Understanding the Context of Pharmacy Practice Change: Gaining insight into the professional culture of pharmacy and pharmacists' personality traits

By

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ABSTRACT:

Background: Pharmacists around the world are being asked to adopt, and integrate, an increasing number of clinical services into their practices. Evidence for the efficacy of pharmacists' interventions in patient care also continues to grow. Traditional approaches to understanding practice change have not fully accounted for the environmental context of pharmacy practice.

Aim: The aim of this work was to begin this process of understanding the context of pharmacy practice by gaining insