Champion & Leach, 1989; Hatcher & Tranmer, 1997; McCloskey, 2005; Meijers et al., 2006; Pepler et al., 2005; Royle, Blythe, Ciliska, & Ing,

2000; Veeramah, 1995). More recent studies have also cited human resources (e.g., availability of adequate nursing staff and RU champions) as factors that promote RU (Estabrooks, Scott, et al., 2008). For example, in their best practice guideline related to effective staffing, RNAO (n.d) acknowledged that the more full-time the nursing ratio, the more likely research evidence would be incorporated into nursing practice.

Organizational resources have been reported as being more limited in rural settings compared to those available in urban settings. Rural nurses had limited access to materials such as research journals and research findings via on-site library and technological (e.g., Internet) resources (Goodridge & Duggleby, 2010; Hunsberger et al., 2009; MacLeod, Kulig, Stewart, & Pitblado, 2004; MacLeod, Lindsey, Ulrich, Fulton, & John, 2008; Mueller & MacKinney, 2006; Olade, 2004a; Penz, et al., 2007). Distance also often represented an impediment to accessing the knowledge and skills required to develop the competence to champion RU as an integral component of nursing practice (Bushy, 2005; MacLeod, Kulig, Stewart, & Pitblado, 2004; Olade, 2004a). Therefore, rural nurses may have less access to RU champions within their settings. Staffing patterns in rural acute care settings are quite different from those in urban settings and may impact on the amount of organizational slack in rural settings. A comparison of recent statistics demonstrated a higher part-time to full-time ratio of nursing employment in rural settings, primarily in an attempt to address unpredictable fluctuating levels of patient care (Baumann et al., 2006; Newhouse, Morlock, Pronovost, & Sproat, 2011). However, this strategy appeared to be ineffective. Respondents in Baumann et al.'s (2006) study indicated that lack of full-time opportunities led to decreased retention rates and staffing

shortages. When patient volumes were high, this shortage resulted in heavier patient workload, which may have impacted on the time rural nurses had to pursue, analyze, and implement research findings. When patient volumes were low, fewer nurses staffed each shift, which might also have affected the time rural nurses could commit to RU.

The studies discussed, generally conducted in urban settings, indicated that having fewer organizational resources has been associated with less RU among nurses. Reports have also found that rural nurses have less access to material and human resources than their urban counterparts do. However, the extent to which these differences are associated with RU among rural nurses has not been thoroughly examined.

Demographics. Studies of rural nurses indicated that significant differences may exist between the demographic attributes of rural and urban nurses. The association between RU and level of nursing education and part-time/full-time distribution of nurses was compared earlier. The findings suggested that fewer rural nurses are employed full-time and fewer nurses possess baccalaureate or higher levels of education. Both of these factors may have contributed to lower RU among nurses. Reports that compared other demographic attributes (e.g., age, year of employment) between rural and urban nurses have found that rural nurses are on average older than the average age of the total population of nurses in Canada and that they have a significantly longer tenure within their place of employment (Stewart et al., 2005). Studies that have examined the association between age, gender, years of employment, and RU have indicated equivocal results (Squires, Estabrooks, Gustavsson, et al., 2011). No clear evidence has linked these

factors with RU; however, they will be examined in this study in order to control for their potential effect.

Research Utilization among Rural Nurses

The extent to which the same factors as those identified in the previous section may be associated with RU by rural nurses has been only superficially examined (Estabrooks, Chong, et al., 2003; Lenz & Barnard, 2009; Olade, 2004a; Winters et al, 2006). Estabrooks, Chong, et al. (2003) conducted telephone surveys of 408 registered nurses who were members of the Alberta Association of Registered Nurses and who consented to be contacted for research activities on their membership renewal forms. The sample was stratified by region (rural, small urban, and large urban) and nursing groups (staff nurses, educators, and managers). The researchers randomly selected 50 subjects from each regional and nursing group sample pool for the study. The study examined differences in reported RU and associated factors among nurses based on their region and nursing position. Although, the sample pool for small urban educators and managers were exhausted before the quota (50 subjects) was achieved, the large sample size and high response rate (89%) of participants strengthened the credibility of the study findings. These researchers provided detailed descriptions of the statistical testing methods applied to test the null hypothesis that no differences existed between the groups of nurses identified by region or position. The unequal group sizes where addressed statistically. The results indicated that urban nurses spent more time acquiring and analyzing research than rural nurses ($p < .01$) and that rural nurses spent a significantly lower percentage of their time on research related activities ($p = .04$) than urban nurses. The researchers noted

that rural nurses also reported lower scores in both instrumental (M = 3.34, SD = 1.09, p =.012) and overall RU (M = 3.71, SD = .92, p = .045) compared to their urban counterparts. When the interaction effect between nurses' regional location and positions were explored, significantly lower measures of the frequency and variety of research evidences used by rural nurses in each of the nursing positions were reported compared to those for the urban groups.

When the predictive variables were examined, rural nurses scored significantly lower on their attitude towards RU and on the contributions provided by other users of research in their organization A multiple linear regression applied to determine the factors (independent variables) that were predictive of RU when all factors were considered simultaneously. Rural/urban location (environmental context) was not found to be a significant predictor of nurses'Overall RU in this study. It is important to consider that the quota sampling process used in sample selection for this study yielded a higher proportion of participants from the educator and manager groups than what was represented in the sample pool (target population). Since these two groups of nurses reported significantly higher measures of the several predictive factors for RU, the results of this study cannot be generalized to the Alberta population of nurses or nationally where the majority of nurses occupy staff positions.

Olade (2004a) conducted a descriptive study using a semi-structured questionnaire designed to explore the research-related activities of rural nurses in a South-western U.S. state. In this study, research utilization was defined as "the translation of research findings into practice" (Olade, 2004a, p. 221). The questionnaires were distributed to 120

nurses (106 responses) located in various settings (e.g., hospitals, community). Both a qualitative content analysis and frequencies were tabulated for each category of research activity identified in the data. Olade (2004a) reported that only 20% of nurses who participated in the study were involved in utilizing nursing research in their practice. The most common type of activity engaged in was applying guidelines. The majority of the nurses who reported applying research were baccalaureate prepared. Only 44% of all respondents reported ever implementing research findings in their practice. However, over 88% of the nurses expressed an interest in using research, if they were given the opportunity and the necessary support (e.g., time). The barriers to using research that rural nurses identified were geographic isolation and the lack of a nursing research consultant. No comparisons in this study were made to nurses working in urban settings.

Several potential methodological issues were identified that could have contributed to the introduction of bias into Olade's (2004a) study (Pedhazur & Schmelkin, 1991). First, the author indicated that a random selection methodology was used to identify the study sample. However, the account of the recruitment process described a convenience sampling of 120 nurses who were encouraged to complete a survey distributed in their practice settings by graduate students who lived in the same rural counties. The extent to which the demographics of the participants of this study reflected those of the rural target population was not reported; neither was the sample size justified. Second, the instrument used for data collection was developed by the researcher, who reported few details regarding the process for establishing its face validity. For example, no information was provided regarding the length of time over which nurses were asked to recall their

previous use of research findings. Additionally, no information about testing the instrument's reliability was provided. Therefore, nurses' responses could have reflected research use anywhere from the week prior to the study to as far back as their first day in nursing practice. Finally, insufficient information was provided regarding the scientific rigor of the data collection and the analysis of the data (i.e., trustworthiness of data and data analysis; Loiselle et al., 2007). As a result of these methodological concerns, the potential for response bias (e.g., recall bias or desirable response bias; Loiselle et al., 2007) among the respondents and the generalizability of the study's findings are not known.

Winters et al. (2007) conducted a qualitative, ethnographic study that employed a snowball sampling technique to recruit 29 nurses working in various rural settings in the U.S. The study explored how nurses in rural settings accessed research findings and incorporated them into their practice. The researchers' observations, field notes, and the interview responses of participating nurses revealed that most rural nurses equated the term *research* with gathering various types of information, not specifically information from research studies or reviews. The most common sources of information participants identified were obtained from discussions they had with their colleagues. The researchers asked nurses to cite factors they believed would facilitate their implementation of scientific research findings into practice. Participants noted supportive supervisors and access to easy-to-read journal articles about studies conducted in rural populations. Barriers to using research identified in the study included (a) a lack of knowledge of research methods, (b) a lack of time to look up information, and (c) poor computer

literacy that hampered locating information quickly. Barriers associated with lack of financial support and long distances to attend conferences were also reported. The use of trained interviewers to collect multiple sources of data contributed to the richness of the findings from this study. Details regarding the study procedures deployed in order to establish credibility, dependability, confirmability, and neutrality of the findings were provided and contributed to establishing the scientific rigour of this study. Saturation of data was reported to have occurred prior to the completion of data analysis, indicating that sufficient subjects had been interviewed and reinforcing the credibility of the results.

The findings of this study provided significant insights into how a network of rural nurses' perceived and interpreted the term *research use* in their practice. The barriers and facilitators to the use of scientific research evidence reported by the rural participants in this study were similar to those reported by urban nurses (Champion & Leach, 1989; Hatcher & Tramner, 1997; Meijers et al, 2006); suggesting similar factors may be associated with research use despite the differences in context of practice.

Lenz and Barnard (2009) conducted an intervention study at one rural hospital with 13 registered nurses who had been identified as informal leaders within the organization. These nurses participated in a 2-hour educational presentation with interactive learning that was designed to enhance their knowledge and skills in integrating research evidence into nursing practice on their units with the support of the organization and policy changes. The sample size was too small to allow for any statistical analysis of the intervention's effectiveness. Since the intervention included a one-time exposure, the dose effect of the intervention may have been insufficient to result in a significant change

(Pedhazur & Schmelkin, 1991). In the post-test evaluation, participants reported the following factors as being important to promoting the implementation of evidence-based nursing practice within their rural health centre: (a) access to ongoing educational opportunities, (b) support from organizational leadership, and (c) collaborations with nurses who have research expertise. The items noted in these findings are similar to those identified in other RU literature. The findings of these studies support previously presented arguments related to the opportunities and challenges that rural nurses may have in integrating research into their practice. In addition, the findings suggest that the factors that differentiate rural from urban nursing are also the factors that impact on the integration of RU into rural nursing practice.

Instruments for Measuring Research Utilization and Related Factors

The ability to robustly measure RU and its associated factors has been identified as paramount to the field of RU research. Squires, Estabrooks, O'Rourke, et al. (2011) observed that "both researchers and decision-makers rely on such measures to evaluate the up-take and effectiveness of research findings on improving patient and organizational outcomes" (p. 2). Accurate RU measures would also further an understanding of the role of various individual and contextual factors within the RU phenomena (Squires, Estabrooks, O'Rourke, et al., 2011).

At the time during which this study was submitted for ethics approval and data were being collected, only one integrative review of RU instruments used in nursing studies was found in the literature (Estabrooks, Wallin, & Milner, 2003). Since then, additional instruments and a more comprehensive systematic review of RU measures have been

published (Squires, Estabrooks, O'Rourke, et al., 2011; Van Eerd et al., 2011). Challenges associated with the variety of available RU instruments are presented here.

Estabrooks, Wallin, et al. (2003) conducted an integrative review to examine the psychometric properties of self-report instruments used in measuring RU among nurses and other allied health care professionals. Of the 24 instruments which had been applied in nursing studies, over half did not provide an explicit definition of RU. In the studies that defined RU, discrepancies existed between the definitions of this term and the measures applied within the instruments. In several studies, for example, Estabrooks, Wallin, et al. found that RU was defined as a process, but was measured as an event: "RU process measures [generally] included measures of the various steps in the RU process including awareness, critical appraisal and implementation; [instead], RU events focused on measuring the implementation stage of RU" (p. 4). They suggested that this discrepancy may be attributed to the fact that instrument development has generally not been guided by theoretical frameworks.

These authors also reported that evidence to support the validity and reliability of over half of the instruments had not been determined. In the studies using multiple items to measure RU, where information about reliability or validity was provided, the most common evidence supplied was the Cronbach's coefficient alpha (Cronbach's α) score. This measure of internal consistency indicates the degree to which the items within the survey measure the same construct (Pedhazur & Schmelkin, 1991) at one point in time. Consistency over time or the degree to which the items measure the RU construct are not addressed by the Cronbach's α score. The reviewers found that the validity of instruments

was rarely tested; when conducted, it was primarily restricted to content validity, which was commonly determined by expert panels. However, most publications provided limited details about how these assessments were performed. Estabrooks, Wallin, et al.'s (2003) review of the non-nursing literature identified similar deficits in measures of RU. Although the researchers had identified several important deficits in the instruments that had been used in nursing, application of the AMSTAR tool revealed several factors that impacted the quality of this systematic review. Estabrooks, Wallin, et al.'s decision to exclude (a) measurements of evidence-based practice, (b) non-published instruments, and (c) those published in non-English languages potentially decreased the comprehensiveness of the reviewed instruments. Furthermore, no information was provided regarding the number of studies reviewed but excluded after the initial search of the literature or the reasons for their exclusion. As well, the researchers provided few details about the process that was used to review the quality of the included studies (i.e., use of independent reviewers, level of agreement between reviewers, process for resolving disagreement). Consequently it is not possible to evaluate the review's validity or the reliability of its findings.

Recently, Squires, Estabrooks, O'Rourke, et al. (2011) conducted a systematic review of self-report RU measures used in health care studies. They examined the acceptability, reliability, and validity of the 60 identified instruments. Despite the increase in available measures, many of the same limitations that Estabrooks, Wallin, et al. (2003) noted continued to persist in the measurement of RU. Squires Estabrooks, O'Rourke, et al. proposed that "defensible self-report measures of research utilization" (p. 14) are

urgently needed in the field of knowledge translation research and recommended that researchers incorporate methodologies for determining the following evidences of measurement validity:

> *Content evidence* refers to the extent to which the items in a self-report measure adequately represent the content domain of the concept or construct of interest. *Response processes* evidence refers to how respondents interpret, process, and elaborate upon item content and whether this behaviour is in accordance with the concept or construct being measured. *Internal structure evidence* examines the relationships between the items on a self-report measure to evaluate its dimensionality. *Relations to other variables evidence* provide the fourth source of validity evidence. (p. 6)

Using the AMSTAR tool to critically examine the quality of this systematic review revealed that it was well designed, with a clear research question, inclusion/exclusion criteria, and comprehensive search criteria in multiple electronic databases. The "Standards for Educational and Psychological Testing Validity Framework" (Squires, Estabrooks, O'Rourke, et al., 2011) was applied in a comprehensive manner to evaluate the quality of the psychometric properties of the instruments in the review. The high quality of this review enhanced its findings about the limitations of several instruments that included only one self-report item that asked nurses to indicate the extent to which they utilized research in their practice, with no definition or exemplars to guide the participant's response (Brown, 1997; Nelson, 1995; Parahoo, 1998; Veeramah, 1995). These instruments were not associated with any conceptual framework, nor did they

reflect the various types of RU Estabrooks (1999a) and her colleagues proposed. Therefore, it could be suggested that these instruments were insufficiently developed to be compatible with any existing RU conceptualization or to possess the reliability and validity required to measure the RU construct.

Several other observations can be made after further examining the instruments identified in these two systematic reviews. A number of tools have been developed to measure nurses' participation in/ conduct of research within their practice (Alcock, Carroll, & Goodman, 1990; Humphris, Hamilton, O'Halloran, Fisher, & Littlejohns, 1999; Pain, Hagler, & Warren, 1996; Tsai, 2003; Wells & Baggs, 1994). These instruments could be considered for collecting data required to determine the RU associated with engagement and collaboration among researchers, clinicians, and key stakeholders. However, they provide limited data for examining the association between individual and contextual factors and RU in practice. Furthermore, both of the reviews discussed here (Estabrooks, Wallin, et al., 2003; Squires, Estabrooks, O'Rourke, et al., 2011) examined self-report measures of RU and did not consider measures of evidence-based practice or types of RU measures other than those used in self-reporting (e.g., observational measures or chart audits).

Recently, Van Eerd et al. (2011) conducted a review of the literature to "identify reliable, valid and/or useful instruments to apply in the assessment of knowledge transfer and exchange (KTE) implementation and its impact" (p. 3). Their review included qualitative and quantitative studies from a "wide [range of research fields], knowledge transfer and exchange approaches, contexts and outcomes with an explicit link to a

research evidence base" (Van Eerd et al., p.3). The AMSTAR tool was also applied to assess this systematic review. The team of reviewers consulted with multiple expert stakeholders and provided details of the comprehensive list of terms used in the bibliographic search of multiple databases. Due to the extensive body of literature, they decided to limit their review to those reports using some type of instrument for collecting data directly from health care practitioners. A total of 66 instruments (12 qualitative and 54 quantitative) were identified as having been used to measure KTE implementation and impact. Fifty-four (89%) of these studies were conducted in the health care setting. Details of the process and criteria applied to assess the quality of both the qualitative and quantitative studies were included in the appendices of the report. Although the reliability and validity of the tool the reviewers developed to assess the quality of the studies were not reported, their review included an appraisal of all of the critical elements relevant to undertaking a comprehensive critical review of research, for example, research question(s), conceptual framework, target population, sample selection, methodology, reliability, and validity of instruments (DiCenso et al., 2003).

Several instruments that Van Eerd, et al. (2011) identified measured the implementation of specific research products such as research protocols (Dufault, Bielecki, Collins, & Willey, 1995; Edwards et al., 2005; Price, Hillman, Gardner, Schenk, & Warren, 2008; Rashotte, Thomas, Gregoire, & Ledouz, 2008; Titler et al., 2009). The advantage of using these measures is that they include observational or chart audit data collection in addition to nurses' self-reports, which decreases the potential for inflated responses that can occur when participants perceive certain responses to be socially

desirable (Loiselle et al., 2007). However, there are also several important limitations to using these instruments. They can only be applied to measure the implementation of specific guidelines. As additional evidence becomes available and guidelines or policies are revised, the instruments become obsolete. Furthermore, they do not measure nurses' understanding or acceptance of the scientific paradigm. It is conceivable that nurses simply adopt new policies and practices in the same manner they adopted and adhered to traditional practices in the past. Nurses could have no understanding of the concept of research utilization but could receive a high score in RU for simply following a guideline as instructed by a manager or unit educator. Thus, the instruments within this grouping are more appropriate for measuring the adoption of RU at the organizational level than for measuring individual nurses' RU.

Overall, Van Eerd et al. (2011) found that 55% of the reviewed studies did not report sufficient details regarding the psychometric properties of the instruments used in data collection. More specifically, validity was reported for only 26% of instruments, with face validity (15%) being the most commonly reported, while instrument reliability was reported in only 30% of the studies. Only 9% of studies reported both measures, and 55% reported no psychometric information for the instruments used. Similar to the authors of the previously discussed reviews, Van Eerd et al. concluded that the overall quality of available instruments was low and recommended that researchers collaborate with KTE practitioners in developing instruments with sound properties that could be applied in a wide range of practice contexts.

Estabrooks' (1997) Research Utilization Survey was identified by this researcher as the only instrument in the literature containing measures of all four types of RU, as well as measures of many of the individual and contextual factors shown to be associated with RU in previous studies. The instrument included measures of those factors which were of interest to this investigation and reliability and validity coefficients were reported.

Prior to the approval of the current study J. E Squires (personal communication, May 30, 2008) on behalf of Dr. Estabrooks, provided this investigator with a copy of a revised version of the Research Utilization Survey. The new instrument contained three key modifications. First, the three measures of overall RU that had been included in the original version of Estabrooks (1997, 1999a) instrument had been replaced with only one measure of this construct at the end of the survey. Secondly, the instrument no longer contained measures of the participant demographics, individual nurse's characteristics or measures of contextual factors. Finally, modifications had been made to the wording of the definitions of each type of RU and the Likert-scale responses.

The change to the responses of items measuring each type of RU included the replacement of a 7-point Likert-scale which originally asked nurses to respond to the frequency of their research use over the past year. The descriptors were provided on only 4 of the numbers on the equidistance scale. The labelled responses corresponded to numbers on the scale included, 1- *never*; 2- *on 1-2 shifts*; 5- *on about half the shifts*; 7- *nearly every shift*. The revised instrument included responses using a five-item ordinal scale, that asked nurses to quantify their research use on their last typical work day. The new scale of responses ranged from 1- "*10% or less*" to 5-"*Almost 100%*". The changes

to Estabrooks' original instrument appeared to have the potential to enhance the interpretation of data collected through its application in studies. Only one example of the use of this instrument was identified in the literature prior to data collection for this study. No data were available regarding the psychometric properties of the revised instrument.

Additional examples were also found in the literature of studies in which Estabrooks' measures of RU using a five point ordinal scale was used for data collection, however in these studies the descriptors of the responses ranged from 1- "*never"*; to 5-" *always*" (Estabrooks, Chong, et al., 2003; Milner et al., 2005). These studies provided detailed descriptions of the modifications that had been made to Estabrooks' original survey, however, as in the studies identified above, they did not include evidence to support that validity or reliability of the modified measures.

Additional Instruments Published Following Study Approval

Measures of RU. After the current study was underway, studies were identified in the literature that had implemented Estabrooks revised instrument. However, these investigations did not contain reports of the validity or reliability of the revised measure (Cummings, Hutchinson, Scott, Norton, & Estabrooks, 2010; Estabrooks, Squires, et al., 2008; Mallidou, et al., 2011).

More recently, Squires, Estabrooks, Newburn-Cook and Gierl (2011) reported on the development and validation for a survey for use in measuring conceptual RU among health care aides in the long term care setting. In this report, the researchers provided a comprehensive application of current instrument design and validity testing principles. Their findings suggested that with additional modifications, the instrument could be a

valid measure of the construct and had the potential to address some of the issues associated with the use of self-report RU measures which have been identified in the literature. The validity of this instrument in measuring conceptual RU among rural and urban nurses has not been examined.

Measures of Factors Associated with RU. Soon after committee approval was received for this study, two relevant additional instruments were found in the literature (Estabrooks, Squires, et al., 2008; McCormack, McCarthy, Wright, Slater, & Coffey, 2009). These instruments were specifically developed to measure contextual factors associated with quality outcomes of care, including RU and the PARiHS framework was identified as the conceptual framework for both instruments.

Estabrooks, Squires, et al. (2008) designed and tested the *Alberta Context Tool* (ACT) to measure organizational context and RU behaviours of health care providers and managers in acute care settings. Their instrument included eight elements of context that the developers believe represent modifiable factors within an organizational context that may be predictive of RU (See Appendix B). ACT is based on the Promoting Action on Research Implementation in Health Services (PARiHS) framework. It included measures of sub-concepts of context, defined in the current version of this model as culture, leadership, and evaluation but not receptive context. Measures of receptive context appear to have been replaced with the addition of measures of organizational, human, structural, and electronic resources; information-sharing interactions among staff; information-sharing activities; and information processes (or social capital). Each of these measures represents additional factors within the context of health care that may be associated with

RU. The developers of ACT have not explicitly addressed whether these factors represent aspects of the receptive context or of the other three sub-concepts of context within the PARiHS model or if they represent additional sub-concepts within that domain.

Estabrooks, Scott, et al. (2008) conducted a pilot study in four Canadian acute care hospitals and included five professional groups (nurses, physicians, managers, clinical specialists, and allied health providers) when they tested the validity and reliability of ACT. They found that "the eight variables [as outlined] explained 70% of the variability in reported research use by the five professional groups" (Estabrooks, Scott, et al., 2008, p.6). This instrument has also been tested for use in studying RU among health care aides in long-term care settings (Estabrooks, Squires, Hayduk, Cummings, & Norton, 2011; Mallidou et al., 2011). Additionally, Estabrooks, Squires, Hutchinson, et al. (2011) tested ACT's capacity to distinguish measurement of factors associated with RU; among individual health care providers; in unit-level teams; and at the organizational level of health care delivery. Their findings suggested that different factors may be associated with RU among each of these levels within health care. This instrument includes many of the measures of the factors that have been identified in the rural nursing literature; however, to date, ACT has only been tested using data collected from health care organizations based in large urban centres.

The second instrument, the *Context Assessment Index* (CAI) was developed by a team of researcher led by McCormack, one of the principle developers of the PARiHS model. McCormack et al. (2009) conducted a multi-staged study to develop the CAI, which contains 37 items, as an effective, reliable, and valid instrument to measures

context. In their multi-phased study, they identified five key elements of context significantly associated with the "readiness of a practice context for research utilization" (McCormack et al., 2009, p. 1). McCormack et al.'s (2009) findings indicated that 48% of the variance in scores of successful research implementation in a long-term care setting was explained by the variance in the scores of these five elements (factors).

The elements measured within this instrument were 1) collaborative practice, 2) evidence-informed practice, 3) respect for person, 4) practice boundaries, and, 5) evaluation. This instrument may have been useful in measuring some of the differences identified in the comparisons that have been discussed in the review of the rural and urban nurses in this literature review.

Although, acceptable levels of validity and reliability for the instrument have been reported in the literature, the researchers did not explain how these newly identified elements were linked with the sub-elements of context that had been previously identified in the PARiHS framework (i.e., receptive context, culture, leadership, and evaluation). From the description of the new set of contextual elements and the examples given, it appears that the original elements had been subsumed within them. The relatedness of this measure with the PARiHS framework, which serves as the theoretical underpinning of the instrument may require further clarification. Although a review of the items within this instrument appear to align with the differences identified in the comparisons that have been discussed in the review of the rural and urban nurses in this literature review, the study results on which the instrument was based were conducted in the U.K. and only in

long-term care settings. The extent to which the same elements would be significant across cultural boundaries or in acute care practice settings has not been examined.

As stated earlier, neither of these two instruments were available during data collection for this study. Use of the CAT and CAI measures in future studies will be discussed in Chapter five, the final chapter of this thesis.

Summary

In this literature review, the individual characteristics and contextual factors that have been found in both the rural nursing and RU literature were identified. Evidence supporting the association between these factors and RU was also examined. Conceptual frameworks relevant to the focus of this study were distinguished from the wide range of frameworks that have been reported in the literature. Additionally, the quality of the instruments that have been designed to measure RU were assessed. This review informed the design and interpretation of the findings of the current study. The study findings, in turn, contribute to the state of the evidence in both RU and rural nursing literature.

Theoretical Framework

The numerous conceptual frameworks identified in the literature suggest that RU is a complex phenomenon that can be examined from multiple perspectives (Mitchell et al., 2010; Sudswad, 2007). Selecting a framework that is compatible with a researcher's perceptions and that incorporates the key elements of interest in a study contributes to an understanding of the phenomena by facilitating the interpretations of a study's findings at the theoretical level (Pedhazur & Schmelkin, 1991).

The factors associated with RU selected for this study include (a) nurses' attitudes towards RU, (b) nursing position, (c) nursing education, (d) interpersonal relationships supportive of RU, and (e) organizational resources. These factors were chosen because they have been identified in both the rural nursing and the RU literature. In addition to examining the association between these factors, this study examined the extent to which their association with RU may be influenced by the environments in which nurses practice (specifically the influences of rural and urban environments).The extent to which the practice environment (environmental context) plays as role in RU and the factors associated with its use has not been scientifically examined in any depth.

The PARiHS framework which was originally developed by Kitson et al. (1998) has undergone several revisions and continues to evolve based on emerging evidence (Harvey et al., 2002; Kitson, 2009; Kitson et al., 2008; Rycroft-Malone, Kitson, et al., 2002; Rycroft-Malone, Harvey, et al., 2004). The version of the model that was available at the time that this study was undertaken (Kitson, et al., 2008) was applied as the conceptual framework for the current investigation. This model was chosen because it conceptualizes context as one of three key predictors of RU. The PARiHS model has been used as the conceptual framework in several recent studies within various health care settings, including studies with Canadian nursing subjects (Cummings et al., 2007; Cummings et al., 2010; Estabrooks, Midodzi, et al., 2007; Jansson, Bahtsevani, Pilhammar-Andersson, & Forsberg, 2010; Wright et al., 2006). Therefore, the selection of this framework enhanced the comparisons that could be made between this study's

findings and the previous investigations, hence contributing to the emerging body of knowledge in this field.

The PARiHS framework was composed of the following three interconnected core elements which, according to its developers, predict the successful implementation of research in practice: "The nature and type of evidence to be implemented into practice, the qualities of the context in which the evidence is being introduced, and the way the process is facilitated" (Kitson et al., 2008, p. 2). Within the PARiHS model, context was originally defined as "the environment or setting in which the proposed change was to be implemented (Kitson, et al., 1998, p. 152). More recently this broadly stated and inclusive definition of context within the model was contrasted with the identification of the following four contextual sub-concepts that were identified by the developers to represent the contextual factors that were predictive of RU (Kitson et al., 2008): (a) a receptive context; (b) an organizational culture supportive of RU; (c) transformational leadership supportive of teamwork, collaboration, and change; and (d) a mechanism for evaluating and providing feedback on the effectiveness of care delivery. Kitson et al. (2008) postulated that nurses working in organizations that exhibited a high degree of these four contextual sub-concepts were more likely to exhibit a greater degree of RU.

Recently, Kitson (2009) suggested that while organizational context likely plays an important role in RU, there is a growing awareness that factors relating to social and economic contexts also influence the successful up-take of research knowledge. She proposed that adopting a systems theories perspective, in which organizations are considered open systems, may further enhance an understanding of the RU phenomenon.

Kitson asserted that organizational systems within which RU occurs consist of complex, multidimensional, and multilayered and interdependent structures and relationships. Complex interactions constantly occur between both the internal and external elements of complex systems (Kitson, 2009). McCormack et al. (2002) acknowledged that "health care practice … takes place in a variety of settings, communities and cultures that are all influenced by (for example) economic, social, political, fiscal, historical and psychosocial factors" (p. 96). Therefore, it can be proposed that in addition to organizational factors, other factors external to health care organizations may also significantly influence RU.

This investigator postulates that while progress has been made in understanding the RU phenomenon through studies that have identified organizational contextual factors, additional knowledge may emerge by examining the role played by factors external to organizations (i.e., factors arising from environmental contexts). More specifically, a study of the differences associated with factors related to the rural environmental context may be illuminating. It has been reported that in rural environments, the boundaries between individual and organizational entities and the rural communities in which they are located are less distinct than the ones that exist in large urban centres (Baumann et al., 2006; MacLeod, Kulig, Stewart, Pitblado, & Knock, 2004). Additionally, researchers have found that rural health care providers are less able to separate their personal and professional identities compared to their urban counterparts. (Baumann, et al., 2006; Bushy, 2002, 2005; CIHI, 2002; Kulig et al., 2006; MacLeod, Kulig, Stewart, Pitblado, & Knock, 2004; McCarthy & Hegney,1998). Since little research has been undertaken in populations outside of large urban centres, it is not known if the unique characteristics

associated with the rural environmental context contribute to differences in the individual and organizational factors that have been identified as predictive of RU in these two distinct environments (rural and urban).

The factors identified as being associated with RU in the rural and RU literatures aligned with contextual sub-concepts of organizational culture and receptive contexts within the PARiHS framework. No factors within the framework's categories of transformative leadership (as defined within the PARIHS framework) and evaluation mechanisms (the two other contextual sub-concepts) were identified as relevant in the rural literature and therefore, were not the focus of this study.

Additionally, individual nurses' attitudes and beliefs towards RU (i.e., positive RU attitude, belief-suspension, trust, and competence), level of education, nursing position, and full-time versus part-time employment were cited as individual characteristics distinguishing rural from urban nurses and also as being associated with RU. Although Kitson (1999) acknowledged an association between the characteristics of individual adopters and the effective implementation of research in an earlier publication, these characteristics are not currently included in the PARiHS framework. Since several individual characteristics have been demonstrated to be relevant in RU (Estabrooks, Floyd, et al., 2003; Squires, Estabrooks, Gustavsson, 2011) and a comparison of rural and urban nurses suggested that these factors may differ significantly between these two groups, these characteristics were examined in this study.

Although the PARiHS framework provides a description of the three elements that are believed to influence research implementation, the actual construct of RU is less

clearly developed. Therefore for this study, Estabrooks' (1997, 1999a) conceptualization of RU was used to complement the concept of RU proposed within the PARiHS framework. As discussed earlier, Estabrooks empirically demonstrated four distinct forms of research utilization: direct, indirect, persuasive, and overall RU. For this study, examining the use of the three types of RU, in addition to measuring overall RU, enhanced the depth of comparisons that could be made regarding RU between nurse participants working in rural and urban practice environments.

The PARiHS framework and Estabrooks' (1997) conceptualization of RU guided the selection of an instrument for data collection in this study. Choosing an instrument compatible with the study's conceptual framework was particularly important, since at the time of this study, available measures of RU were reported to be generally underdeveloped (Estabrooks, Wallin, et al., 2003; Frasure, 2008; Pedhazur & Schmelkin, 1991; Wallin, Estabrooks, Midodzi, & Cummings, 2006).

Definition of Variables

Research Utilization

Research utilization (RU) was defined in this study as the translation of research (scientific) evidence in nursing practice. Types of RU that were examined include instrumental (direct), conceptual (indirect), persuasive (symbolic), and overall translation of research knowledge. In this study, instrumental (direct) utilization was defined "as the concrete application of the research [knowledge, comprised of the research] that has been normally translated into material or usable form such as protocols, [policies and practice guidelines] (Estabrooks, 1999a, p. 204). This research has been "used to make specific

decisions [about] interventions" (Estabrooks, p. 204). In contrast, conceptual RU referred to the changing of one's thinking, but not necessarily one's actions, because of the research. This type of research [knowledge] utilization may have enlightened practitioners and decision makers but may not have directly led to changes in nursing practice (Estabrooks, 1999a). Persuasive RU "addressed the use of research [knowledge] as a persuasive or political tool to legitimate a position or practice" (Estabrooks, 1999a, p. 204). Overall RU was defined as nurses' overall perception of their usage of research knowledge in practice.

Individual Factors

Individual factors were defined as those characteristics of individual nurses that have been associated with RU in nursing studies. Individual factors examined in this study include (a) nurses' attitudes and beliefs towards RU, (b) nursing position, and (c) nursing level of education. Nursing demographic factors (e.g., gender, age, years in nursing, and tenure) have not been found to be significantly associated with RU in past investigations; however, these factors were also examined to ensure that they did not present a confounding effect in this study.

Contextual Factors

To enhance clarity regarding the use of terms within this study, it was important to define the concept of contextual factors. McCormack (2002) defined context as the physical, social, cultural, and structural places where health care services are delivered and in which research can be implemented to enhance practice. Kitson (1999) postulated that contextual factors could be defined as physical, social, cultural, and structural factors

associated with individuals, teams, and organizations that may influence RU. Dopson (2007) suggested that context is central to optimal RU in health care settings. As indicated earlier, only two of the contextual sub-concepts identified in the PARiHS framework were examined in this study: organizational culture and receptive context. Organizational culture was reflected in the measures of (a) professional group affiliation, (b) organizational relationships supportive of RU, and (c) nurses' autonomy over practice. Receptive contexts were reflected in the measures of access to organizational resources such as (a) champions or persons with expertise in research use, (b) the availability of materials and technologies for accessing evidence-based information, (c) time to engage in RU, and (d) the availability of ongoing in-services or educational opportunities that support research utilization among nurses. The focus of this study was to determine if the rural or urban location of nurses played a significant role in determining RU. The rural or urban location of participants in this study was therefore conceptualized as a measure of the environmental context and as being distinct from measures of the organizational context.

Rural Acute Care Hospitals

The challenges associated with defining the concept of rural were presented in the review of the literature. For clarity, the nurses in this study were distinguished according to the rural/ urban classification of the acute care hospitals in which they were employed. Acute care hospitals were defined as being either rural or urban according to the rural designation adopted by the Ontario Hospital Association's Joint Policy and Planning Committee, Small, Rural and Northern Hospital Advisory Group (JPPC, 2006).

Consequently, hospitals were defined as being rural when they consisted of less than 100 acute care beds and were geographically located in communities with a rural designation. Urban hospitals were defined as those that provided tertiary acute care services and were located within urban settings. In 2006, the Ontario Ministry of Health and Long-Term Care introduced a regional model of health care delivery in which the province was divided into 14 regional Local Health Integration Networks (LHINs). Each LHIN was assigned the responsibility for planning and administering the delivery of health care services within its region (Ministry of Health and Long-Term Care [MHLTC], 2009). A JPPC (2006) report listed 92 acute care hospitals in Ontario that were categorized as rural acute care hospitals. Appendix C provides a list of these 92 hospitals and their LHIN allocation. The convenience sample for this study worked in hospitals located in the South West LHIN, which was selected as the target for this study. It contains 20 rural and 8 urban hospitals. At the time of this study, over 5,000 nurses worked in either rural or urban settings within this LHIN, which was selected because it contained large numbers of nurses working in both settings.

Summary

A review of the literature illustrated that little is known about RU among rural nurses in Canada. Studies comparing rural and urban nurses have identified factors associated with differences in the environmental context that contribute to differences between these two groups of nurses and their nursing practice. Many of these same factors appeared in the RU literature. However, there is insufficient evidence to support any conclusions related to the similarities or differences in RU or in the relevance of the

identified factors in RU among nurses working rural settings. The comparison of rural and urban nurses RU in this study contributes further to evidence in this field of study.

For this study, selecting the PARiHS framework, in which context is identified as a key element associated with RU, and combining it with Estabrooks' (1999a) multiple constructs of RU enabled a more comprehensive comparison of RU and related factors among the participating rural and urban acute care nurses. Selecting an instrument that was compatible with the conceptualization of RU and the PARiHS framework promoted the interpretation of findings resulting from this study and its contribution to the emerging body of knowledge related to factors associated with RU among nurses in various practice settings.

CHAPTER THREE:

METHOD

Study Design

This study employed a descriptive cross-sectional design. Quantitative data measuring 17 individual and contextual factors (independent variables) and RU among nurses (dependent variable) were collected using a paper-based, mailed, self-report survey. Analysis included a comparison of the responses of rural and urban nurses working in acute care hospitals.

Target Population

Acute care nurses working in a Local Health Integration Network (LHIN) located in the South West of Ontario, Canada, were selected as the target population for this study. The South West LHIN was chosen because it included a large number of registered nurses (RNs) working in hospitals representative of both rural and urban acute care settings. A total of 20 rural and 8 urban hospitals were designated as acute care hospitals within this LHIN. Nurses were considered for inclusion in this study if they (a) identified themselves as general class RNs; (b) identified acute care as their primary practice setting; and (c) listed their primary place of employment as one of the 20 rural or 8 urban designated acute care hospitals within the South West LHIN (see Appendix D for a complete list of rural and urban hospitals).

The investigator submitted the address and postal code of all hospitals located within the South West LHIN that the Ontario Hospital Association (OHA) designated as being acute care hospitals to the College of Nurses of Ontario (CNO). In June 2009, the

CNO Provincial Registry List identified 5,197 general class RNs working in acute care settings within this LHIN. A total of 1,119 of these RNs were identified as working in one of the 20 designated rural acute care hospitals, and 2,633 were identified as working in one of the 8 urban acute care hospitals. An additional 1,445 nurses in the CNO database identified themselves as being primarily employed in an acute care setting. However, these individuals did not identify one of the designated acute care hospitals as their primary place of employment. Instead, this group of nurses indicated employment in health centres designated as long-term care, rehabilitation facilities, or other extended care settings. They were therefore excluded from the study. Of the sample of nurses clearly classified as working within rural or urban acute care hospitals, 480 rural nurses (43%) and 1,279 urban nurses (49%) had indicated on their annual registration renewal form their consent to release of contact information for the purpose of receiving requests to participate in research. This sub-sample was considered the target population for this study.

Sample Selection

An a priori calculation of the sample size was conducted to determine the required number of participants needed to detect differences between the two groups of nurses. Calculations of sample size are based on predetermined levels of probability of a Type I and a Type II error, and medium effect size (Cohen, 1988).

A level of significance of .05 (alpha value) and a power value set at .80 (1-.20 = .80) were selected for this study. Cohen (1988) indicated that these values were appropriate for use in most behavioural research studies, as they represent a difference

that is visible in a population. A total of 17 variables were examined in this study, including individual factors (8 measures), organizational culture (3 measures), receptive context (5 measures), and one environmental contextual factor (rural/urban). A two-step, algebraic, rule-of-thumb formula based on Cohen's (1988) power analytic approach was used to determine the study sample size (Green, 1991) as follows:

(Step 1) $\boldsymbol{L = 6.4 + 1.65m - .05\, m^2}$ if $m \leq 10$ (Green, 1991, p. 504)

Where m = the number of single predictors and for variable numbers more than 10, 0.6 will be added to L. Based on this criterion, L = 22.1 for 17 variables.

(Step 2) $\boldsymbol{N \geq L / f^2}$ **where** $\boldsymbol{f^2 = R^2 / (1- R)^2}$ (Green, 1991, p.504)

Where R^2 = .13 (medium effect size)

f^2 = .13/ (1-.13)

f^2= .13/ .87

f^2= .15

$N \geq$ 22.1 / .13 / (1-.13)

$N \geq$ 148

Based on this calculation, a minimum of 148 subjects was determined to be a sufficient sample size to accept or reject the null hypothesis with sufficient confidence. However, to avoid having a sample size smaller than 148 at the end of study and having a higher power for the study we decided to have as many participants as possible. In consideration of the lower rates of response often associated with mail in responses (i.e.,

25% – 60 %) (Couper et al., 1998), the CNO was asked to provide the mailing address information for all 480 nurses working in rural acute care hospitals who agreed to be contacted. Also, using SPSS program, version 16.0, a representative of the CNO randomly selected a sample of 500 nurses working in urban acute care hospitals from those who had agreed to be contacted, and their mailing address information was provided as well (see Figure 3.1). This study was designed to answer three questions. A null hypothesis implying that there were no differences between the two groups of nurses was implied.

Data Collection

Procedure for Gathering Data

The survey and covering letter requesting participation in the study were mailed to the home addresses of each of the 480 rural and 500 urban acute care nurses on June 3, 2009. The potential participants were requested to complete the survey and return it in a return-addressed and stamped envelope. Surveys were numerically coded in a manner that ensured confidentiality. The potential participants were given an information sheet that supplied details about all aspects of the study. The individuals who agreed to participate in the study were directed to complete and return the survey within a 2-week period. A reminder letter with an additional copy of the survey was mailed out 3 weeks after the initial mailing to all nurses who had not returned their survey. In the reminder, the nurses were asked to respond within the following 2 weeks. No subsequent reminders were sent out. As a small incentive for completing the survey, the nurses were offered an opportunity to enter a draw for a prize of a 1-year subscription to a nursing journal or

popular magazine. Responses to mail-out surveys that incorporate these combined strategies were reported in the literature to have achieved response rates between 25% and 60% (Couper et al., 1998).

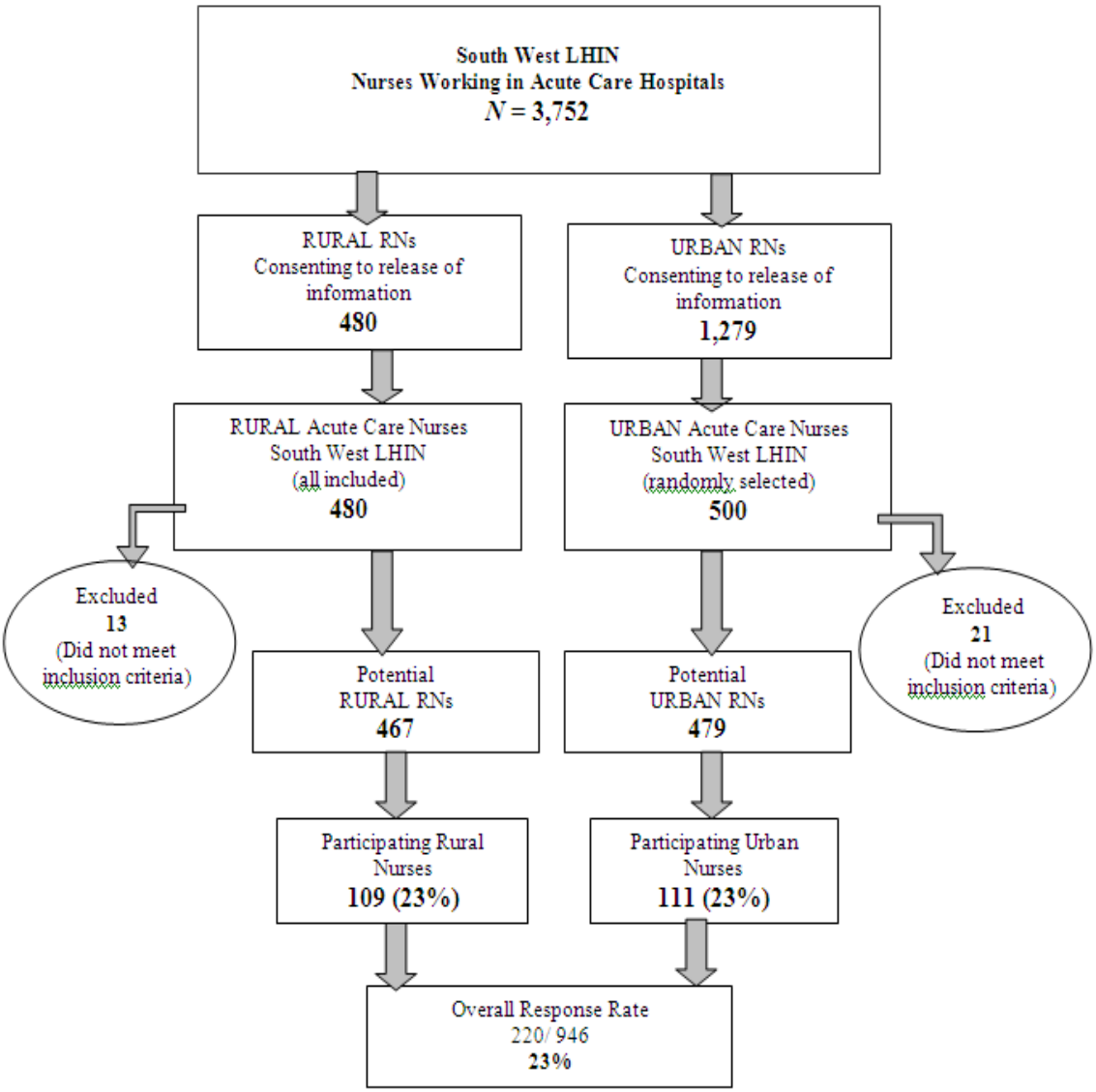

Figure 3.1. Study sample and responses.

Measuring Research Utilization and Associated Factors

According to the literature, limitations in the instruments available for measuring RU at the time of data collection for this study had contributed to the inconclusive and inconsistent results found in studies that had examined the individual and contextual factors associated with RU in nursing practice. Andresen (2000) stated that clearly identifying the criteria most relevant to measuring a specific phenomenon assists researchers in identifying the strengths and weaknesses of available instruments and in selecting the most appropriate instrument(s) for use in an intended study. Pedhazur and Schmelkin (1991) indicated that alignment of an instrument with the conceptual framework of a study strengthens the interpretation of data collected using a specific instrument. Additionally, selecting an instrument with reported levels of acceptable reliability and validity is critical to the interpretation of findings (Pedhazur & Schmelkin, 1991; Wallin et al., 2006).

Based on these considerations, the criteria established for selecting a compatible instrument for this study were as follows: (a) designed for collecting data from a relatively large number of respondents, located over a large geographic region, in a relatively short period of time; (b) included measures of RU that were compatible with the study's conceptualization of the types of RU (direct, indirect, persuasive, and overall); (c) incorporated measures of the key factors of interest in this investigation; and (d) had reported acceptable levels of reliability and validity.

The Research Utilization Survey. The shortened version of Estabrooks (1997) Research Utilization Survey (RUS) that had been used by Kenny (2002) and Connor

(2006) was selected as the instrument to collect data for this study. This self-report survey was the only one identified as meeting all of the previously described selection criteria, compared to the instruments available when this study received approval for data collection by McMaster University Research Ethics Board (April 2009). The measures in Estabrooks' survey were determined to be compatible with the conceptualization of RU proposed by Estabrooks (1997, 1999a) and constructs of organizational culture and receptive context identified within the PARiHS framework. Additionally, the reliability and validity of this instrument had been reported, including its construct validity (Connor, 2006; Estabrooks, 1997; Estabrooks, Chong, et al., 2003; Kenny, 2002).

As noted in the literature review, a newer version of Estabrooks RUS instrument had been developed prior to the undertaking of data collection for this current investigation (J. E. Squires, personal communication, May 30, 2008). However, the modifications to the instrument rendered it less suitable for use in the data collection for this study because it no longer contained measures of nurses' characteristics and contextual factors that were the focus of this study. It was also noted that although the wording and responses for the measures of each type of RU had been significantly modified in the revised instruments, no data had been reported to support the validity or reliability of the changes. Therefore, a decision was made to use a shortened version of Estabrooks original instrument that had been used in previous investigations.

The updated search conducted after data were collected for this study resulted in the identification of additional instruments that appear to have been developed specifically to measure contextual factors associated with RU. These were not available at the time of

the proposal's development. The implications of using these instruments in future investigations will be considered later when the findings of this thesis are discussed.

Estabrooks' original instrument contained five sections and included 90 items measuring the various types of research nurses used and 25 factors that had been associated with the use or non-use of research findings in practice. Both Kenny (2002) and Connor (2006) with Estabrooks' permission, reduced the original survey to 39 items, including 14 items measuring the various aspects of research evidence and types of research use and 25 items measuring individual and contextual factors. The shortened survey retained only items that Estabrooks (1997) identified as being significantly associated with RU. For this current study, the items within the survey were grouped into the following categories: (a) RU, including measures of instrumental, conceptual, persuasive, and overall RU; (b) individual characteristics and demographics of nurses, including level of nursing education and position in nursing, years in nursing, and tenure within the current organization; (b) attitudes and beliefs towards RU (attitude, belief suspension, trust, and perceived RU competence); (c) organizational(professional affiliations, interprofessional relationships supportive of RU, nurses' perception of authority over practice); and (d) receptive contexts (access and importance of material resources, time for RU activities, access to ongoing in-service and educational opportunities, and access to an RU champions). Appendix E provides a detailed description of the measurement for each variable.

Estabrooks articulated that types of RU and the concept of overall RU were complex phenomena that could be measured only indirectly. In the survey, the concept of

Overall RU was measured using a single item that asked nurses the following question: "Overall, in the past year how often have you used research in some aspect of your nursing practice?" In their responses, the nurses were asked to define overall RU specific to "the use of any kind of research findings (nursing and non-nursing), in any kind of way, in any aspect of [their] work as a nurse [and not to] count as research, things learned in [their] nursing school or [in their] basic training." The nurses were asked to answer using a 7-point Likert scale with responses ranging from 1 (*never*) to 7 (*nearly every shift*). The same overall RU question appeared in three separate places in the questionnaire: once at the beginning of the research use section (Overall RU #1), then after the measures of both instrumental and conceptual RU (Overall RU #2), and finally after the question measuring persuasive RU (Overall RU #3).

In developing her instrument, Estabrooks (1997, 1999a) used three methods to test and report on the reliability and content validity for the measure of RU among nurses and for each of the factors identified as contributing to RU. First, she completed an extensive review of the literature and incorporated available measures of specific variables as sub-scale measures within her instrument. Where measures did not exist, she applied questionnaire design theory to create single and multi-item measures of the factors. Second, two researchers with expertise in instrument development and RU reviewed each of the items within her survey. Three doctoral students also provided feedback related to its length and clarity. Finally, the revised instrument was used in a pilot study with a convenience sample of 23 post-baccalaureate nursing students and then applied in a large Canadian study that included 600 nurses. Estabrooks tested the internal consistency of

each sub-scale item and reported satisfactory Cronbach's α scores ranging from 0.72 to 0.85 (Estabrooks, 1997).

Estabrooks (1999a) applied structure equation modelling to test the proposed construct of the theoretical model that had served as the conceptual foundations for the instrument. Exploratory and confirmatory factor analysis tests are appropriate for determining evidence of an instrument's construct validity (Pedhazur & Schmelkin, 1991). Estabrooks (1999a) reported that the findings from the factor analysis supported the indirect measurement of conceptual, instrumental, and persuasive types of RU by nurses. She also found that these three types of RU explained over 70% of the variance in the measure of overall RU, the key construct of interest in her study. Estabrooks (1999a) also concluded that RU was a relatively stable construct that could be measured through the self-reporting survey she had developed. Her findings indicated that there was a statistically significant goodness-of- fit between the theoretical construct model underlying the instrument's design and the data in her study.

Several examples exist of the use of modified versions of Estabrooks' original instrument (Conner, 2006; Estabrooks, Chong, et al., 2003; Estabrooks, Kenny, et al., 2007; Estabrooks, Rutakumwa, et al., 2005; Estabrooks, Squires, et al., 2008; Kenny, 2002). Items from her original instrument have also been incorporated into a national Canadian survey examining the differences in RU among nurses, physicians, and policy makers (Birdsell, et al., 2005). In most documented uses of this instrument, researchers have removed items that were not relevant to their investigations or added single-item measures that were. Reports of the internal consistency and reliability of these modified

versions of the instrument have remained relatively stable. However, no additional studies were found that further tested the construct validity of the measures of RU within Estabrooks' survey.

It is important to note that not all data collected using the shortened version of Estabrooks survey were included in the analysis of findings for the current study. Only data obtained measuring the types of RU and associated factors were analyzed. The entire shortened version of Estabrooks' (1997) instrument, adapted by Conner (2006) and Kenny (2002), was administered to participants in order to preserve the reliability and validity of the instrument. Modifying, removing, or changing the order of items within an instrument could have diminished its capacity to measure the constructs it was designed to measure. The removal of items not directly applicable to the current study could have negatively impacted the reliability and validity of the instrument (Pedhazur & Schmelkin, 1991).

A total of 10 survey items were excluded in the analysis. The rationale for the decision to exclude data was as follows. First, data were excluded from three items that Estabrooks identified as serving an instructive purpose. In her written description of the instrument, she indicated that several items had been developed to promote compatibility between a study participant's definition of RU and the theoretical construct she had used to develop and test the instrument (Estabrooks, 1997, 1999a). For example, one item in the survey stated, "At one time or another, people writing in nursing have considered the items on the following list to be research utilization. When your actions are based on the findings of sound research, do YOU consider the following to be research utilization? "

(Estabrooks, 1999a, p.208). A list of 13 descriptors of instrumental, conceptual, and persuasive RU follow the question, and respondents are asked to provide a yes or no response. Estabrooks (1999a) indicated that this question and others similar in nature were designed to promote study participants' consideration of these forms of RU in their responses to subsequent survey questions.

The second set of data, from five items excluded from the analysis, was associated with questions designed to measure the *evidence* domain proposed within the PARiHS model. Kitson et al. (1998) described evidence and factors associated with it as one of the three essential elements in determining research utilization. However, the focus of this study was to examine the factors associated with RU. Therefore, data from questions examining evidence, its sources, and perceived quality were determined to be beyond this study's scope and subsequently excluded. Two additional survey items were excluded because it could not be determined by this researcher whether they were intended to measure constructs of types of RU or its associated factors. The ten excluded survey items are identified in Appendix F.

Although the data from these items were not analyzed in the current study, these data are available for future analysis. The findings from a secondary analysis of these data would provide additional results that would contribute to further determining the validity of the measures within Estabrooks' (1999a) instrument. The findings could also contribute to an enhanced understanding of the association between the two elements (evidence and context) within the PARiHS model, and the factors associated with RU among nurses in both rural and urban settings. The knowledge that could be gained

through completing a secondary analysis of these data would not require subjects to be burdened with completing an additional survey in the future.

One modification to the instrument was required for use in this study. In a question added to the demographic section of Estabrooks' survey, nurses were asked to identify their place of primary employment from a list of all designated acute care hospitals within the South West LHIN. Responses were recorded only as being rural, urban, or other. This question was added to ensure that the respondents were correctly coded according to the rural or urban categories that were being compared in this study. These data were not available from the CNO database. Dr. Estabrooks granted permission for the additional question to be included in the survey for this study. A copy of the modified version of Estabrooks' survey is included in Appendix G.

Ethical Considerations

Ethical approval was obtained from the McMaster University Research Ethics Board. The risks to participants in this study were identified as being minimal. A participant information sheet, which was mailed out with the survey, included a description of the study and information regarding the requirements, benefits, and risks for those who chose to participate. Potential subjects were reassured that their participation in the study would be kept confidential. To ensure that participants understood the study, the information sheet was rated at an 8.2 grade reading level using the Flesch-Kincaid Grade Level Score. A copy of the information sheet is included in Appendix H.

The original list of names and addresses received from the CNO was kept in a locked cabinet within the principal investigator's office, located within an academic setting. The surveys were coded, and only the investigators had access to the information linking the codes to the participants. At the conclusion of the study, the list containing participants' names and addresses was destroyed by shredding the document in a manner that complies with the requirements of the ethical review board. Only aggregate data were reported in the study findings.

Written consent was not requested, as the participants were informed that their return of a completed survey was considered implied consent for participation in the study. Participation consisted of the nurses responding to a self-administered one-time survey that took an estimated 30 minutes to complete. Therefore, the burden on participants was considered minimal. Entry into a draw for a nursing journal or popular magazine subscription was offered as a small incentive for participation. One prize was offered to each cohort of nurses (rural and urban). The maximum value of each subscription was $100. The entry ballots were included with the mailed-out surveys, and nurses were invited to return the ballot with the completed surveys. The chances for winning the draw were 1 in 109 for the rural respondents and 1 in 111 for the urban respondents. Winners were notified by mail with instructions to submit their journal selection to the researcher.

All participants were provided with the name and contact information of the principal investigator and the McMaster University faculty member who was identified as the thesis supervisor and local principal investigator. Participants were invited to contact

either investigator if they had any questions regarding the study or to request that a copy of the final study results be provided to them.

Data Analysis

Testing the Reliability of the RUS

To address the challenges associated with the development and testing of RU measures identified in the literature, the reliability of the indirect measures of RU contained within Estabrooks' (1997, 1999a) instrument was tested in the current study. Indirect measures were considered valid if they sufficiently predicted the occurrence of the phenomena that they were purported to measure (Pedhazur & Schmelkin, 1991). Reliability testing was performed by calculating the Cronbach's α score for the three measures of overall RU, contained within the instrument, in order to determine the consistency with which these items measured the construct. Evidence of a reliable and stable measure of overall RU was considered necessary to support using only the final measure (Overall RU #3) as the indicator of overall RU in the analysis of data for this study. A Cronbach's α score > .60 was considered sufficient evidence to support the reliability of this measure (Salkind, 2007).

Once the reliability of measures of overall RU was determined, only the last measure of overall RU (Overall RU#3) was used as the measure for the dependent variable, overall research utilization, in this study. The use of this final measure was consistent with how this construct has been measured in other studies (Estabrooks, Chong, et al., 2003; Profetto-McGrath et al., 2003) and with how the construct is measured in the revised versions of this instrument (Cummings, et al., 2010; Estabrooks,

Chong et al., 2003; Estabrooks, Squires, et al., 2008; Mallidou, et al., 2011 Milner et al., 2005)

Cronbach's α scores were also calculated to confirm the internal consistency of the multi-item sub-scale questions that measured the individual and contextual factors (independent variables) within Estabrooks' instrument. Specifically, the alpha coefficients for the sub-scales measuring the following variables were calculated: (a) RU attitudes (6 sub-scale items); (b) RU trust (3 sub-scale items); (c) belief suspension (6 sub-scale items); (d) organizational relationships supportive of research use (7 sub-scale items); (e) time to engage in RU (5 sub-scale items), and; (f) access to workplace resources (5 sub-scale items).

Descriptive Statistical Analysis

Demographic characteristics. All data collected from the participants were entered into a Predictive Analytics Software Statistics (PASW Statistics, version 18.0) database for statistical analysis. This program was used to conduct the statistical analysis for this study. Details of the plan for data analysis are provided in Appendix I.

Frequency of responses to items designed to collect nominal and categorical data were reported in the description of the sample characteristics. For those characteristics measured using interval and ratio measurement scales (e.g., years worked in nursing), the mean and standard deviation (*SD*) were reported. Data supplied by rural and urban participants were compared using the *t*-test or the Chi-squared statistical test, depending on the nature of the data, to determine if there were any statistically significant differences between the demographic characteristics of the two groups.

Research utilization. The data from responses in Part 2 of the survey were used to measure and compare the frequencies of three types of RU and the frequency of the overall RU between rural and urban nurses. Each type of RU was measured using the same 7 point-Likert scale that was used in measuring Overall RU, which was described earlier. The mean score and *SD* for each type of RU were calculated and a *t*-test used to compare the responses of rural and urban nurses. Salkind (2007) considered the *t*-test to be the appropriate statistic for determining if significant differences exist in the average (mean) scores of variables that are independently measured between two groups when the scores represent scale, ordinal, or interval data. The post hoc Hotelling's trace statistic was conducted to ensure that the appropriate percentage of error for significance ($p < .05$) was apportioned to the entire list of RU measures (Meyers, Gamst, & Guarino, 2006). This statistical test was conducted to ensure that the significance of the findings was not inflated (Warner, 2008).

Individual and contextual factors. Part 3 of the survey measured individual and contextual factors. Categorical, ordinal, and interval data measuring these contextual factors were compared for the two groups (rural / urban nurses). To determine if there were any statistical differences between the measures of these contextual factors reported by each group, *t*-tests were carried out to examine the calculated means of the ordinal and interval data, and a chi-square statistic was used to examine the frequency distribution of the categorical data (Salkind, 2007). Similar to the testing of the measures of RU, the post hoc Hotelling's trace statistic was conducted for each group of measures representing

individual attitudes and beliefs, organizational culture and receptive culture. A $p < .05$ was set as the significant value.

Bivariate and Multiple Linear Regression Analysis

A regression analysis is the statistical method of analyzing the variability in the dependent variable based on the measures of more than one independent variable (Pedhazur & Schmelkin, 1991). This statistical test was used to examine which of the individual and contextual factors (independent variables) were predictive of measures of overall RU (dependent variable) and to ascertain if environmental context played a significant role in determining RU among nurses (Gordon, 2010; Keith, 2006; Pedhazur & Schmelkin, 1991). As a first step in conducting this test, a correlation matrix of the dependent variable and all of the independent variables was conducted to determine which of the 17 factors (independent variables) were significantly associated with overall RU scores (dependent variable). Also a bivariate analysis was conducted to identify the factors significantly associated with overall RU. A significant correlation in this study was defined as one where the *r* coefficient was calculated to be $\geq$ +/- .20 and the *p*-value $\leq$ .05 (Howell, 2004). A separate analysis of rural and urban nurses' scores was conducted to determine if differences existed in the associations between measures of overall RU and the various independent variables (the individual and contextual factors) among these two groups.

Data from the dependent variable and factors significantly associated with RU were examined to ensure that conditions for applying the multiple linear regression test had been satisfied, including (a) interval or scaled data used in the measurement of the

dependent variable and independent variables; (b) independence of observations; (c) normal distribution of the dependent variable; (d) linear relationships between the independent and the dependent variable using the homogeneity of regression slopes (Cohen, as cited in Leech, Barrett, & Morgan, 2008). Independent observation was addressed in the data collection process as part of the study's design. Participants were identified from the nursing registry, and respondents were not subjected to repeat measurement (Leech et al., 2008). The skewness of the data measuring the dependent variable was computed to determine if the data met the criterion of normal distribution (Leech et al., 2008). Skewness values between -1 and 1 were considered to be indicators of the normal distribution of data (Kinnear & Gray, 2008; Leech et al., 2008). The assumption of homogeneity of variance was computed using the Levene statistic, which PASW Statistical package, version 18.0 provided as part of the multiple regression analysis calculation. A Levene test result of a *p*-value >.05 is required to satisfy this assumption. Finally, the linear relationship between the independent and the dependent variable was tested using a scatter plot and calculating the homogeneity of the regression slope (Leech et al., 2008).

Parsimony and multicollinearity were two additional important considerations in conducting the multiple regression analysis (Leech et al., 2008; Pedhazur & Schmelkin, 1991). Since the regression analysis measured the extent to which each independent variable contributed to predicting the dependent variable, it was important to determine if multicollinearity existed among the independent variables. Multicollinearity among variables occurs when an independent variable that is significantly correlated with the

dependent variable is also highly correlated with the measures of one or more of the other independent variables. Such a finding would signify that the highly correlated variables may essentially be measuring the same phenomenon (Leech et al., 2008). Multiple linear regression testing calculates the independent predictive effect of each independent variable on the dependent variable. Highly correlated variables may incorrectly be identified as minimally predictive and lead to problematic interpretations of the findings. (Leech et al., 2008; Pedhazur & Schmelkin, 1991). Therefore, correlation coefficients resulting from the bivariate analysis of the independent variables were screened for *r* values $\geq$ +/- .60. If highly correlated pairs of variables were identified, they could have been combined into new variables or one of the variables could have been removed from the regression analysis testing. Consequently, the newly combined variables or the remaining variables may have been identified as significant predictors (Leech et al., 2008). However, Pedhazur and Schmelkin (1991) indicated that "it is possible for the . . . correlation between independent variables to be relatively low and for the squared multiple correlation of an independent variable with the rest of the independent variables to be high" (p. 448). Therefore, in addition to calculating the correlation coefficient, multicollinearity was also determined by including a calculation of the *tolerance* scores for each variable as part of the regression analysis test. These scores represented the extent to which independent variables were likely to be measuring the same constructs (Leech et al., 2008). A high tolerance score (> 0.1) signified that variables were unlikely to be measuring the same constructs (Pedhazur & Schmelkin, 1991). Any factors

demonstrated as exhibiting traits of multicollinearity would have to be adjusted or removed from the analysis.

Once all the assumptions associated with conducting a regression analysis were addressed, data from measures of overall RU were entered into the PASW statistical package as the dependent variable. The data obtained from the scaled data responses to overall RU measures were entered as the dependent variable (Overall RU#3). Several of the independent variables examined in this study, were measured by either categorical or nominal data. For the regression analysis these data were converted to dichotomous data and recoded into dummy variables (Gordon, 2010). Independent variables that were recoded in this way include a) location (*1= rural, 0= not rural*), (b) highest level of nursing education (1 = *baccalaureate/graduate level,* 0 = *diploma level*), (c) nursing position (1 = *manager/ educator/ researcher,* 0 = *staff nurse*), (d) level of competence in the critical review of RU (1 = *competence*, 0 = *no competence*), and (e) access to an organizational champion (1 = *yes,* 0 = *no/not known*).

First, a univariate linear regression was conducted to determine if rural location was significant factor in predicting overall RU. This testing was followed by a backward stepwise multiple linear regression analysis was conducted. Following this process only those variables that were significantly contributing to the prediction of overall RU measure remained in the model.

CHAPTER FOUR:

RESULTS

Study Sample

A total of 220 acute care nurses (109 rural and 111 urban) returned completed surveys between June and August 2009 which exceeded the required sample size of 148. The response rate was 23% among both rural and urban nurses. From the stamped dated postmarks on the return survey envelopes, it was determined that 63% of the respondents returned surveys after the first mail-out, and 21% were returned after the second mail out. The return dates were not identified on 16% of the surveys due to either the absence or illegibility of the stamped postmark. Tables 4.1 and 4.2 provides a comparison of the demographic characteristics of the participating rural and urban nurses. The c*hi-square* statistics calculated for the nominal and categorical data and the *t*-test statistics obtained for interval data revealed no significant differences in the demographic variables between the two groups of nurses. Only six male nurses (five urban and one rural nurse) responded to the survey; therefore, a comparison by gender was not conducted.

Testing the Reliability of the Research Utilization Survey (RUS)

A Cronbach's α score of .89 was calculated for the data of the three measures of overall RU, which suggested that the three items were measuring the same variable (Salkind, 2007). This finding was similar to Estabrooks' (1997) original study results and could be considered further evidence of the stability of this key construct within the instrument. The Cronbach's α for the sub-scale items in the RUS measures of (a) RU attitudes and beliefs, (b) organizational relationships supportive of RU, and (c)

organizational resources supportive of RU ranged between .74 and .89 (see Table 4.3 for full details). These results were similar to those reported in previous studies that used Estabrooks' instrument and were considered to be evidence that the measures continued to demonstrate sufficient internal consistency (Estabrooks, Chong, et al., 2003; Estabrooks, Kenny, et al., 2007; Estabrooks, Rutakumwa, et al., 2005).

Table 4.1
Comparison of Rural and Urban Nurses' Demographic Characteristics: Categorical Data (*N = 220*)

	Rural nurses		Urban nurses		Statistical comparison		
	n	%	*N*	%	test	*df*	*p*-value
Gender							
Female	103	94	110	99	Fisher's exact test		.12
Male	5	5	1	1			
Missing (excluded*)	1	1	0				
Basic education (entry-to-practice)							
Diploma	95	86	86	78	Fisher's exact test		.08
Baccalaureate/ graduate education	14	14	25	22			
Missing (excluded*)	1	1	0				
Highest education achieved: nursing							
Diploma	75	69	69	62	Pearson $Chi^2 = 3.26$	2	.20
Diploma plus additional certification	11	19	8	7			
Baccalaureate/ graduate education	22	20	34	31			
Missing (excluded*)	1	1					

Table 4.1 continued
Comparison of Rural and Urban Nurses' Demographic Characteristics: Categorical Data (*N = 220*)

	Rural nurses		Urban nurses		Statistical comparison		
	n	%	*n*	%	test	*df*	*p*-value
Highest education achieved: non-nursing							
Additional diploma or certificate	43	39	35	32	Pearson $Chi^2 = 1.51$	2	.47
Baccalaureate/ graduate education	9	8	9	8			
None	54	50	63	57			
Missing (excluded*)	3	3	4	4			
Nursing position							
Staff nurse	86	79	90	81	Pearson $Chi^2 = 2.06$	2	.36
Administrator/ manager	17	16	12	11			
Educator/APN/ researchTeam	5	5	9	8			

***** missing data excluded from analysis.

Table 4.2
Comparison of Rural and Urban Nurses' Demographic Characteristics: Interval Data (*N = 220*)

	Rural nurses *n* = 109		Urban nurses *n* = 111		Statistical comparison		
	Mean	*SD*	Mean	*SD*	*t-test*	*df*	*p*-value
Nursing experience Years in nursing	25.3	11.2	23.5	10.3	1.23	215	.22
Years of work in current organization	19.0	12.1	18.2	10.8	0.54	218	.59

Table 4.3
Reliability Coefficients for Items within the Modified Research Utilization Survey (N = 220)

Research Utilization Survey	# Items	Range of scores	Cronbach's alpha	Number of responses *n*[a]
Overall research utilization – same measure applied at three points in the survey:	3	1–7	.89	186
Attitudes and beliefs towards RU				
• Attitude	6	6–30	.74	216
• Trust	3	3–15	.89	216
• Belief suspension	6	6–30	.84	212
Organizational relationships supportive of RU	7	7–35	.88	159
Organizational resources supportive of RU				
• Time to engage in RU	5	5–25	.80	217
• Access to RU resources workplace resources	5	5–25	.77	214

[a] Variation in number of responses resulted from responses omitted by participants to some of the questions in the survey.

Research Question One

An analysis was conducted to answer the first research question, "Are there differences in research utilization (RU) between acute care nurses working in rural and urban settings?" During the analysis of data, an error in the 7-point Likert scale used to measure the types of RU was noticed in the printed survey. The placement of the label *on about half the shifts* had been shifted from number 5 (in the original survey) to number 4 in the surveys used in this study. Although this error was unfortunate, the investigator was not in a position to resend the questionnaire. It was unlikely to impact on the comparison of RU scores between the two groups of nurses, since all nurses received copies of the survey containing the same error. Also, studies were described in the

literature review, in which Estabrooks and her colleagues had made various modifications to the Likert-scale responses for the measures of RU. The intent of these changes appeared to be related to enhancing the interpretation of data (Cummings et al., 2010; Estabrooks, Chong, et al., 2003; Estabrooks, Squires, et al., 2008). The interpretation of the data from the current study, and comparison to studies that had used the original Likert scale was impacted by the unintended change to the position of the anchor in the scale.

Table 4.4 provides a comparison of the mean score and standard deviation for each type of RU and the results of the *t*-test used in the statistical analysis. The mean scores of instrumental, conceptual, and persuasive types of RU for both rural and urban nurses indicated that nurses were using these types of RU on about half of their shifts. The findings also suggested that there were no significant differences between rural and urban nurses' scores for any of the three types of RU. In both groups, conceptual RU was given the highest scores and persuasive RU the lowest. However, there was a significant difference in the scores for overall RU. Rural nurses reported statistically significant lower scores for overall RU: $t(208) = 2.43$, $p = .016$, and $d = .34$. The *d*-value refers to the effect size of the statistically significant difference (Leech et al., 2008). This value provides insights into the magnitude of the difference, in order to determine if the result was likely to represent a significant difference in practice. The reported *d*-value = .34 represented a moderate effect size (Cohen, as cited in Leech et al., 2008). This finding indicated that there were observable differences in overall RU between nurses working in rural and urban settings.

Table 4.4
Means and Standard Deviation (SD) Differences for Measures of Each Type of Research Utilization (RU) between Rural and Urban Nurses (N = 220)

Dependent variables	Score range	Rural nurses (*n* = 109)		Urban nurses (*n* = 111)		Statistical comparison			
		Mean	*SD*	Mean	*SD*	*T*	*df*	*p*	Cohen's *d*
Instrumental	1–**7**	4.4	1.8	4.8	1.9	1.73	199	.09	
Conceptual	1–**7**	5.4	1.8	5.6	1.8	0.79	200	.43	
Persuasive	1–**7**	3.4	1.5	3.6	1.7	0.90	204	.37	
Overall	1–**7**	4.5	1.8	5.1	1.7	2.43	206	.02	.34

Table 4.5 illustrates that the results of the post hoc Hotelling's trace statistic test support the findings of significant differences between overall RU scores between the rural and urban nurses: $F_{(4, 178)} = 2.76$, $p = .029$. However, these results suggest that instrumental RU scores may differ between the two groups (p=.04), with lower scores reported by rural nurses. The finding of a significant difference between rural and urban nurses' use of instrumental (direct) RU may have resulted from differences in the sample size used to calculate the two statistical tests. A case by case deletion of subjects identified as not having responded to each RU measure was used to perform a *t*-test, whereas a listwise deletion of subjects was performed for the Hotelling's trace test. The findings suggest that the mean score of both overall RU and instrumental RU for the nurses who responded to all measures of RU may have been reported to be significantly lower by rural nurses. However, a calculation of the effect size (d) was d =.24 which represents a small effect (Leech et al., 2008). The post-hoc testing supported the main

findings of lower overall RU scores among rural nurses, but no differences in conceptual or persuasive RU among scores between rural and urban nurses. Mixed results were associated with differences in instrumental RU between the two groups of nurses.

Table 4.5
Using the Hotelling's Trace Test to Compare Types of Research Utilization (RU) among Rural and Urban Nurses

		Statistical comparison		
	Score range	*F*	*df*	*p*
Instrumental	1–5	4.29	1	.04
Conceptual	1–5	.45	1	.50
Persuasive	1–5	.52	1	.47
Overall	1–5	8 .63	1	<.01

Casewise deletion of missing date; *N*= 283 including; Rural nurses *n* = 88; Urban nurses *n*= 95

Research Question Two

Another analysis was conducted to address the study's second question, "Are there differences in the individual and contextual factors associated with research utilization among acute care nurses working in rural and urban settings?"

Individual Factors

Demographic factors. As noted previously, there were no significant differences observed between rural and urban nurses on any demographic variables.

Attitudes and beliefs. The mean scores, standard deviation, and statistical comparison of rural and urban nurses' measures of attitudes and beliefs are provided in

Table 4.6. Nurses in both groups reported moderate to high measures of positive attitude and trust towards RU and moderate levels of willingness to suspend traditional beliefs in order to implement RU. The *t*-test results indicated that there were no statistically significant differences in the responses measuring trust in research findings ($t = 1.51$, $df = 215$, $p = .13$); positive attitudes towards RU ($t = 1.22$, $df = 214$, $p = .22$); and belief suspension ($t = .76$, $df = 215$, $p = .45$). Table 4.7 contains data for the differences in competence in reviewing research findings that nurses in the two groups reported. These differences were also found not to be statistically significant (Fisher's exact test = .35). The results of the Hotelling's trace test, illustrated in Table 4.8 supported the findings of no significant differences between the rural and urban nurses: $F_{(4, 194)} = .803$, $p = .525$.

Table 4.6
Attitudes and Beliefs Differences between Rural and Urban Nurses: Ordinal Data

		Rural *n* = 106		Urban *n* = 111		Statistical comparison		
Measures of attitudes and beliefs	Score range	Mean	*SD*	Mean	*SD*	t	*df*	*p*
Trust	3–15	10.3	2.4	10.8	2.6	1.51	215	.13
Belief suspension	6–30	21.4	4.7	21.9	5.2	0.76	215	.45
Attitude (sum of sub- scales)	6–30	24.6	2.7	25.1	3.0	1.22	214	.22

Note. Missing responses excluded from the analysis.

Table 4.7
Attitudes and Beliefs Differences between Rural and Urban Nurses: Categorical Data

Measures of attitudes and beliefs	Response	Rural *n* = 98		Urban *n* = 102		Statistical test
		n	%	*n*	%	
Competence in reviewing research	Yes	68	69.4	77	75.5	Fisher's exact test = .35
	No	30	30.6	25	24.5	

Note. Missing responses excluded from the analysis.

Table 4.8
Using Hotelling's Trace Test to Compare Measures of Attitudes and Beliefs among Rural and Urban Nurses

Measures of attitudes and beliefs	Score range	Statistical comparison		
		F	*df*	*p*
Trust	3–15	2.77	1	.09
Belief suspension	6–30	.27	1	.60
Attitude	6–30	1.11	1	.29
Competency in reviewing research	Yes/ No	1.02	1	. 31

Contextual Factors

Organizational culture. Three measures were used to collect data on factors of organizational culture that were supportive of research use. Details of the means, standard deviation, and statistical comparison of the rural and urban nurses' scores are provided in Table 4.9. Approximately half of the participants did not respond to the question related to professional affiliations. However, no statistically significant differences were

identified between the rural and urban nurses who did respond (t = 1.02, df = 114, p = .31). Although, almost all of the participants responded to the question asking nurses to rate the degree to which health professionals within their organization were supportive, a *t*-test result revealed that there was no statistical difference in the summed responses of rural and urban nurses (t = .36, df = 207, p = .72). Analysis of nurses responses to the questions asking them about their perceived authority to apply RU within their practice setting, also indicated that there was no statistical difference between the nurses working in the two settings (t= 1.85, df = 202, p =07).

The results of the Hotelling's trace test, which included all of the measures of organizational culture examined in this study (see Table 4.10), supported the findings of no significant differences between the rural and urban nurses: $F_{(3, 106)}$ = .98, p = .41.

Table 4.9
Factors of Organizational Culture: Comparing Differences between Rural and Urban Nurses: Ordinal Data

		Rural nurses			Urban nurses			Statistical test		
Measures of organizational culture supportive of RU	Score range	Mean	*SD*	*n*	Mean	*SD*	*n*	*t*	*df*	*p*
Affiliation with professional interest groups	Sum total	1.5	.8	58	1.7	.8	58	1.02	114	.31
Organizational relationships supportive of RU	7-35	19.4	6.1	101	19.1	6.5	108	-0.36	207	.72
Perceived authority to use RU	1-5	3.6	.8	102	3.9	1.0	102	-1.85	202	.07

Note. Missing responses excluded from the analysis.

Table 4.10
Using Hotelling's Trace Test to Compare Measures of Organizational Culture among Rural and Urban Nurses

Measures of organizational culture	Score range	Statistical comparison		
		F	*df*	*P*
Affiliation with professional interest groups	Sum total	1.16	1	. 28
Organizational relationships supportive of RU	7–35	.19	1	.66
Perceived authority to use RU	1–5	1.14	1	.29

Receptive context. Differences among five measures of receptive context were examined in this study. A comparison of the time that rural and urban nurses were given to engage in RU was not found to be statistically significant ($t = 1.18$, $df = 195$, $p = .24$). However, a comparison of nurses' access to RU resources in the workplace revealed that rural nurses' scores were significantly lower than urban nurses' ($t = 4.33$, $df = 215$, $p < .001$). The effect size of $d = .60$ was considered to be of medium size. A comparison of the scores of each of the five sub-scale items measuring access to workplace resources is provided in Table 4.11. The findings of the *t*-test analysis of each item indicated that rural nurses reported having less access to a medical library that contains research journals and library computers. Nurses were also asked to score the importance of access to these resources for RU. Again, rural nurses' scores were significantly lower than those of urban nurses ($t = 4.32$, $df = 204$, $p < .001$).

Table 4.11
Comparison of Factors of Receptive context supportive of Research Use among Rural and Urban Nurses: Ordinal data

Measures of receptive context supportive	Score range	Rural *n* = 106		Urban *n* = 111		Statistical comparison		
		Mean	*SD*	Mean	*SD*	*t*	*df*	*p*
Time to engage in RU	5–25	10.8	2.8	11.3	4.1	1.18	195	. 24
Access to workplace resources (sum of all items)	5–25	15.6	5.1	18.7	5.2	4.33	215	< .001
• Access to medical library with research journals	1–5	2.8	1.5	3.7	1.5	4.56	205	< .001
• Access to unit library with nursing materials	1–5	2.6	1.5	3.0	1.7	1.95	215	.05
• Library computer	1–5	2.3	1.8	3.4	1.5	4.86	213	< .001
• Internet electronic mail	1–5	4.3	1.1	4.4	1.2	0.19	215	.85
• Internet research resources	1–5	4.0	1.2	4.3	1.1	1.50	214	.14
Importance of access to resources	1–5	3.5	1.1	4.1	0.9	4.31	204	< .001

Table 4.12 illustrates the data collected to determine nurses' access to organizational champions. Twenty-seven (26%) rural nurses and 57 (51%) urban nurses responded "yes." A Fisher's exact test indicated a statistically significant difference between the responses of the rural and urban nurses ($p < .001$). The final measure of receptive context examined in this study was nurses' accessing of in-services and continuing education opportunities. Table 4.13 illustrates that although rural nurses reported lower participation in these events, the difference between rural and urban nurses was not statistically significant. The results of the Hotelling's trace test (see Table 4.14)

supported the findings of between group differences among the measures of receptive context: $F_{(9,165)} = 4.38$, $p = <.001$.

Few differences were found in the comparison of individual and contextual factors among the rural and urban nurses who participated in this study. No rural–urban differences were revealed in the demographic characteristics of the nurses, the scores of the individual factors that had been associated with RU in previous studies, and for most of the contextual factors that were examined in this study. The only exceptions identified in the findings were that rural nurses scored significantly lower than urban nurses on the following receptive context factors: (a) access to RU resources in the workplace, (b) the importance of access to RU resources, and (c) the availability of an organizational champion.

Table 4.12
Comparison of Factors of Receptive Context Supportive of Research Use among Rural and Urban Nurses: Categorical Data

Measures of receptive context	Score range	Rural nurses *n*	Rural nurses %	Urban nurses *n*	Urban nurses %	Fisher's exact test
Organizational champion	Yes	27	26	57	51	(p < .001
	No/Do not know	77	74	54	49	

Note. Missing responses excluded from the analysis.

Table 4.13
Statistical Comparison of Rural and Urban Nurses Accessing of In-service and Continuing Education: Interval Data (N = 214)

	Rural nurses *n* = 105		Urban nurses *n* = 109		Statistical comparison		
	Mean	*SD*	Mean	*SD*	*t-test*	*df*	*p*-value
Accessing of in-service and continuing education	10.0	8.2	10.7	10.1	.61	212	.54

Table 4.14
Using Hotelling's Trace Test to Compare Measures of Receptive Context among Rural and Urban Nurses

		Statistical comparison		
Receptive Context Measures	Score range	*F*	*df*	*p*
Time to engage in RU	5-25	1.473	1	.227
Access to resources (sub- scale items)				
• Access to medical library with research journals	1–5	20.034	1	< .001
• Access to unit library with nursing materials	1–5	3.54	1	.062
• Library computer	1–5	8.45	1	< .01
• Internet electronic mail	1–5	.044	1	.84
• Internet research resources	1–5	.03	1	.86
Importance of access	1–5	14.40	1	< .001
Organizational Champion	Yes/ No	9.35	1	< .01
Accessing in-services and continuing education	Sum total	.047	1	.83

Research Question Three

The final question addressed in this study was, "What is the relationship between identified individual and contextual factors and research utilization among acute care nurses working in rural and urban settings?" A multiple linear regression analysis was used to identify which individual and contextual factors were significantly associated with RU and to determine if environmental context (rural/urban) played a significant role.

Bivariate and Multiple Linear Regression Analysis

The conditions required for conducting a multiple linear regression analysis were verified. The independence of observation in the data collection process was addressed in the study design (surveys, mailed to individual home addresses). The assumption of normal distribution of the dependent variables was satisfied (mean = 4.9, *SD* = .8, skewness = -.34, SE = .17).

Before the multiple linear regression analysis was conducted, a correlation matrix of the independent variables was performed in order to determine any potential issues related to multicollinearity among independent variables. ($r > .5$, $p < .05$). Results of the correlation matrix are provided in Appendix J. A high correlation was identified between measures of reported years worked in nursing and years worked within the current organization ($r = .667$, $p < .001$). Since years of experience within the current practice setting was determined to be more relevant to this study and likely to reflect the measure of nursing experience, this factor was retained and the other excluded from the analysis. The tolerance scores for each independent variable was also calculated to be > 0.1;

therefore mulitcollinearity among the remaining variables was not considered to be a significant factor.

Next, a bivariate analysis was conducted to identify the independent variables that were significantly associated with overall RU (the dependent variable). Those independent variables are listed in Table 4.15 from highest to lowest *r* value. Although the correlation factor (*r*) was below the significant correlation criterion established for this study (i.e., $r < .20$), location (rural/urban) was significantly correlated with the dependent variables ($p = .016$). A separate bivariate analysis of rural and urban nurses' scores revealed differences in the associations between overall RU and various independent variables. Among urban nurses, most of the same significant correlations reported for the overall study sample were also found; however, higher correlations were discovered in the measures of access to organizational resources for RU ($r = .279$, and $p = .003$). Also, the results from the measures of two variables (importance of access to RU resources within the organization and the presence of an organizational champion) were not significant. One additional variable (highest nursing education), which was not significantly correlated for the rural sample, was found to be significantly correlated with overall RU among urban nurses ($r = .212$ and $p = .03$).

A separate bivariate analysis of rural nurses' responses also identified differences from the findings of the full sample analysis. Two variables, organizational time for RU and organizational access to RU resources, were reported to have lower correlation scores and levels of significance reported when compared to the scores of the full sample. Among rural nurses' responses, these variables did not meet the significant correlation

criteria established for this study (p = .05). Also, one variable, highest nursing education, was found not significantly correlated to overall RU. As well, the number of years worked within an organization was demonstrated to have a significant negative correlation with overall RU among rural nurses.

In the first step of the regression analysis the rural location variable to was included in a univariate regression model to examine its contribution to predicting lower overall RU scores: F (1, 207) = - 5.91, p = .016; (See Step 1 in Table 4.16). The *R*-squared value (r^2) was calculated to = .028, which was consistent with the findings of the bivariate analysis between location and overall RU: r = .167 (reported in Table 4.15). This finding indicated that rural context significantly contributed to explaining 2.8% of the variance in overall RU scores reported by the participating nurses (See Step 1 in Table 4.16).

In the second step of the analysis, the following factors were included in the multiple linear regression analysis: (a) years in nursing; (b) tenure in organization; (c) nursing position (e.g., staff nurses, educator, or managers); (d) educational level; (e) positive RU attitude; (f) trust in research findings; (g) beliefs suspension; (h) perceived competence in critically revising research; (i) professional group affiliation; (j) organizational relationships supportive of RU; (k) autonomy in practice; (l) organizational access to time; (m) organizational access to material resources; (n) access to an RU champion; (o) continuing education opportunities; and (p) the rural/urban environmental context.

Table 4.15
Bivariate Analysis of Significant Correlations (r) and Level of Significance (p) between Overall Research Utilization and the Independent Variables among Overall Sample, and Urban and Rural Sub-samples

Variable	Overall sample		Urban nurses		Rural nurses	
	n	*r*	*n*	*r*	*n*	*r*
Trust in research	208	.282***	108	.267**	100	.270**
Belief suspension	208	.321***	108	.264**	100	.382***
RU attitudes	208	.393***	106	.315***	100	.476***
Relationships supportive of RU	201	.328***	105	.327**	100	.350**
Organizational time for RU	208	.226***	108	.226**	100	.219
Organizational access to RU resources	208	.273***	108	.279**	100	.195
Importance of access resources to RU	200	.246***	105	.151	100	.265**
Years working in the organization	208	-.142*	105	-.124	100	-.236*
Highest nursing education	207	.154*	108	.212*	99	.187
Competence to critically review research	193	.246***	99	.255**	94	.218*
Organizational champion	207	.232***	108	.163	99	.247**
Location (rural/ urban)	208	-.167*				

Note. Missing responses excluded from the analysis.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

As explained above, all of the required conditions for conducting the mulitiple linear regression had been met. A listwise approach was used for this analysis, resulting in the inclusion of only those participants for whom measures for all variables had been collected. As a result the sample size for the analysis was reduced to 186 participants. A backward stepwise multiple linear regression analysis was performed to determine the strength of association of each independent variable on the measures of overall RU, and to determine if environmental context (urban/rural) was a significant contributing factor (Leech et al., 2008). Step 2 in Table 4.16 illustrates the results of the multiple linear regression once all the factors not significantly contributing to the prediction of overall RU were removed from the model. The results indicated that a combination of four factors, (a) individual nurses' positive RU attitude ($p < .001$); (b) perceived competence in critically reviewing research findings ($p < .001$); (c) an organizational culture of relationships supportive of RU ($p < .002$); and (d) working in a rural practice setting ($p = .05$), significantly contributed to the prediction of overall RU among respondents in this study: $F(4,181) = 17.42$, $p < .001$. The adjusted *R*-squared value was .26 (See Step 2 in Table 4.16). This indicated that 26% of the variance in RU was explained by the measures of the four significant variables. According to Cohen, (1988) this represents a moderate to large effect. When adjusted for the contribution of the other variables, rural location remained a significant factor in explaining the variance of overall RU.

Table 4.16
Regression Analysis Summary for Individual and Contextual Variables Predicting Overall RU. Step1: Univariate Analysis of Rural Location. Step2: Backward Stepwise Multivariate Analysis.

Variable	*B*	*SEB*	*p*-values	Total R^2	Incremental ΔR^2
Step 1*				.028	.028
Rural location	- 5.90	.24	< .001		
Constant	5.13	.17			
Step 2**				.26	.237
Positive RU attitudes	.20	.04	< .001		
Supportive organizational relationships for RU	.06	.02	< .01		
Level of competence	.77	.25	< .01		
Rural location	- .43	.22	.05		
Constant	- 2.52	1.02			

* N = 207, ** N = 185.

Summary

The findings of this study indicated that although there were few reported differences in the use of instrumental, conceptual, and persuasive RU between rural and urban nurses, the overall RU scores were significantly lower among rural nurses. An examination of the differences in individual characteristics and measures of the organizational cultural context revealed no significant differences in the reported scores of nurses in the two settings. However, rural nurses reported lower scores for the

following receptive contextual factors: access to organizational resources, importance of the resources, and access to an organizational RU champion.

The results of a statistical examination of the bivariate association between the factors and overall RU indicated few differences between the rural and urban acute care nurses. Results of the multiple linear regression indicated that positive RU attitudes, competence in critically reviewing research, and organizational relationships supportive of RU were factors that were significant and positively associated with higher levels of overall RU in both groups of nurses. However, the results of both the univariate and multivariate regression analysis indicated that rural context was significantly associated with a negative variance in overall RU. The scores of these four factors accounted for 26% of the variance in overall RU reported by nurses.

CHAPTER FIVE:

DISCUSSION

The purpose of this study was to compare RU and the factors associated with its use between nurses working in rural and urban acute care settings. In this chapter, the answers to the three research questions are discussed, based on the analysis of similarities and differences reported by rural and urban nurses who participated in this study. The study's limitations, generalizability, and the implications for future theory development, practice, and research are also explored.

Research Question One

The first research question asked, "Are there differences in research utilization between acute care nurses working in rural and urban settings?" As a result of the review of studies in which the nature of rural nursing practice was examined, it was anticipated that the rural participants in this study would have lower scores for all four types of RU. However, this study found no difference in conceptual or persuasive RU reported by the two groups of nurses, and the analysis of instrumental RU yielded mixed results. Overall RU was significantly lower amongst rural nurses.

Another relevant finding from this study was that conceptual RU was the most common form of RU reported by participants from both settings. Both groups of nurses said they engaged in conceptual RU on *more than half* of their worked shifts, but on *less than* every shift. A comparison of this finding with those of previous investigations indicated that conceptual RU has consistently been reported as the most frequent type used by nurses (Estabrooks, 1997, 1999a; Estabrooks, Kenny, et al., 2007; Estabrooks,

Scott, et al., 2008; Kenny, 2002). Therefore, the results of the current study contribute to the growing body of evidence suggesting that conceptual RU may be the most common form of RU that nurses use in various health care settings, including rural and urban acute care.

Estabrooks (1999a) described conceptual RU as contributing to expanding or changing nurses' views or ways of thinking in practice, but not necessarily their particular actions. One possible explanation for the prevalence of conceptual RU in this and other studies may be that nurses can engage in it without requiring organizational change or other forms of system change that would be necessary for either instrumental or persuasive RU. Therefore, it is possible that any differences between urban and rural settings would not impinge on using conceptual RU to change thinking.

The proximity between the rural and urban nurses in this study may have also contributed to the similarities in reported RU among the two groups. It is possible that some participants had at some time worked in both rural and urban settings, which could have contributed to heightening nurses' awareness or application of research-based practice across rural and urban sites. However, data regarding the extent to which this may have been a factor among participants were not collected. Influences such as these may have resulted in making these two groups of nurses more homogenous than anticipated in terms of how they think about research (conceptual RU), how they apply research to their practice (instrumental RU), and how they use research findings to influence, for example, organizational change (persuasive RU).

Despite the similarities found in the use of the three types of RU, rural nurses in this study reported significantly lower scores of overall RU than their urban counterparts: t (208) = 2.43, p = .016, and d = .34. Estabrooks' (1997; 1999a) suggested that conceptual, instrumental, and persuasive RU were determinants of overall RU, which she described as the use of any types of RU in any way by nurses. Estabrooks' conceptualization of RU and the similar scores for conceptual, instrumental, and persuasive RU that rural and urban nurses reported in this study, led the investigator to anticipate that their reports of overall RU would also be similar. Instead, the calculated d –value represented a moderate effect size for the identified difference. Cohen (1988) indicated that a finding of statistical significance and a moderate effect size could be interpreted as representing an observable difference. Therefore, the results in this study could be interpreted as representing an observable difference in overall RU between the nurses in the two settings.

This unexpected finding differs from those reported by Estabrooks, Chong, et al. (2003), who conducted the only other study found in the literature that compared Canadian rural and urban nurses' RU. They observed no significant differences in conceptual, persuasive, or overall RU between rural and urban nurses, but they did identify significantly lower usage of instrumental RU among rural participants (p-value = .012). No explanation was provided for the identified difference.

The unexpected findings in this study may indicate that there is a need for further theoretical development of the conceptualization of RU. Estabrooks has noted that the concepts and descriptions of the various types of RU have been evolutionary in their development (Estabrooks, 1999a). It can be postulated that there may be other yet to be

discovered types of RU predictive of overall RU that may influence rural versus urban nurses' RU in different ways. It may be that the three types of RU in Estabrooks' proposed conceptualization are not predictive for all populations in the same way. It is also possible that Overall RU may be a measure of some other phenomenon altogether. Recently, Estabrooks, Squires, Strandberg, et al., (2011) acknowledged that although several studies over the past decade have measured the four types of RU, "there have been no other attempts to validate this or other formal structures of research utilization" (p. 1706). Additional studies are needed to expand our understanding of the various types of RU and how they are interrelated.

Another important consideration in interpreting the findings relates to Estabrooks' (1997) Research Utilization Survey (RUS). This survey was chosen because it was compatible with her (1997, 1999a) concepts of RU and the conceptualization of contextual factors proposed in the PARiHS model. Comparisons to the findings of previous investigations that had used the same survey were intended; however, this was somewhat compromised by the inadvertent shift in printing the survey of the descriptive label from number 5 to number 4 on the Likert-scales which measured each type of RU. Apart from the error in labelling, additional aspects of the instrument's design may have contributed to challenges in interpreting the findings of this study. For example, 4.54 and 5.13 represented the mean scores of rural and urban nurses' overall RU, respectively. Although these scores were found to be significantly different, it was not possible to determine how the RU practice specifically varied between the two groups of nurses. This lack of specificity was due to the fact that only some of the numbers on the Likert scale

were labelled. In this study, the number 4 was labelled to signify *on about half the shifts*, and the number 7 was labelled as *nearly every shift*, with the numbers 5 to 6 remaining unlabelled.

The design of the Likert scale may also have impacted the degree to which the instrument was sensitive to differences in measures of RU reported by nurses. This point may be illustrated by comparing the scores for RU measures from studies that have used this version of Estabrooks' instrument over the past 10 years (Estabrooks, 1997,1999a; Estabrooks, Kenny, et al., 2007; Estabrooks, Scott, et al.,2008; Kenny, 2002; see Appendix K). In the Likert scale for each of these measures, number 5 was labelled to signify *on about half the shifts* and numbers 4 and 6 were unlabelled. RU scores in the current study were similar to those reported in previous studies that had used the instrument, despite the error in labelling the scale. In fact, the similar scores reported in these studies appear to have remained unchanged over time, despite the increased availability of research evidence and increased emphasis placed on RU in the health care system. It is possible that RU differences existed but the instrument was not sensitive enough to pick-up those differences.

Squires, Hutchinson, et al. (2011) recently raised concerns regarding the sensitivity of self-report RU instruments. In a systemic review they found that, "[t]he relatively unchanged self-reports of moderate-high research use by nurses is troubling given that over 40 years have elapsed since the first studies…." (Squires, Hutchinson, et al., 2011, p.1). These self-reported levels of RU were inconsistent with the knowledge-to-practice-gap identified in the literature. The potential factors they identified that may have

detracted from the credibility of the reports of moderate-to-high research use among nurses included the lack of the nurses' understanding of the term *research*, subjective versus objective responses, and social desirability bias (Squires, Hutchinson, et al., 2011). Based on these two concerns about the level of sensitivity of the instrument, it is possible that the current study's findings may represent an under-reporting of the actual differences in RU among rural and urban nurses.

As noted in this study's literature review, Estabrooks and her colleagues are developing a new instrument to measure the four types of RU (J. E. Squires, personal communication, May 30, 2008). The newly designed instrument includes revised definitions of each type of RU and collects responses using an ordinal scale ranging from 1- "*10% or less*" to 5- "*Almost 100%*". Once the validity and reliability of this instrument have been established this version may address the challenges of interpreting data that were encountered in this study. Using the new RUS instrument in future studies in combination with additional measures of contextual factors associated with RU may enhance the extent to which the measures reflect the differences or similarities in RU that potentially exist between rural and urban nurses.

Squires, Estabrooks, Newburn-Cook, and Gierl (2011) recently designed and tested a multi-item instrument focused on measuring conceptual RU. Although it was designed to measure conceptual RU amongst health care aides in long-term settings, it could have some applicability to acute care RNs in urban and rural settings. The use of multiple measures of a construct may contribute to enhancing the level of sensitivity with which the instrument can detect differences in scores (Pedhazur & Schmelkin, 1991; Stewart &

Archbold, 1992,1993). Developing and applying similar multi-item instruments for measuring the various types of RU may enhance our ability to measure the differences in RU that may exist among rural and urban nurses, influence the interpretation of study findings, and expand our understanding of the various RU constructs.

Research Question Two

The second research question was, "Are there differences in the individual and contextual factors associated with research utilization among acute care nurses working in rural and urban settings?" Factors examined in this study were identified in the literature as those likely to distinguish rural from urban nurses' RU. Differences in the responses of rural and urban nurses in this study were expected, but few were identified.

Individual Factors

Various influences could be postulated to explain the unexpected similarities between the two groups of participants. For example, the decision to select participants from only one LHIN may have contributed to the lack of differences found. The purpose of the LHIN system in Ontario is to "plan, integrate and fund local health services," including hospitals (Government of Ontario, n.d., ¶1). As a result, hospitals within a LHIN may share a common vision and mission as they deliver health care within a particular geographic region. This environmental factor may influence the organization's impact on nursing practice, including whether and how research is utilized.

It is also possible that the close geographic proximity of rural and urban hospitals within the LHIN integrated rather than isolated rural nurses from their urban colleagues. This proximity may have contributed to a high degree of interaction and information

sharing between the two groups of nurses, as well as rural nurses' exposure and access to urban resources such as continuing education or professional interest groups.

Another possible explanation for the similarity in the individual factors reported by nurses may be associated with the method used to recruit participants. Surveys were mailed out only to those who gave their permission to be contacted for the purpose of participating in research on their annual nursing registration renewal with the College of Nurses of Ontario. Therefore, the participants in this study may have represented a sub-group of both rural and urban nurses who are generally more accepting of research use and who may be homogeneous in the demographic and individual characteristics that are positively associated with RU.

It is also possible that the differences in rural nurses identified in earlier reports, many of which were based on data available prior to 2000, may have become less pronounced over the past decade. For example, before 2000 a higher percentage of rural nurses reported the nursing diploma as their highest level of nursing education when compared to urban nurses (CIHI, 2002). Since 2005, the requirement for entry to practice in Ontario has been a nursing baccalaureate degree. Baccalaureate education includes an understanding and appreciation of research that was not part of the diploma program (Dobratz, 2003; Price & Thomas; 1979; Radjenovic & Chally, 1998; Wheeler, Fasano, & Burr, 1995). Hence, baccalaureate-prepared nurses may be more apt to embrace RU than their diploma-prepared counterparts. Retiring nurses from both the rural and urban sectors are being replaced by baccalaureate nurses. In instances where retired nurses have not been replaced those left in the workforce tend to be younger with a higher level of

education. These factors may have contributed to decreasing the educational disparity between rural and urban nurses.

A more detailed comparison of the potential changes in the characteristics of rural and urban nurses is not possible because little data about the rural and remote nursing workforce has been collected or reported in the past decade. The Canadian Institute for Health Information, which produces an annual report on the status of the Canadian and provincial nursing workforces only contains data regarding the percentage of nurses who live in rural and remote settings. A comparison of two CIHI reports (CIHI, 2002, 2010), both of which applied Du Plessis, Beshiri, Bollman, and Clemenson's (2002) methodology and definitions to identify urban, rural, and remote nurses, suggests that the population of rural and remote registered nurses in Canada between 2000 and 2008 had declined from 18% to 11%, and that in Ontario, the numbers had decreased from 15% to 6%. Although there appears to have been a large decrease in the percentage of nurses working in rural settings, no additional information regarding the demographic (individual) characteristics of rural nurses could be located. Baumann et al. (2006) confirmed that no updated data have been generated or reported on the characteristics of rural and remote nurses in the past decade. It is possible that the absence of demographic differences between rural and urban nurses' characteristics in this study may reflect changes that have occurred in the characteristics of rural and remote nurses across Canada or Ontario. Or perhaps, these demographic changes may apply only to those rural nursing populations that are located within close proximity to larger urban centres. It is not known

whether selecting a sample of nurses working in more remote communities would have yielded different results.

Contextual Factors

From the literature, factors distinguishing rural and urban nurses appeared to align with two of the four sub-concepts of context (organizational culture and receptive context) which have been identified within the PARiHS as being positively associated with RU amongst nurses. From the findings of lower overall RU scores among rural nurses, it was anticipated that rural nurses would report lower scores in those factors associated with the two sub-concepts of contextual RU examined in this study.

Organizational culture. The results of this study revealed no significant difference in rural nurses' affiliation with professional interest groups or support from people within their organizations for RU in practice. These findings are contrary to those of previous studies that identified rural nurses as being isolated and receiving minimal support to engage in RU from their supervisors, colleagues, and organizational administrators. Reports of higher levels of autonomy in practice, which is a characteristic commonly ascribed to rural nurses in the literature and which has been associated with increased RU, was also not noted by rural participants in this study.

These unexpected findings may be associated with a changing economic–political environment whose influence is growing, prompted by the Ontario Ministry of Health and Long-Term Care (MHLTC, n.d.b) and professional nursing associations. (Holleman, Eliens, van Vliet, & van Achterberg, 2006). Over the past decade, increased governmental attention to fiscal accountability has prompted health organizations to

submit balanced budgets and to provide evidence that their services are resulting in positive patient outcomes (MHLTC, n.d.a). These developments, along with funding incentives associated with the adoption of evidence-based practices, may be prompting health organizations in Ontario (both urban and rural) to be more supportive of the use of research findings in the delivery of patient care. As a result, nursing leaders, administrators, and health care providers, in general, may have become more supportive of nurses' use of research in practice. This explanation may also account for why nurses in both settings self-reported similar high levels of authority for applying research in their practice.

Another unexpected finding was the similarity in nurses' reports of professional affiliation. In recent years, these professional groups have become highly organized in their efforts to attract membership and have expanded their use of distance technologies to engage members. Many associations now offer opportunities for nurses to interact online using blogs, chats, and webinars, thereby reducing geographic barriers that rural nurses traditionally experienced. Professional nursing associations promote the concept of evidence-based practice and the application of research to support nursing practice. For example, the NurseOne initiative offered to members of the Canadian Nurses Association (CNA) allows nurses to connect online to discuss issues and evidence-based practices with colleagues who have similar practice interests (Canadian Nurses Association, 2009). Both rural and urban nurses, on average, reported being members of one or two nursing professional groups. The professional associations most commonly identified included specialty interest groups of the CNA and the Registered Nurses Association of Ontario

(RNAO). Rural nurses' increased involvement in these organizations may be the result of their improved access to them, which may be contributing to their adoption of the evidence-based agenda.

Receptive context. Several statistically significant differences were identified between the two groups of nurses' reported measures of receptive context. A far lower percentage of rural nurses reported having access to organizational champions who support and promote nursing RU than was reported by urban nurses. These results are consistent with those of studies that examined the working environments of rural nurses in the past (Lenz & Barnard, 2009; Olade, 2004a; Winters et al., 2006). It appears that decreased access to champions with specialized expertise in research implementation continues to be a factor in smaller, rural hospitals.

Rural nurses also reported having overall lower access to RU resources within their organizations. More specifically, nurses recounted having significantly less access to research journals and computers within their hospital libraries, but noted no differences from urban nurses in their access to email and Internet-based research resources, which was reported to be high for both groups of nurses. These findings suggest that, despite the geographic proximity between the two groups of nurses in this study, disparities may exist between rural and urban organizational resources that support RU. However, the results of this study also call into question the importance of workplace resources, such as those described above, among rural nurses and may reflect a general shift in how nurses seek out and obtain research-related information.

Traditionally, nurses could only access research findings in peer-reviewed journal articles or published research reports available through subscription or their hospital library. With the proliferation of personal computers and Internet access, Western society has experienced an unprecedented growth in access to online information both in the workplace and the homes of individuals, resulting in the decreased relevance of the traditional library and library computers as means of accessing information (D'Elia, Jorgensen, Woelfel, & Rodger, 2002). In nursing, as in other health professions, the Internet has been instrumental in promoting access to and the up-take of research in practice (Doran, et al, 2010; Henry, Bucher, Mackley, & Eckman, 2010). For example, several nursing (e.g., *Implementation Science and Online Journal of Rural Nursing and Health Care*) have been made electronically accessible, free of charge, to any nurse who has Internet access. Additionally, reports have been found in the literature of how the Internet and email have augmented efforts to influence the awareness and up-take of research findings by policy makers, organizational leaders, and frontline nurses through the distribution of fact sheets, study result summaries, newsletters, and best-practice guidelines (Davies, et al., 2007; Dobbins, et al., 2009). Also, the advent of free search engines, like PubMed and Google Scholar, has made it possible for any nurse to independently conduct a search of the literature on practice topics of interest.

Although no additional differences in the measures of contextual factors associated with RU among rural and urban nurses emerged from the findings, additional differences may have potentially existed. There is the possibility that measures within Estabrooks' (1997) survey were not sensitive enough to the two sub-concepts to demonstrate

relational differences between context and RU. Since the onset of this study, as noted, in the literature review, two groups of researchers (Estabrooks, Scott, et al., 2008; McCormack et al., 2009) have developed tools based on the PARiHS framework in which different approaches are used to measure contextual factors in the health care setting, with the similar intent of identifying other contextual factors that influence RU. It may be that these new approaches would have been more sensitive to the differences that the investigator expected to find.

It is also important to consider that, in this study, comparisons were made only between the measures of organizational culture and receptive contexts. It is possible that the two other sub-elements of context (leadership and evaluation) from the PARiHS model, which were not included in this study, may have a more significant bearing on demonstrating differences in the associations between contextual factors and RU than was suspected. It is also possible that the PARiHS model's conceptualization of context needs further development. Additional exploration may be needed to determine whether there are any other sub-elements of context besides the four currently identified within the PARiHS model. This recommendation is supported by Helfrich et al. (2010), who conducted a critical review of studies that adopted the PARiHS model as the conceptual framework to examine predictors of RU. They noted that, although the PARiHS model had been extensively adopted for use in this field of research, it required "greater conceptual clarity in the definitions of sub-elements and the nature of the dynamic relationships among the elements and sub-elements" (Helfrich et al., 2010, p.1). Dopson (2007) identified several theories emerging in the field of organizational studies that have

the potential to contribute to further developing the concept of context and its role in RU. These theories promote the consideration of context as "a multidimensional and multifaceted configuration of forces, some of which can be seen as external to the agency and some as more internal" (Dopson, 2007, p. S76). Dopson (2007) also presented some insights into how individual characteristics may be interrelated to contextual factors by suggesting that,

> Individuals make sense of the multiple contexts that they come up against by drawing on a range of cognitive and emotional judgments to create for themselves an integral context that informs their action. Collectively, [individuals] make sense of their context and thereby create or enact their environment in such a way as to affect and shape the impact of action. (p. S76)

In summary, rural nurses reported statistically significant differences in factors associated with receptive context, but not in those associated with individual characteristics or organizational culture. Whether this difference has an impact on rural nurses' overall RU will be discussed in the next section.

Research Question Three

The final study question was, "What is the relationship between identified individual and contextual factors and research utilization among acute care nurses working in rural and urban settings?" As discussed previously, few differences were revealed; however, rural nurses reported significantly lower overall RU scores. When the association of factors with overall RU were examined, mixed results were obtained. The findings, therefore, were not conclusive.

Similarities between Rural and Urban Nurses

The findings from the bivariate analysis of data suggest that not only did the participating rural and urban nurses report many similarities in the factors examined in this study, but that similarities also existed between how these factors were associated with overall RU in the two groups of nurses. More specifically, the data suggest that the individual characteristics that were significantly associated with overall RU in both rural and urban nurses included (a) positive attitudes towards RU (b) belief suspension, (c) trust in research, and (d) competence to critically review research. Factors associated with organizational context that were also found to be significantly associated with RU in both groups of nurses included (a) organizational relationships that were supportive of RU, (b) access to organizational resources for RU, (c) access to an organizational RU champion, and (d) organizational time for RU.

When interpreting the significance of these results, it is important to note that the squared *r*-value used to determine the statistical association among variables represents the percentage of the variance in one variable that is accounted for by the variance in another (Salkind, 2007). The findings suggest that although several factors were reported as statistically significant, each factor, individually, would be considered to have a moderate-to-weak association with RU. These findings are consistent with those from previous studies that examined factors associated with research use (Birdsell et al., 2005; Bonner & Sando, 2008; Eller et al., 2003; Estabrooks, 1997, 1999a; Estabrooks, Chong, et al., 2005; Estabrooks, Scott, et al., 2008; French, 2006; McCleary & Brown, 2003; McCloskey, 2005, 2008; Melnyk et al., 2004; Micevski et al., 2004; Veeramah, 1995).

In the regression analysis, the two factors that were found to have the highest association scores for overall RU were individual nurses' positive attitudes towards RU (r^2 = .15) and organizational relationships that were supportive of RU (r^2 = .11). One explanation for the significant relationship between positive attitudes towards research use and RU may be found in theories of human behaviour. A significant body of research has been developed that supports a strong association between human attitudes and behaviours (Ajzen & Cote, 2008; Carver & Scheier, 1998; Fazio, 1990; Michie, 2008; Prochaska, & DiClemente, 1986; Prochaska & Velicer, 1997; Stone & Fernandez, 2008), although how these two factors are related has been debated (Bandura, 1986; Kraus, 1995; Locke & Latham, 1990; McClelland & Fararo, 2006; Mischel, 2004; Powers, 1973). Based on this literature, it could be speculated that nurses who have a positive attitude toward RU are more likely to engage in RU. It has also been posited that the association between attitudes and behaviours may be influenced by additional factors (Mischel, 2004; Powers, 2008). A review of the knowledge translation literature indicates that little is known about the interactions or processes through which identified factors have been associated with RU. Despite the need for additional studies to clarify the relationship between positive RU attitudes and overall RU among nurses, the findings of this study suggest that nurses' positive attitude towards RU may be an important factor to be considered in both rural and urban settings.

Supportive relationships were conceptualized as a measure of organizational culture (one of the sub-concepts of context within the PARiHS model) and were found to significantly contribute to RU. Developers of the PARiHS model postulated that

organizations exhibiting highly supportive contexts were more likely to demonstrate higher levels of RU (Kitson et al., 2008). The findings from this study appear to support Kitson et al.'s (2008) contention for both rural and urban nurses.

The third variable identified as a significant predictor of both rural and urban nurses' overall RU was their self-reported level of competence in skills and knowledge related to the evaluation of research findings. Similar to the previously presented argument about the relationship between attitudes and behaviours, it is not surprising that nurses who believe themselves to be competent are more likely to engage in RU.

Both nursing attitudes and organizational relationships supportive of RU have been noted in systematic reviews of the literature to be significantly and consistently associated with nurses' RU (Meijers et al., 2006; Squires, Estabrooks, Gustavsson, et al., 2011). The findings of this study, which corroborate the literature considering RU for both rural and urban nurses, thus contribute to a growing body of evidence that supports including these factors as predictors of RU. More recent studies like those conducted by Estabrooks, Squires, Hutchinson, et al., (2011), and McCormack et al. (2009) have the potential to identify additional factors that may contribute to further expanding the sub-elements that are included in the conceptualization of context within the PARiHS model.

Differences between Rural and Urban Nurses

Despite the many similarities discussed, a few statistically significant differences emerged when the data reported by rural and urban nurses were examined separately. In the bivariate analysis, rural nurses reported a higher association between overall RU and the measures of positive research attitudes (rural nurses $r^2 = .23$; urban nurses $r^2 = .10$)

and belief suspension (rural nurses r^2= .15; urban nurses r^2= .07) than their urban counterparts did. This disparity may be related to a rural characteristic of community connectedness reported in the rural literature (Baernholdt et al., 2010; Lee & McDonagh, 2010; Scharff, 2010). Several authors have indicated that individuals who have long-term membership in rural communities often share similar perspectives and are professionally and personally connected in their ideologies (Baernholdt et al., 2010; Kulig et al., 2009). Therefore, it is possible that rural nurses working in organizations or communities that have embraced the research-based paradigm may be more likely to demonstrate greater homogeneity in the way they think (positive RU attitudes and suspension of traditional beliefs) and act (overall RU) than their urban counterparts, who may more diverse, as is more common in larger urban settings.

The findings of the regression analysis may be viewed as lending additional support to the proposition that differences exist between nurses working in rural versus urban settings. It also revealed geographic location (rural/urban) to be a significant predictor of overall RU. The four factors identified in the regression analysis (positive RU attitudes, supportive organizational relationship, level of competence, and location) accounted for 26 % of the overall RU scores. Rural location, in and of itself, was found to be negatively associated with nurses' reported scores of overall RU. Identifying rural context as a significant factor lends support to the premise that the rural environmental context or factors associated with this context may play a role in determining overall RU among nurses. Although a closer examination of this finding revealed that this factor's contribution to the prediction of RU was small it can be interpreted as significant, given

the homogeneity of responses provided by the rural and urban participants in this study. It is also possible that additional factors within rural environments, which were not examined in this study, may contribute to further enhancing the relevance of geographic location as a predictor of RU.

The current PARiHS model identifies only factors within organizational contexts that predict RU. In the original model, context was defined as "the environment or setting in which the proposed change is to be implemented . . . including the physical, social, cultural, and structural places where health care services are delivered" (Kitson et al., 1998, p. 152). The original model appeared to be compatible with a *systems theory* viewpoint and reflective of the potential interrelatedness of factors existing across various system boundaries, that is, between the system itself – the organization – and the system's environment (Sturmberg, O'Halloran, & Martin, 2012). The finding of a significant association between a rural geographic locale and less overall RU suggests that there may be merit in revisiting the original conceptualization of context and examining the role of those factors present beyond the organizational boundary. Exploration in this area may contribute to an enhanced understanding of factors that may be associated with the differences in overall RU among rural and urban nurses identified in this study.

Some investigators may think there is little merit in studying environmental factors such as geographic location as it cannot be modified. It can be argued that social, cultural, political, and historical factors associated with environmental context do influence health care organizations and do change over time. Therefore, these factors may be relevant to the design and/or effectiveness of strategies to promote RU within a geographic locale.

In summary, several factors that had been reported in the literature were also found in this study to be significantly associated with RU, both in terms of similarity and difference, among urban and rural nurses. The findings also suggest that, although the existing body of knowledge and conceptual frameworks developed in this field may be relevant in understanding RU among rural nurses, it may also be worthwhile to investigate and test contextual factors external to health care organizations that may also impact RU amongst nurses. For example, current models do not illuminate an explanation for a key finding of this study: the lower level of RU among rural nurses, even for those nurses who work in locations that are in close proximity to large urban health centres.

Limitations of the Study

Self-selected Sample

Several limitations for this study were identified. As indicated earlier, bias may have occurred through the sample selection process, whereby it is possible that only nurses who were interested in or felt positively towards RU responded. Self-selections may have contributed to the similarities that were noted in the distribution of demographic characteristics among the nurses in both rural and urban settings and may explain why this study did not identify the differences between rural and urban nurses that had been reported in the literature.

Low Response Rate

The low participation rate for this study is another major limitation. Only 23% of the potential participants responded to the survey. The fact that very few nurses reported low RU scores suggests that nurses who were not supportive of or interested in RU may

not have responded to the request to participate in this study. Therefore, the findings may not represent differences which may have existed among nursing working in these two settings.

Socially Desirable Responses

The recent increased emphasis by professional nursing associations and health care funders on evidence-based practice may have influenced both rural and urban nurses in this study to provide socially desirable responses rather than those that reflected their actual RU. Responses of nurses in both settings who may have been influenced in this way may have decreased measures of actual differences that may have existed between these two groups of nurses.

Geographic Proximity

The rural nurses within the South West LHIN who participated in this study were not geographically isolated from large urban centres. Consequently, the close proximity between rural and urban nurses in this study may have contributed to making the two groups more homogeneous than was reported in the literature. As a result, some important factors that may be associated with nurses working in more isolated rural settings may not have been identified as being significant.

Application of the Instrument

The identified printing error in labelling the Likert scale responses in Estabrooks (1997, 1999a) survey contributed to the challenges associated with interpreting the level of RU reported by nurses in this study and also limited the extent to which the current

findings could be compared to previous investigations in which the same instrument was used.

Generalizability

The data from this study were collected from a self-selected sample of nurses who were identified as being employed primarily in rural and urban acute care hospitals located within one LHIN in South West Ontario. The low participation rate limited the extent to which the conceptual, instrumental, persuasive, or overall RU that was reported could be generalized to the target population. Additionally, the lack of data available at the time of this study regarding the demographic and other factors associated with rural nursing in Canada or Ontario resulted in the inability to generalize this study's findings to rural nurses beyond those in the study. In order to do so, this study would need to be replicated with a larger sample of urban and rural nurses from a greater number of LHINs. On a theoretical level, the findings could be used to support the possibility that the environmental context of practice, specifically the rural context, may play an important role in the use of research evidence in knowledge translation.

Implications

Theory Development

Estabrooks' (1997, 1999a) conceptualization of RU was applied to interpret the results of the comparison of rural and urban nurses' RU in this study. The findings supported Estabrooks' proposed multidimensional constructs of RU and contributed to the emerging evidence that conceptual RU may be the most commonly used form among nurses. Further theoretical development is required to determine why this form of RU is

most prevalent among nurses and how this type of RU may enhance the quality outcomes of nursing care.

The lower overall RU scores reported by rural nurses, despite the similar scores noted for conceptual, instrumental, and persuasive RU, may indicate as yet undetected differences in how the four types of RU are interconnected among nurses working in rural and urban settings. Additional theory development is needed to further explain the interrelatedness of the various types of RU and the potential role of environmental context. Further consideration should also be given to the possibility that additional forms of RU may exist and that these may be contributing to differences in nurses' reported overall RU.

The PARiHS model complemented Estabrooks proposed constructs of RU by providing a framework for examining the similarities and differences that may have existed among the contextual factors relevant to rural and urban practice settings and nurses' reported RU. Only two contextual sub-elements were examined in this study. The findings indicated that only one measure of organizational culture (relationships supportive of RU) was significantly predictive of RU among nurses in both settings. Ongoing scholarly activity related to the PARiHS model has focused primarily on expanding the identification of organizational factors that may be predictive of RU (Cummings et al., 2004; Damschroder et al., 2009; Estabrooks, Midodzi, et al., 2007; Estabrooks, Squires, Hutchinson, et al., 2011). How contextual factors may be associated with different types of RU could also be explored.

The findings of the current study suggest that individual characteristics (positive RU attitudes and perceived competency in reviewing research findings) and rural location (environmental context) were also significantly associated with RU. Future theory development is needed to determine how these factors may be interrelated with context and other key elements proposed with the PARiHS model.

Practice

Despite the descriptive nature of this study and the limited generalizability of its findings, some recommendations for practice can be proposed. The similarities between the urban and rural nurses' responses and the fact that these findings support those noted in previous RU studies suggest that similar factors and dynamics may be influencing nurses working in rural and urban care settings. Therefore, it could be suggested that strategies similar to those that have been proposed in the literature for promoting RU may also be effectively applied in rural and urban acute care settings. Based on this study's findings, focusing on the following strategies may be particularly effective: (a) enhancing positive RU attitudes, (b) building competency in reviewing research findings, and (c) promoting organizational relationships that are supportive of RU. However, additional studies would be required to determine if these strategies are compatible or equally effective in rural settings, especially those that are more geographically isolated than those of the nurses who participated in this study.

The finding of significantly lower overall RU scores among the rural nurses, despite the close geographical proximity of the rural and urban participants in this study, suggests that a greater understanding of how RU occurs among nurses in rural practice is needed.

The knowledge generated from additional studies of rural nurses' practice will contribute to (a) determining if significantly greater knowledge-to -practice gaps exist among nurses who work more remotely, (b) revealing what factors may be contributing to the potential gap, and (c) eventually identifying the strategies and resources that may be needed to further enhance research-based practice in these settings.

Research

The current study contributes to the limited body of knowledge related to the use of research evidence among rural nurses. Several recommendations for future research can be based on its findings. This field of study would benefit greatly if the CIHI would implement a system for identifying and regularly collecting descriptive data on the status of rural nurses across Canada, similar to what was contained in the CIHI (2002) report produced a decade ago. These expanded reports would promote a more informed understanding of the trends and issues associated with the context of practice among rural nurses that may affect their RU and influence their impact on the health of Canadians living in rural settings.

To enhance the generalizability of the current study's findings, it should be redesigned using a larger sample of urban and rural nurses that is representative of additional LHINs. Such a study should also include nurses working in remote rural settings, where geographic isolation between nurses in rural and urban settings is more predominant. A more comprehensive study of this nature would allow researchers to determine whether the similarities and differences between urban and rural nurses that

were identified in the current study are substantiated and whether there are other factors associated with rural context that may play an important role in RU.

It can be recommended that future studies select self-report instruments that are more sensitive to measuring the differences that may exist between rural and urban nurses (de Leeuw, Hox, & Dillman, 2008). Instruments that may be well suited for use in future investigations include: (a) the new survey that Estabrooks and her colleagues have developed to measure the four types of RU when acceptable levels of reliability and validity for the instrument have been established (J. E. Squires, personal communication, May 30, 2008); (b) multi-item surveys of RU like the one that Squires, Estabrooks, Newburn-Cook, et al. (2011) developed to measure conceptual RU; and (c) the ACT survey (Estabrooks, Squires, Cummings, Birdsell, & Norton, 2009) or the CAI instrument (Wright et al., 2006), which could be used to measure contextual factors . The use of rigorous instrument design principles and testing in the development of these instruments, which has been reported in the literature, may contribute to the quality and interpretability of data resulting from their use in future studies of RU among nurses, including rural nurses (Estabrooks, Squires, et al., 2008; Estabrooks, Squires, Hayduk, et al., 2011; Estabrooks, Squires, Hutchinson, et al., 2011; McCormack et al., 2009).

Additionally, using study methodologies that include multiple methods of data collection may reduce the potential influences of self-selection and social desirability bias that may have contributed to the finding of few differences in this study. For example, studies that triangulate the findings of data that are collected through the use of self-report surveys, on-site observation, and focus groups interviews may result in enhancing what is

known about the differences and similarities in RU between nurses working in diverse settings (Loiselle et al., 2007).

Dissemination

A final report of the study will be submitted to the offices of the South West LHIN to inform professional development initiatives. Electronic copies of the final report will also be sent to chief nursing officers and/or professional practice leaders within each rural and urban acute care hospital in the South West LHIN to promote discussions related to the findings. A copy of the results will also be shared with the College of Nurses of Ontario, who provided this investigator with the list of potential participants. Study participants were informed that a copy of the findings would be made available at their request. The study will be submitted for publication in a peer-reviewed journal and for presentation at the annual conferences of the Registered Nurses Association of Ontario, the Ontario Hospital Association, and the Canadian Association of Schools of Nursing.

Conclusions

This study examined the similarities and differences in the use of research knowledge in practice between rural and urban nurses in one LHIN located in South West Ontario. The results suggest that the current conceptual frameworks of research utilization may be relevant to enhancing our understanding and promotion of RU among acute care nurses working in rural settings. However, the results also indicate that small but important differences in RU and factors associated with its use may exist between nurses in urban and rural locations. These differences confirm the importance of additional qualitative and quantitative studies to further our understanding of the RU phenomenon

and its use among rural nurses, and to promote effective implementation strategies that will ultimately affect the quality of health care provided to those Canadians who live and work in rural communities.

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Appendix A

Search strategy for literature review

Primary Search Strategy:

- Search of literature tin the following databases: Medline, CINAHL, Proquest, Proquest Dissertations and, Thesis and health and Psychosocial Instruments (HAPI) .
- Initial search up to March 2009-(Prior to submission for Ethics Approval)
- Revised literature search from March 2009- April 2012.

Terminology Used in the Search Strategy

1	2	3	4	5	6
Research Utilization	**Nursing**	**Rural**	**Conceptual Frameworks**	**Factors**	**Measures of**
implementation science, research utilization, research utlisation, dissemination and diffusion of knowledge, research use, knowledge transfer and exchange, and knowledge translation. Research based practice, evidence-based practice	Nursing, nurs*, Nurs practice Nursing care Acute Nurs*	Rural, Remote, Community Community based	Conceptual Frameworks, Theory, Model, Theor*	RU factors, barriers, challenges, facilitation, promotion, elements, Individual factors, organization organisation context, contextual, social environment, social context, job environment, job context, nursing practice environment, clinical practice environment, organizational climate, organizational culture, organizational context,	Instrument* measur*scale form tools, survey, self report, questionnaire
Terms connected with OR	Terms connected with OR	Terms connected with OR	Terms connected with OR	Terms connected with OR	Terms connected with OR

RU theoretical Frameworks applied in Nursing: terms in columns 1, 2,and 4 combined with AND.

RU among Rural nurses Search for RU: terms in columns 1,2 and 3 combined with AND.

Description of Rural Nursing practice and contributing factors: terms in columns 1,2,3,and 5 combined with AND.

Factors associated with RU in nursing: terms in columns 1,2, and 5, combined with AND.

Search for instruments used in the measures of RU and associated factors in nursing: terms in columns 1,2 and 6 combined with AND.

Secondary Search Strategy:

- Review **relevant** article bibliographies and reference were examined for additional citations lists
- A hand search of grey literature including, Google search of governments, university and professional nursing professional/interprofessional and health care knowledge translation web-sites.

Appendix B

Description of the 10 Measures of Context developed for the Alberta Context Tool
Developed by Estabrooks, Squires, Hutchinson, et al. (2011)

Table 1 Dimensions of the ACT

Concept	Definition	Sample item
Leadership[1]	The actions of formal leaders in an organization (unit) to influence change and excellence in practice, items generally reflect emotionally intelligent leadership	The leader calmly handles stressful situations
Culture[1]	The way that "we do things" in our organizations and work units; items generally reflect a supportive work culture	My organization effectively balances best practice and productivity
Evaluation[1]	The process of using data to assess group/team performance and to achieve outcomes in organizations or units (i.e., evaluation)	Our team routinely monitors our performance with respect to the action plans
Social Capital[1]	The stock of active connections among people. These connections are of three types: bonding, bridging, and linking	People in the group share information with others in the group
Informal Interactions[2]	Informal exchanges that occur between individuals working within an organization (unit) that can promote the transfer of knowledge	How often do you interact with people in the following roles or positions?; - Someone who *champions* research and its use in practice
Formal Interactions[2]	Formal exchanges that occur between individuals working within an organization (unit) through scheduled activities that can promote the transfer of knowledge	How often do these activities occur?; - Team meetings
Structural/ Electronic Resources[3]	The structural and electronic elements of an organization (unit) that facilitate the ability to assess and use knowledge	How often do you use/attend the following?; - A library
Organizational Slack	The cushion of actual or potential resources which allows an organization (unit) to adapt successfully to internal pressures for adjustments or to external pressures for changes	
Staffing[1]		Enough staff to deliver quality care
Time[1]		Time to do something extra for patients
Space[1]		Use of designated space

[1]= Scale: 1-strongly disagree; 2-disagree; 3-neither agree or disagree; 4-agree; 5-strongly agree; [2]= Scale: 1-never; 2-rarely; 3-ocasionally; 4-frequently; 5-almost always;
[3]= Scale: 1-never; 2-rarely; 3-ocasionally; 4-frequently; 5-almost always; 6- not accessible

(Estabrooks, Squires, Hutchinson et al., 2011, p. 3)

Appendix C

Listing of Designated Rural Acute Care Hospitals Associated with Ontario LHINs

LHIN 1-ERIE ST. CLAIR	SITES		LHIN 3- WATERLOO WELLINGTON	SITES
Bluewater Health	1		Groves Memorial Community Hospital	1
Leamington District Memorial Hospital	1		North Wellington Health Care Corporation	2
Sydenham District Hospital	1		LHIN 4- HAMILTON NIAGARA HALDIMAND BRANT	SITES
LHIN 2-SOUTH WEST	SITES		Haldimand War Memorial Hospital	1
Alexandra Hospital	1		Niagara Health System	3
Alexandra Marine & General Hospital	1		West Haldimand General Hospital	1
Clinton Public Hospital	1		West Lincoln Memorial Hospital	1
Four Counties Health Services	1		MISSISSAUGA HALTON	SITES
Grey Bruce Health Services	4		Halton Healthcare Corporation	2
Hanover and District Hospital	1		LHIN 8- CENTRAL	SITES
Listowel Memorial Hospital	1		Markham Stouffville Hospital	1
Seaforth Community Hospital	1		The Stevenson Memorial Hospital	1
South Bruce Grey Health Centre	4		LHIN 9- CENTRAL EAST	SITES
South Huron Hospital Association	1		Campbellford Memorial Hospital	1
St. Mary's Memorial Hospital	1		Haliburton Highlands Health Services	1
Strathroy Middlesex General Hospital	1		Lakeridge Health care Corporation	2
Tillsonburg District Memorial Hospital	1		Northumberland Hills Hospital	1
Wingham and District Hospital	1			

LHIN 10- SOUTH EAST	SITES		LHIN 13- NORTH EAST	SITES
Lennox & Addington Country General Hosp.	1		Anson General Hospital	1
Perth & Smith Falls District Hospital	2		Bingham Memorial Hospital	1
Quinte Healthcare	3		Blind River District Health Centre	1
LHIN 11- CHAMPLAIN	SITES		Englehart & District Hospital	1
Almonte General Hospital	1		Espanola General Hospital	1
Arnprior and District Memorial Hospital	1		Hôpital Notre-Dame Hospital	1
Carleton Place & District Memorial Hospital	1		Hornepayne Community Hospital	1
Deep River and District Hospital	1		Kirkland and District Hospital	1
Glengarry Memorial Hospital	1		Lady Dunn Health Centre	1
Hôpital régional de Hawkesburg	1		Manitoulin Health Center	2
Kemptville District Hospital	1		Mattawa General Hospital	1
Renfrew Victoria Hospital	1		Sensenbrenner Hospital	1
St. Francis Memorial Hospital	1		Services de santé de Chapleau Health	1
Winchester District Memorial Hospital	1		Smooth Rock Falls Hospital	1
LHIN 12- NORTH SIMCOE MUSKOKA	SITES		St. Joseph's General Hospital (Elliot Lake)	1
Huntsville District Memorial Hospital	1		Temiskaming Hospital	1
South Muskoka Memorial Hospital	1		The Lady Minto Hospital	1
			West Nipissing General Hospital	1
			West Parry Sound Health Centre	1

LHIN 14-NORTH WEST	SITES
Atikokan General Hospital	1
Dryden Regional Health Center	1
Geraldton District Hospital	1
Lake of the Woods District Hospital	1
Manitouwadge General Hospital	1
McCausland Hospital	1
Nipigon District Memorial Hospital	1
Red Lake Margaret Cochenour Memorial Hospital	1
Riverside Health Care Facilities	3
Sioux Lookout Meno-Ya-Win Health Centre	1
Wilson Memorial General Hospital`	1

Appendix D:
List of South West LHIN Rural and Urban Acute Care Hospitals

Rural Acute Care Hospitals	**Address**	**Postal Code**
Alexandra Hospital	29 Noxon Street, Ingersoll, ON	N5C 3V6
Alexandra Marine & General Hospital	120 Napier Street, Goderich, ON	N7A 1W5
Four Counties Health Services Middlesex Hosp. Alliance	R.R. 3 Newbury, ON	N0L 1Z0
Grey Bruce Health Services-Lion's Head	22 Moore Street, Lion's Head, ON.	N0H 1W0
Grey Bruce Health Services-Markdale Hospital	55 Isla Street, Markdale, ON	N0C 1H0
Grey Bruce Health Services- Meaford Hospital	229 Nelson Street West, Meaford, ON	N4L 1A3
Grey Bruce Health Services- Southampton Hospital	340 High Street, Southampton, ON	NOH 2L0
Grey Bruce Health Services- Wiarton Hospital	369 Mary Street, Wiarton, ON	N0H 2T0
Hanover And District Hospital	90-7th Avenue, Hanover, ON.	N4N 1N1
Huron-Perth HA.Seaforth Community Hospital	Box 99, 24 Centennial Drive, Seaforth, ON	N0K 1W0
Huron Perth H A. St. Mary's Memorial Hospital	Box 940 267 Queen Street West St. Marys, ON	N4X 1B6
Huron Perth- HA.Clinton Public Hospital	98 Shipley Street, Clinton, ON	N0M 1L0
Listowel Memorial Hospital	255 Elizabeth Street East, Listowel, ON	N4W 2P5
South Bruce Grey Health Centre- Chesley Site	P.O. Box 40, 39 Second Street S.E., Chesley, ON	N0G 1L0
South Bruce Grey Health Centre- Walkerton	Box 1300, 21 McGivern Street, Walkerton, ON	N0G 2V0
South Bruce Grey Health Centre- Durham	Box 638, 320 College Street, Durham, ON	N0G 1R0
South Huron Hospital Association, Kincardine	Box 4000, 43 Queen Street , Kincardine, ON	N2Z 2Z2
Strathroy Middlesex General Hospital	P.O. Box 5001, 395 Carrie Street , Strathroy, ON	N7G 3J4
Tillsonburg District Memorial Hospital	167 Rolph Street, Tillsonburg, ON	N4G 3Y9
Wingham and District Hospital	270 Carling Terrace, Wingham, ON	N0G 2W0
Urban Acute Care Hospitals		
London health Science Centre- Commissioners Campus	800 Commissioners Road. East, P.O Box 5375, London, ON	N6A 4G5
London Health Science Centre- Victoria Hospital	800 Commissioners Road. East, P.O Box 5375, London, ON	N6A 4G5
London Health Science Centre- University Hospital	330 Windermere Road, Box. 5339, London, ON	N6A 5A5
St. Josephs Health Care- London	268 Grosvenor St., London, ON	N6A 4V2
Huron Perth Health Care All.-Stratford General Hospital	46 General Hospital Drive, Stratford ON,	N5A 2Y6
Woodstock Private Hospital	270 Riddell Street, Woodstock, ON	N4S 6N4
St. Thomas-Elgin General Hospital	189 Elm Street, St. Thomas, ON	N5R 5C4
Grey Bruce Health Services- Owen Sound Hospital	P.O. Box 1800, 1800 8th Street East, Owen Sound, ON	N4K 6M9

Data sources: MHLTC (2009) and JPPC (2006).

Appendix E
Proposed Measurement of Variables/ Evidences

Instrument:
Survey questions proposed for measurement of the variables were originally contained by Estabrooks (1997, 1999) Research Utilization Survey (RUS) as adapted by Connor (2006)

(DEM=demographic data, RUS=questions originating from RUS)

Operationalized Variables	**Sample Survey Question(s)/Components**	**No of Items**	**Scale**	**Evidence in the Literature to Support influence/association of Contextual Variable**
Demographic Variables				
Gender (DEM)	Gender	1	1-Famale 2-Male	No evidence
Education (DEM)	What is your basic nursing education? What is your highest completed level of formal nursing education What is your highest completed level of non-nursing post-secondary education?	3	1-RN diploma 2-Bachelor's degree 3-Master's degree 4-PhD	Non- significant findings: Estabrooks, 1999
Years in nursing (DEM)	Approximately how many years you have worked in nursing?	1	Years	No significant findings
Employment Status (DEM) *Modified – Originally included in Estabrooks tool	Which of the following best describes your employment status today?	1	1-Full time 2-Part-time 3-Casual 4- Not employed	No significant findings
Location of Principal employment (DEM) *Modified from original tool to identify the rural/urban variable	Do you work in an acute care facility? Do you work in a Rural or Urban acute care hospital	1 1	1-Yes 2- No 1-Rural 2-Urban 3-Neither.	Significant findings: Estabrooks, Chong & Birdsell, 2003; Non- significant findings: Birdsell, Thornley, Landry, Estabooks, & Mayan; 2005; Bonner & Sando; 2008

Operationalized Variables	Sample Survey Question(s)/Components	No of Items	Scale	Evidence in the Literature to Support influence/association of Contextual Variable
Dependent Variables Direct Research Utilization (instrumental RU) (RUS)	Instrumental research use Definition: Using observable research-based practices when care for patients. By this we mean that practice may be guided by guidelines, protocols, routines, care plans or procedures that are based on research. This would include following evidence based protocols or Guidelines such as: Internal rotating the femur during injections into the dorsogluteal sites Working with elderly to help them mobilize because of prolonged immobility can result in loss of independence in ADL's) ….. Overall in the past year, how often did you use research in this direct way in some aspect of your nursing practice?	1	Likert Scale- 1-7 (Never to nearly every shift.)	Birdsell, Thornley, Landry, Estabrooks, & Mayan, 2005; Estabrooks, Chong, & Birdsell, 2003; Estabrooks, Scott-Findlay, Rutakumwa, Duan, & Rozanova, 2004
Indirect Research Utilization (conceptual RU) (RUS)	Conceptual Research Use Definition: Thinking about research-based knowledge and then using it to inform your clinical decision-making Example would be: • Using knowledge of death and dying stages to plan care • Using knowledge of behaviours characteristic delirium to assess and plan care for patients exhibiting difficult behaviours Overall in the past year, how often did you use research in this non- direct way in some aspect of your nursing practice?	1	Likert Scale- 1-7 (Never to nearly every shift.)	Birdsell, Thornley, Landry, Estabrooks, & Mayan, 2005; Estabrooks, Chong, & Birdsell, 2003; Estabrooks, Scott-Findlay, Rutakumwa, Duan, & Rozanova, 2004

Operationalized Variables	Sample Survey Question(s)/Components	No of Items	Scale	Evidence in the Literature to Support influence/association of Contextual Variable
Persuasive Research Utilization (symbolic RU) (RUS)	Persuasive Research Use Definition: Using research findings to win an argument or make a case to someone regardless of whether you have made a thorough assessment of the research How often have you used knowledge of particular research findings to try to persuade the following groups of people to make changes in this way in the past year? Overall , and including all of the categories of people in previous question, in the past year how often have your used research in this pervasive way?	9 1	Likert Scale- 1-4 (Never - Often) Likert Scale- 1-7 (Never to nearly every shift.)	Birdsell, Thornley, Landry, Estabrooks, & Mayan, 2005; Estabrooks, Chong, & Birdsell, 2003; Estabrooks, Scott-Findlay, Rutakumwa, Duan, & Rozanova, 2004
Overall/General Research Use (RUS)	Overall/General Research Use Some organizational investigators have argued that research use is much more general and have suggested the following definition: Definition: The use of any kind of research findings, in any kind of way, in any aspect of your work as a professional in your role (this is inclusive of the three kinds of research use described above). If you have circled a number from 2-7 in the above question, estimate how much of the research that you used was:	1 1	Likert Scale- 1-7 (Never to nearly every shift.) ___% nursing ___% medical ___% other	Birdsell, Thornley, Landry, Estabrooks, & Mayan, 2005; Estabrooks, Chong, & Birdsell, 2003; Estabrooks, Scott-Findlay, Rutakumwa, Duan, & Rozanova, 2004

Operationalized Variables	Sample Survey Question(s)/Components	No of Items	Scale	Evidence in the Literature to Support influence/association of Contextual Variable
Independent Variables				
Individual Factors				
1) Gender (DEM)	What is your gender?	1	Male/ Female	Birdsell, Thornley, Landry, Estabooks, & Mayan, 2005; Bonner & Sando, 2008; Estabrooks, Chong, & Birdsell, 2003.
2) Highest Nursing Education (DEM)	What is your highest completed level of formal nursing education?	3	- Diploma - Baccalaureate /Masters. - No Response	
3) Years in Nursing (DEM)	Excluding your basic nursing training, how many years have your worked as a registered nurse?	1	# of years.	
4) Tenure with Current Organization (DEM)	How many years have you worked at your current organization?	1	# of year	
5) Position in Nursing (DEM)	What is your current nursing position?		- staff nurse -administrator -educator -other	
6) Trust research Evidence (RUS)	How much faith do you have that nurse research will produce research that is. . . a) relevant… b)easily used… c) can safely be used…	3	1-5 Likert scale (None to a great deal)	Alcock et al.,1990 Champion & Leach, 1989; Lacey, 1994; Birdsell, Thornley, Landry, Estabooks, & Mayan, 2005; Bonner & Sando, 2008; Butler; 1995; Estabrooks, 2003; Estabrooks, Chong, & Birdsell, 2003); Marsh & Brown, 1992; McCleary & Brown, 2003; Melnyk, Fineout-Overholt, Feinstein, Li, Small et al., 2004; Sheehan, 1986; Veeramah, 1995.
7) Belief Suspension (RUS)	How willing are you to implement research when it contradicts something you… How often do you actually implement research when it contradicts something you… a. learned prior to nursing school? b. learned in nursing school? c. learned in your place of work?	6	1-5 Likert scale (Very unwilling to very willing)	
8) RU Competence (RUS)	Do you feel competent in your skills and knowledge to evaluate research finding?		Yes/No	

Operationalized Variables	Sample Survey Question(s)/Components	No of Items	Scale	Evidence in the Literature to Support influence/association of Contextual Variable
Contextual Factors				
Organizational Culture				
9) Professional Affiliation (DEM)	How many nursing interest groups or organizations do you presently belong to?	1	Number of groups.	
10) Interpersonal Relationships Supportive of RU (RUS)	Degree to which the following people are supportive of you using research in your practice: 1. Other nurses in your area 2. Your immediate supervisor 3. Nursing administration 4. General administration 5. Physicians 6. Other health professionals	6	Sum of the six Items (Cronbach's α=.89)	Adams,2001; Bonner & Sando, 2008; Bostrom et al., 1989; Champion & Leach, 1989; Clark & Sleep, 1991, Ciliska et al., 1999; DiCenso, Cullum, & Ciliska.,1998; Egerdo & Hansen, 2005; Eller, Kleber & Wang, 2003; French, 2005; Larrabee Sions, Fanning, Withrow & Ferretti, 2007; McCloskey, 2005; Melnyk, 2005; Melnyk, Fineout-Overholt, Feinstein, Li, Small & et al., 2004; Micevski, Sarkissian, Byrne & Smirnis, 2004; Olade 2004; Parahoo, 2000; Pepler, Edgar, Frisch, Rennick, Swidzinski et al., 2006; Pravikoff, Tanner & Pierce, 2005; Rodgers, 2000; Royle & Blythe,1998; Rycroft-Malone, Harvey, Seers, Kitson et al., 2004; Schoonover, 2006; Veeraman, 1995
11) Level of Authority in Practice. (RUS)	How often have you avoided using research in this *direct* way because you did not believe you had the authority to do so, even though you were convinced of the usefulness of the research?	1	1-5 Likert scale (Never to nearly every shift) Scoring reversed so that higher score reflects higher authority score.	

Operationalized Variables	Sample Survey Question(s)/Components	No of Items	Scale	Evidence in the Literature to Support influence/association of Contextual Variable
Receptive Context				
12) Organizational Resources to support RU (RUS)	To what extent are the following organizational factors present in your workplace? 1. Nurses/others with research skills 2. Paid time allotted for participation in various research activities 3. Attendance at research and clinical conferences encouraged 4. A group or committee to review and critique research 5. Money from internal and /or external sources for research	5	Sum of the five items (Cronbach's α=.85)	Birdsell, Thornley, Landry, Estabooks, & Mayan, 2005; Cheater et al.,2006; Clifford & Murray, 2001; Estabrooks, Chong & Birdsell, 2003; McCloskey, 2005; Olade, 2004; Pepler, Edgar, Frisch, Rennick, Swidzinski et al., 2006; Robinson, 1987; Royle, Blythe, Ciliska, & Ing, 2000; Veeraman, 1995.
13) Importance of Access to Organizational Resources (RUS)	Do you think that better access to the above is important to whether or not you use research?	1	1-5 Likert scales (not at all important to extremely important)	
14) Time for RU Activities. (RUS)	In a normal workday is there ever time to do any of the following: Use the library Read (Journals/text) Reflect on your practice Participate in projects Participate in research	5	1-5 Likert scales (not at all to always)	
15) Organizational Champion (RUS)	Is there someone in your organization who currently, or in the past year, has championed nursing research and or research based practice (a research champion)?	1	Yes/No	

Operationalized Variables	Sample Survey Question(s)/Components	No of Items	Scale	Evidence in the Literature to Support influence/association of Contextual Variable
16) Access to Inservices and Continuing Education (DEM)	In the past 12 months, how many research related continuing education courses have you taken? In the past twelve months, how many research related in-services have you attended?	1 1	Total Number Total Number	Alcock & Goodman, 1990; Bonner & Sando, 2008; Estabrooks, Chong, & Birdsell, 2003; Lacey, 1994;March & Brown, 1992; McCleary & Brown, 2003; McCloskey, 2005; Olade, 2004; Czerwinski, Cesario & Holt-Ashley, 2004; Tsai, 2003.
Environmental Context				
17) Rural or Urban Nursing practice (DEM)	Do you work in an acute care facility? Do you work in a Rural or Urban acute care hospital	1 1	1-Yes 2- No 1-Rural 2-Urban 3-Neither.	Significant findings: Estabrooks, Chong & Birdsell, 2003 Non- significant findings: Birdsell, Thornley, Landry, Estabooks, & Mayan; 2005; Bonner & Sando; 2008

Appendix F

Research Utilization Survey (RUS) Items omitted from data analysis with rationale.

Survey question number	Operationalized Variables (coding)	Sample Survey Question(s)/Components	Data	Rationale for omitting data from analysis
Section 2-Q.1	Descriptors of types of Research use.	At one time or another, people writing in nursing have considered the items on the following list….do you..consider the following research utilization? (14 sub-scales)	Yes/No responses.(summed)	Designed to promote compatibility between of responses the theoretical construct underpinning the instrument.
Section 2-Q.4	Intent to use research	Would you use research more often in your practice if you could? (one item)	Yes/No responses	Measures intent to use RU. Data not directly related to the research questions proposed in this study.
Section 2-Q.5	Perceived effectiveness of research evidence	If nurses used research more in their practice it would make a positive difference to patient care and outcomes? (1 item)	5 point Likert scale	Measuring the Domain of Research Evidence associated with the PARiHS Model.
Section 2-Q.6.	Source of research knowledge	What is the one most common source from which you learn about research findings? (1 item)	Open ended question Qualitative data	Measuring the Domain of Research Evidence associated with the PARiHS Model.
Section 2-Q.8	Avoiding RU	How often have you avoided using research in a direct way because you did not believe you had the authority….? (1 item)	5 point Likert scale	This item measured non-research use which was not conceptualized as a measure of RU therefore data was not analyzed in the study.
Section 2-Q.9.	Descriptor of the term research implementation	Still considering this direct kind of utilization, how many times in the past year have your encountered a research finding or recommendation…. (4- sub-scales) .	6 point Likert scale	Designed to promote compatibility between of responses the theoretical construct of *"implementation"* underpinning the instrument.
Section 2-Q.11.	Descriptor of the concept of persuasive RU	How often have you used knowledge of a particular research finding to try to persuade the following groups of people…? (9 sub-scales)	4 point Likert scale	Designed to promote compatibility between of responses the theoretical construct underpinning the instrument.

Survey question number	Operationalized Variables (coding)	Sample Survey Question(s)/Components	Data	Rationale for omitting data from analysis
Section 2- Q.14.	Types of RU	Estimate how much of the research that you used was…nursing, medical or other.	percentages of each	Measuring the Domain of Research Evidence associated with the PARiHS Model.
Section 3 Q.5.	Nature of research evidence	How important are the following in your decision to use or not use a particular research finding in your practice? (9 sub-scales)	5-point Likert scale	Measuring the Domain of Research Evidence associated with the PARiHS Model.
Section 3 Q.8.	Source of research evidence	The knowledge that I use in my practice is based on…(characteristics of evidence). 16 sub-scales.	5-point Likert scale	Measuring the Domain of Research Evidence associated with the PARiHS Model.

Appendix G

Research Utilization Survey (Estabrooks, 1997, 1999, adapted by Connor, 2006)

RESEARCH UTILIZATION SURVEY*
SECTION 1: Demographic Data *

CODE#_____

1. What is your basic nursing education?
   a. Diploma _____
   b. Baccalaureate _____
   c. Other _____ (specify)_____

2. What is your highest completed level of formal nursing education?
   a. Diploma _____
   b. Baccalaureate _____
   c. Master's Degree _____
   d. Doctorate _____
   e. Other (specify) _____

3. What is your highest completed level of non-nursing post-secondary education?
   a. Diploma _____
   b. Baccalaureate _____
   c. Master's Degree _____
   d. Doctorate _____
   e. Other (specify) _____
   f. None _____

4. What is your gender?

   a. Female _____
   b. Male _____

5. Excluding your basic nursing training, how many years have you worked as a registered nurse?

   a. Number of years _____ and /or months _____

6. How many years have you worked at your current organization?

   a. Number of years _____ and/or months _____

7. Are you currently in a management position? Yes _____ No_____
(NOT ANALYZED)

8. What is your current nursing position?

   a. staff nurse _____
   b. administrator _____
   c. educator _____
   d. other: _____ _____

9. Data from the CNO indicated that you identified one of the following hospitals as your primary place of employment. Which of the following applies to you? (Select only one response).

☐ a. Currently, my primary place of employment is one of the rural acute hospitals listed below.
If you have selected this response, please proceed to questions 10.

List of Rural Acute Care Hospitals	
Alexandra Hospital	Huron-Perth HA.Seaforth Community Hospital
Alexandra Marine & General Hospital	Huron Perth H A. St. Mary's Memorial Hospital
Four Counties Health Services Middlesex Hosp. Alliance	Huron Perth- HA.Clinton Public Hospital
Grey Bruce Health Services-Lion's Head	Listowel Memorial Hospital
Grey Bruce Health Services-Markdale Hospital	South Bruce Grey Health Centre- Chesley Site
Grey Bruce Health Services- Meaford Hospital	South Bruce Grey Health Centre- Walkerton
Grey Bruce Health Services- Southampton Hospital	South Bruce Grey Health Centre- Durham
Grey Bruce Health Services- Wiarton Hospital	South Huron Hospital Association, Kincardine
Hanover And District Hospital	Strathroy Middlesex General Hospital
	Tillsonburg District Memorial Hospital
	Wingham and District Hospital

☐ b. Currently, my primary place of employment is one of the urban acute care hospitals listed below.
If you have selected this response, please proceed to questions 10.

List of Urban Acute Care Hospitals	
London health Science Centre- Commissioners Campus	Huron Perth Health Care All.-Stratford General Hospital
London Health Science Centre- Victoria Hospital	Woodstock Private Hospital
London Health Science Centre- University Hospital	St. Thomas-Elgin General Hospital
St. Joseph's Health Care- London	Grey Bruce Health Services- Owen Sound Hospital

☐ c. Currently, my primary place of employment in not one of the hospitals listed in either a or b.

If you have selected this response, please do not proceed with the survey.
Please return the survey in the return-addressed stamped envelope.
Thank you for your participation in this study

10. In the past twelve months, how many continuing education courses have you attended?

    a. Number:_____

11. In the past twelve months, how many in-services have you attended?

    a. Number: _____

12. How many nursing interest groups or organizations do you presently belong to?

    a. Specify:_____
    b. Specify:_____
    c. Not applicable/none:_____

13. How often have you read nursing journals in the past year?

Specify Journal most read:	Times per year				
	Once	**2-3**	**5-7**	**8-10**	**>10**
a. _____	1	2	3	4	5
b. _____	1	2	3	4	5
c. _____	1	2	3	4	5

14. How often have you read non-nursing but health related journals in the past year?

Specify Journal most read:	Times per year				
	Once	**2-3**	**5-7**	**8-10**	**>10**
a. _____	1	2	3	4	5
b. _____	1	2	3	4	5
c. _____	1	2	3	4	5

Adapted with the verbal permission from Research Utilization in Nursing: An Alberta Survey of Practicing Nurses, 1996, Carole A. Estabrooks, University of Alberta, Canada.
page

SECTION II: Research Utilization

OVERALL RESEARCH UTILIZATION

For Questions 1-6, please use the following definition of overall research utilization:

> The use of any kind of research findings (nursing and non-nursing), in any kind of way, in any aspect of your work as a nurse. Do not count as research, things you learned in the nursing school or where you did your basic training.

1. Overall, in the past year, how often have you used research in some aspect of your nursing practice?

Never	On 1 or 2 shifts		On about half the shifts			Nearly every shift	Do not know
1	2	3	4	5	6	7	N/A

2. At one time or another, people writing in nursing have considered the items on the following list to be research utilization. When your actions are based on the findings of sound research, do YOU consider the following to be research utilization? (Circle answer) (NOT ANALYZED)

Changing an aspect of your own personal nursing practice…… YES NO

Changing a practice or routine on your "unit" or in your work area ……...YES NO

Changing a nursing procedure, technique, or other nursing intervention…… YES NO

Changing a nursing policy, technique, or other nursing intervention…… YES NO

Changing your beliefs about a particular approach or procedure…….YES NO

Educating or informing the patient or client…….YES NO

Educating or informing another nurse……...YES NO

Educating or informing another health professional…….YES NO

Educating or informing a member of the public……YES NO

Persuading another nurse to make a change……..YES NO

Persuading another health professional to make a change…… YES NO

Persuading a patient or client to make a change…… YES NO

Persuading a member of the public to make a change……YES NO

Other (Specify:_____) …….. YES NO

3. If the items in question 2 above are considered to be research utilization, overall in the past year, how often have you used research in some aspect of your nursing practice? (NOT ANALYZED)

Never	On 1 or 2 shifts		On about half the shifts			Nearly every shift	Do not know
1	2	3	4	5	6	7	N/A

4. Would you use research more often in your practice if you could? (Circle answer) (NOT ANALYZED)

YES____ MAYBE ____ NO ____ DO NOT KNOW____

5. Do you agree with the statement: "if nurses used research more in their practice it would make a positive difference to patient care and outcomes"? (NOT ANALYZED)

Strongly disagree				Strongly agree
1	2	3	4	5

6. What is the one most common source from which you learn about research findings? Be as specific as possible. (NOT ANALYZED)

_____

DIRECT RESEARCH UTILIZATION

For Questions 7-9, please use the following definition of direct research utilization:

> The use of research findings (nursing and non-nursing), where you directly use the findings in giving patient care and/or in client interventions. Do not count as research, things you learned in your basic nursing training.

Direct research use often results in protocols, procedures, routine or policy development. The following are **examples** of research that can be used in this **direct way**:

- Internally rotating the femur during injection into the dorsogluteal site, in either the prone or side-lying position to reduce discomfort.
- Working with the elderly to help them mobilize (because prolonged immobility can result in loss of independence in ADL's).
- Following current CDC immunization guidelines in long-term care facilities.

7. Overall, in the past year, how often have you *used research findings in this direct way* in some aspect of your nursing practice?

Never	On 1 or 2 shifts		On about half the shifts			Nearly every shift	Do not know
1	2	3	4	5	6	7	N/A

8. How often have you avoided using research in this *direct* way because you did not believe you had the authority to do so, even though you were convinced of the usefulness of the research?

Never	Rarely	Sometimes	Frequently	Always
1	2	3	4	5

9. Still considering this ***direct*** kind of utilization, how many times in the past year have you encountered a research finding or recommendation:

SCALE:

Never	On 1 or 2 shifts		On about half the shifts			Nearly every shift	Do not know
1	2	3	4	5	6	7	N/A

(a) That you <u>completely</u> implemented	1	2	3	4	5	6	7	N/A
(b) That you <u>partially</u> implemented?	1	2	3	4	5	6	7	N/A
(c) That you <u>modified</u> to fit your situation and then implemented?	1	2	3	4	5	6	7	N/A
(d) Where you did nothing, that is, did not implement the finding or recommendation?	1	2	3	4	5	6	7	N/A

<u>INDIRECT RESEARCH UTILIZATION</u>

For Question 10, please use the following definition of indirect research utilization, which *is different from the definition for direct utilization given above:*

> The use of research findings (nursing and non-nursing), **to change your thinking or your opinions** about how to approach certain patient care or client situations. Do not count as research, things you learned in your basic nursing training.

Indirect research use usually does *not* result in protocol, procedure, routine or policy development. The following are **examples** of research that can be used in this **indirect** way:

- Because you are aware of the stages of death and dying, you understand a newly diagnosed cancer patient's refusal to believe the diagnosis.

- Whenever possible, you schedule night routines with an awareness of the normal sleep cycle (e.g., 90 minutes), so as not to interfere with patients' sleep and rest.

- Based on the knowledge that infection is sometimes a trigger for confusion in the elderly, you observe the client's interactions for any mental status changes.

10. Overall, in the past year, how often have you used *research in this **non-direct** way* in some aspect of your nursing practice?

Never	On 1 or 2 shifts		On about half the shifts			Nearly every shift	Do not know
1	2	3	4	5	6	7	N/A

PERSUASIVE RESEARCH UTILIZATION

For Question 11-12, please use the following definition w*hich is different from the definitions for direct and indirect utilization:*

The use of research findings (nursing and non-nursing), **to persuade others, who are usually in decision making positions, to make** changes in conditions, policies, or practice relevant to nurses, patients/ clients, and/or the health of individuals or groups. Do not count as research, things you learned in your basic nursing training.

The following are **examples** of research that can be used in this **persuasive** way:

- You use your knowledge of the adverse effect of irregular shift rotations on employee performance and health to persuade your supervisors to improve the shift rotation in your unit.

- You use your knowledge of recent research which demonstrates that elderly nursing home residents often experience fractures related to falls to persuade the physician to prescribe calcium and vitamin D supplements to decrease this risk.

11. How often have you used knowledge of particular research findings to try **to persuade** the following groups of people to make changes in this way, in the past year?

	Never	Rarely	Sometimes	Often	Do not Know
(a) Nurse co-workers	1	2	3	4	N/A
(b) Physicians	1	2	3	4	N/A
(c) Other health professionals	1	2	3	4	N/A
(d) Nurse administrators	1	2	3	4	N/A
(e) Non-nurse administrators	1	2	3	4	N/A

	Never	Rarely	Sometimes	Often	Do not Know
(f) Community leaders	1	2	3	4	N/A
(g) Government representatives	1	2	3	4	N/A
(h) Member of the public	1	2	3	4	N/A
(i) Other (Specify: _____)	1	2	3	4	N/A

12. Overall, and including all the categories of people in #11, in the past year how often have you used research in this persuasive way?

Never	On 1 or 2 shifts		On about half the shifts			Nearly every shift	Do not know
1	2	3	4	5	6	7	N/A

OVERALL RESEARCH UTILIZATION

For Questions 13 please reassess your research utilization using the original definition of overall *research utilization**:***

> The use of any kind of research findings (nursing and non-nursing), in any kind of way, in any aspect of your work as a nurse. Do not count as research, things you learned in your basic nursing training.

13. Overall, in the past year, how often have you used research in some aspect of your nursing practice?

Never	On 1 or 2 shifts		On about half the shifts			Nearly every shift	Do not know
1	2	3	4	5	6	7	N/A

14. If you circled a number from 2-7 in the above questions, estimate how much of the research that you used was: (NOT ANALYZED)

____ % nursing
____ % medical
____ % other
100%

SECTION III: Individual and Organizational Factors

1. For each item, please circle the one number that best describes your beliefs about research.

	Disagree strongly	Disagree	Uncertain	Agree	Agree strongly
a. Research is needed to improve nursing practice continually……...	1	2	3	4	5
b. Research findings are too complex to use in practice……..	1	2	3	4	5
c. I would change my practice as a result of research findings…….	1	2	3	4	5
d. Research is not applicable to my practice…….	1	2	3	4	5
e. Research helps to build a scientific base for nursing……	1	2	3	4	5
f. It takes too much effort to apply research to practice…….	1	2	3	4	5

2. How much faith do you have that nurse researchers will produce research…

	None				A great deal
a. that is **relevant** to you?……...	1	2	3	4	5
b. that is **easily used** by you?..……	1	2	3	4	5
c. that **can safely** be used in your practice?.....	1	2	3	4	5

3. How ***willing are*** you to implement research when it contradicts something you….

	Very unwilling				Very willing
a. learned *prior* to nursing school?……..	1	2	3	4	5
b. learned *in* nursing school?……	1	2	3	4	5
c. learned in your place of work?…….	1	2	3	4	5

4. How often do you ***actually implement*** research when it contradicts something you…

	Never				Very often
a. learned *prior* to nursing school?……..	1	2	3	4	5
b. learned *in* nursing school?……	1	2	3	4	5
c. learned in your place of work?…….	1	2	3	4	5

5. How important are the following in your decision to use or not use particular research findings in your practice?(NOT ANALYZED)

	No at all important				Very important
a. The research matches my personal values …….	1	2	3	4	5
b. The research meets a clinical need…….	1	2	3	4	5
c. The research is easy to understand…….	1	2	3	4	5
d. The research is relatively easy to incorporate into my practice……..	1	2	3	4	5
e. The results of implementing the research are visible to me…….....	1	2	3	4	5
f. The particular research based practice makes my job as a nurse easier……..	1	2	3	4	5
g. The particular research based practice makes me feel like a better nurse……..	1	2	3	4	5
h. The research is relevant to my particular practice situation……	1	2	3	4	5
i. Others who have tried the research are positive about it…….....	1	2	3	4	5

6. How much access do you have to the following in your workplace?

	Very little				A great deal	Not available
a. Medical Library with research journals ……..…….....	1	2	3	4	5	N/A
b. Unit Library (with nursing material)…….	1	2	3	4	5	N/A
c. Library computers……	1	2	3	4	5	N/A
d. Internet electronic mail (e-mail)…….....…	1	2	3	4	5	N/A
e. Internet research resources……	1	2	3	4	5	N/A

7. Do you think that better access to the above is important to whether or not you use research?(switched numbering with next question)

Not at all important	Somewhat important	Quite important	Very important	Extremely important
1	2	3	4	5

8. The knowledge that I use in my practice is based on: (switched numbering with previous question) (NOT ANALYZED)

	Never	Seldom	Sometimes	Frequently	Always
a. information that I learn about each patient/client as an individual…….	1	2	3	4	5
b. my intuitions about what seems to be "right" for the patient/client……	1	2	3	4	5
c. my personal experience of nursing patients/clients over time……	1	2	3	4	5
d. information that I learned in nursing school……..…….	1	2	3	4	5
e. what physicians discuss with me…..	1	2	3	4	5
f. new therapies and medications that I learn about after physicians' order them for the patients……	1	2	3	4	5
g. articles published in **medical** journals	1	2	3	4	5
h. articles published in **nursing** journals	1	2	3	4	5
i. articles published in **nursing research** journals …….	1	2	3	4	5
j. information in textbooks……..	1	2	3	4	5
k. what has worked for me for years….....	1	2	3	4	5
l. the ways that I have always done it…	1	2	3	4	5
m. the information my fellow nurses share…..……	1	2	3	4	5

	Never	Seldom	Sometimes	Frequently	Always
n. information I get from attending inservices/ conferences……	1	2	3	4	5
o. information I get from policy and procedure manuals……..	1	2	3	4	5
p. information I get from the media. (e.g., popular magazines, television, the internet, etc.)…….	1	2	3	4	5

9. During your workday is there ever time to do any of the following:

	Never	Rarely	Sometimes	Quite often	Frequently
a. Use the library……..…	1	2	3	4	5
b. Read (journals/texts)…….	1	2	3	4	5
c. Reflect on your practice….	1	2	3	4	5
d. Participate in projects…….	1	2	3	4	5
e. Participate in research….	1	2	3	4	5

10. Indicate the degree to which the following people are supportive of you using research in your practice.

	Not very supportive				Very supportive	Do not know
a. Other nurses in your area	1	2	3	4	5	N/A
b. Your immediate supervisor	1	2	3	4	5	N/A
c. Administration (nursing)	1	2	3	4	5	N/A
d. Administration (general)	1	2	3	4	5	N/A
e. Physicians	1	2	3	4	5	N/A
f. Other health professionals	1	2	3	4	5	N/A
g. Other (Specify_____)	1	2	3	4	5	N/A

11. Is there someone in your organization who currently, or in the past year, has "championed" nursing research and/or research based practice (a research champion)?

YES_____ NO _____DO NOT KNOW _____

12. Do you feel competent in your skills and knowledge to evaluate research findings?

YES _____ NO _____

Please explain:

Thank you for your Time and Effort
Please return this survey in the return-addressed stamped envelope.

Appendix H
Participant Information Sheet

PARTICIPANT INFORMATION SHEET

Title of Study: Rural / Urban Differences in Knowledge Translation among Nurses Working in Acute Care Hospitals and the Contextual Factors Associated with Differences

Local Principal Investigator: Dr. Donna Ciliska, BScN., MScN., PhD. Faculty Member, School of Nursing, Faculty of Health Sciences, McMaster University.

Principal Investigator: Paula Mastrilli, RN, BScN., MScN, PhD Student, School of Nursing, Faculty of Health Sciences, McMaster University.

You are being invited to participate in a research study conducted by Ms. Paula Mastrilli, a PhD student in Nursing at McMaster University. Your name and mailing address were provided to us by the College of Nurses of Ontario (CNO) because you consented to the release of your contact information on your annual CNO registration renewal for the purposes of participation in research studies. You have been randomly selected because you are a registered nurse working in a hospital in the South Western Ontario. This is a student research project conducted under the supervision of Dr. Donna Ciliska.

In order to decide whether or not you want to be a part of this research study, you should understand what is involved and the potential risks and benefits. This form gives detailed information about the research study. Once you understand the study, you can make an informed choice about whether or not to participate. Please take your time to make your decision. Feel free to discuss it with your friends, family, or peers.

WHY IS THIS RESEARCH BEING DONE?

Some nursing research studies have found positive effects of using research in the nursing care. This is referred to as knowledge translation (KT). Current knowledge and theory development is based mostly on research that has taken place in large hospitals located in large cities. This study will help improve our understanding of whether current KT theories and strategies apply to nurses working in rural hospitals.

WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this study is to explore the differences in the use of research knowledge (KT) by rural and urban nurses working in acute care hospitals and to explore the factors that are related to any identified differences.

WHAT WILL MY RESPONSIBILITIES BE IF I TAKE PART IN THE STUDY?

If you agree to participate in this study, we are asking you to complete the survey that was included with this letter, which will take approximately 30 minutes, and return it to the researcher in the return-addressed stamped envelope. We ask that you return the completed survey within 2 weeks of receiving it.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

There are no known risks to your being involved with the research.

HOW MANY PEOPLE WILL BE IN THIS STUDY?

A total of 1,000 acute care nurses (500 urban and 500 rural) working in the South Western Ontario will be invited to participate in the study.

WHAT ARE THE POSSIBLE BENEFITS FOR ME AND/OR FOR SOCIETY?

We cannot promise any personal benefits to you from your participation in this study. However, participation in the study may help you understand your own use of research knowledge and the factors that may be influencing you. The results of this study may promote a general understanding of whether current theories and strategies in this area apply to nurses working in rural hospitals. A final report of the study will be useful in assisting administrators and educators in developing resources or strategies that will promote research use among nurses in both the rural and urban acute care hospitals.

WHAT INFORMATION WILL BE KEPT PRIVATE?

Your name and personal information will not be shared with anyone. No information about you will be included in the survey. This information has been replaced by a number code on your survey. A list linking this number with your name and address will be kept in a secure place, separate from your survey. All surveys, without identifying data, will be scanned into an electronic file on a password-protected disc, which will be securely kept in a locked cabinet in the researcher's office for 10 years. Once the student completes her PhD program, the paper copies of the survey will be destroyed by shredding.

For the purposes of proper monitoring of the research study, it is possible that a member of McMaster University's Research Ethics Board may review your answers on the survey. However, no information about your identity will be allowed to leave the university. By answering the questions and returning this survey you are agreeing to the use of the monitoring process. If the results of the study are published, your name will not be used and no information that identifies you will be released.

CAN I CHOOSE NOT TO PARTICIPATE OR TO WITHDRAW FROM THE STUDY?

It is important for you to know that you can choose not to take part in the study. Choosing not to participate in this study will in no way affect you as a registered nurse or your status with the College of Nurses of Ontario or your employer. You may refuse to answer any questions you do not want to answer and still remain in the study. You may withdraw at any time. You have the option of removing your survey answers from the study. The researchers will withdraw you from this study if you contact either of them with this request.

WILL I BE PAID TO PARTICIPATE IN THIS STUDY?

No, you will not receive any direct payment. However, as a small incentive for participating, you can enter into the draw for a nursing journal or popular magazine subscription (maximum value $100 per prize). One prize winner will be drawn from the rural nurse participants and one from the urban participants. The chances of winning a prize will be 1 /500 or better, depending on the number of nurses who choose to respond to the survey and enter a ballot for the draw. The entry ballot has been included in this package. Please return it with the survey. The two winners will be notified in writing and given an order form for selecting their journal or magazine subscription.

WILL THERE BE ANY COSTS?

There is no financial cost to you for participating in this research project. A return- addressed stamped envelope has been included in this package for you to return the completed survey and entry ballot for the draw**.**

IF I HAVE ANY QUESTIONS, WHOM CAN I CALL?

If you have any questions about the research now or later, please contact Paula Mastrilli or Dr. Donna Ciliska at (905) 525-9140, ext. 22529, Monday to Friday, during regular office hours.

If you have any questions regarding your rights as a research participant, you may contact the Office of the Chair of the Hamilton Health Sciences/Faculty of Health Sciences Research Ethics Board at (905) 521-2100, ext. 42013.

DO I NEED TO SIGN CONSENT?

No, you are not required to sign a consent for this study. Your consent to participate is implied if you complete and return the survey enclosed in this package. By completing the survey, you are indicating that you have read the information in this information sheet and have had a chance to ask any questions you have about the study. You are also in agreement that you have been told that you can change your mind and withdraw your consent to participate at any time. You are not giving up any of your legal rights. Please keep a copy of this letter for future reference.

Appendix I
Plan for Data Analysis

Demographic Description of Rural and Urban Group:

Demo. Variable	**Response Categories**	**RURAL**	**URBAN**	DATA
Gender	- Male - Female	Frequency	Frequency	Categorical
Education	Highest level of formal - Diploma - Bacc. degree - Master - PhD.	Frequency	Frequency	Categorical
Years in Nursing	- 30 yrs. Of less - 31-40 years - 41-50 years. - 51 years or more	Frequency	Frequency	Categorical
Professional Roles	- staff nurse - administrator - educator - other	Frequency	Frequency	Categorical

Analysis: Include descriptive comparison of demographic factors in rural and urban respondents.

Statistical Test*:* Chi-squared.

Analysis for Question 1. Are there differences in research utilization between acute care nurses working in rural and urban settings?

Description of RU in RURAL and Urban groups of nurses

Dependent Variable	**Items and # of variables**	**Category of responses**	**RURAL Nurses**	**URBAN Nurses**	**DATA**
Direct RU	1	1-7	Mean/SD	Mean/SD	Ordinal
Conceptual RU	1	1-7	Mean/SD	Mean/SD	Ordinal
Persuasive RU	1	1-7	Mean/SD	Mean/SD	Ordinal
Overall RU	1	1-7	Mean/SD	Mean/SD	Ordinal

Analysis: Descriptive results for the above data. Report significant differences between the means of rural and urban respondents.

Statistical Test*:* t-test

Analysis for Question 2: Are there differences in the contextual factors associated with research utilization among acute care nurses working in rural and urban settings?

Variables	Description of responses/ scores	Types of DATA	Description statistics	Statistical Analysis
Individual Factors				
1.Gender	- Male - Female	Categorical	Frequency	Chi-square
2. Highest Nursing Education	-- Diploma - Baccalaureate /Masters. - No Response	Categorical	Frequency	Chi-square
2. Years in nursing	- # or years	Interval	Mean/SD	t-test
3. Employment status	- Full-time - Part-time or casual	Categorical	Frequency	Chi-square
4..Professional roles	% of each - staff nurse - administrator - educator - researchers - other	Categorical	Frequency	chi-square
5. Positive RU Attitudes 6. Trust in RU 7. Belief Suspension	- 6-30 - 3-15 - 6-30	Interval Interval Interval	Mean/SD Mean/ SD Mean/ SD	t-test t-test t-test
8. RU competency	Yes/No	Binomial	Frequency	Fisher's exact test
Organizational Culture				
Participation in professional Interest groups	# of groups	Interval	Mean/SD	t-test
Organizational relationships supportive of RU	7-35	Interval	Mean/SD	t-test
Level of Authority practice	1-5	Interval	Mean/SD	t-test
Receptive Context				
Time to engage in RU	5-25	Interval	Mean/SD	t-test
Organizational Resources Material and Technologies	5-25	Interval	Mean/SD	t-test
Importance of Organizational Resources	1-5	Interval	Mean/SD	t-test
Access to RU Champion(s)	Yes/ No /do not know %	binomial	Mean/SD	Fisher's exact test
Access to in-service and continuing education	Total #	Interval	Mean/SD	t-test
Environmental Context				
Location of Workplace	Rural or Urban	binomial	Frequency	Fisher's exact test

Analysis: Descriptive results for the above data will be reported. Calculate the differences between contextual and demographic factors associated with RU between rural and urban participants.

Statistical Tests: t-test to calculate the differences between means of rural/urban responses and chi- square- to calculate the differences between proportions of rural/urban responses, and the Fisher's exact test will be applied to calculate differences in factors measured as binomial data.
The post hoc Hotelling's trace statistic was conducted to ensure that the appropriate percentage of error for significance ($p < .05$) was apportioned to the entire list of measures of individual attitudes and beliefs, organizational culture and receptive context (Meyers, Gamst, & Guarino, 2006). This statistical test was conducted to ensure that the significance of the findings was not inflated (Warner, 2008).

Analysis for Question 3: What is the relationship between identified contextual factors and research utilization among acute care nurses working in rural and urban settings?

Analysis: Data from the findings of all demographic and contextual factors (including rural and urban) will be tested in order to identify the statistically significant associations between individual and contextual factors (independent variables) and overall RU (dependent variable).

Statistical Tests:
Step 1. Identify which of the 17 variables are significantly associated with RU- correlational Matrix. ($p \leq .05$, $r \geq .20$)

Step 2. Testing that data meet the assumptions required for use of the multiple regression analysis statistic.

Step 3. Conduct a univariate regression analysis. DV- Overall RU, IV- Rural location ($p \leq .05$)

Step 4. Conduct the backwards stepwise multiple linear regression analysis statistic ($p \leq .05$). DV-Overall RU, IVs all individual and contextual factors.

Appendix J

Results of Bivariate Analysis of Variables

	Overall RU	Highest nursing education	Nursing position	Years worked	years worked in organization	RU attitude	Belief suspension	Trust in RU	RU competence	Affiliation with Professional groups.	Organizational Interpersonal support for RU	Authority in practice	Time for RU	Access to resources	Importance of access to resources	Access to in-service and continuing education	Access to organizational Champion
Overall RU	1	.116	.105	-.118	-.142*	.393**	.321**	.282**	.243**	.138	.328**	-.040	.226**	.273**	.246**	.074	.237**
Highest nursing education		1	.112	-.422**	-.340**	.152*	.100	.041	-.041	.112	.029	.035	.038	.013	.248**	-.119	.246**
Nursing position			1	.125	.011	.105	.091	-.022	-.028	.194*	.284**	.071	.287**	.269**	.209**	.199**	.194**
Years worked as a nurse				1	.667**	-.229**	-.045	-.148*	-.135	-.190*	-.057	.049	.011	.095	-.193**	.172*	-.077
years worked in organization					1	-.234**	-.109	-.064	-.126	-.184*	-.035	.052	-.059	.004	-.159*	.153*	-.067
RU attitude						1	.516**	.577**	.190**	.127	.290**	.201**	.202**	.192**	.245**	-.042	.247**
Belief suspension							1	.384**	.127	.032	.197**	.186**	.176**	.172*	.188**	-.013	.111
Trust in RU								1	.225*	.197*	.271**	.178*	.252**	.295**	.205**	.019	.271**
RU competence									1	.074	.074	.073	.087	.091	.101	.015	.069
Affiliation with Professional groups.										1	.076	-.173	.066	.085	.275**	-.059	.148
Organizational Interpersonal support for RU											1	.121	.515**	.345**	.085	.147*	.405**
Authority in practice												1	.135	.140*	.054	.018	.096
Time for RU													1	.474**	.066	.099	.288**
Access to resources														1	.251**	.126	.388**
Importance of access to resources															1	.038	.186**
Access to in-service and continuing education																1	.049
Access to organizational Champion																	1

Note. Missing responses exclluded from the analysis.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$

Appendix K

Comparison of the Mean (M) and Standard Deviation (SD) for Conceptual, Instrumental, Persuasive, and Overall RU Scores among Studies that Have Used Estabrooks' Research Utilization Survey to Measure Research Utilization

Study	Description of nurse	Conceptual RU		Instrumental RU		Persuasive RU		Overall RU	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Estabrooks, 1997,1999a	Canadian nurses (*N* = 680)	5.20	1.82	4.36	1.90	3.60	1.76	4.63	1.77
Estabrooks, Kenny, et al., 2007[a]	American nurses in military health centres (*n*=290)			4.18	1.93			4.53	1.76
	Canadian civilian nurses (*n*=600)			4.74	1.92			4.68	1.72
Estabrooks, Scott, et al., 2008	Canadian urban acute care nurses (*N* = 141)	5.78	1.07	5.41	1.47	4.80	1.81	5.67	1.44
Kenny, 2002	American nurses in military health centres (*N* =290)	4.66	1.88	4.18	1.93	3.63	1.79	4.52	1.85
Current study	Canadian nurses								
	• Rural (*n* = 109)	5.35	1.51	4.35	1.76	3.35	1.51	4.54	1.79
	• Urban (*n* = 111)	5.55	1.80	4.80	1.92	3.55	1.65	5.13	1.70

[a] Conceptual and persuasive RU were reported in this comparative study but were reported in the Kenny 2002 study.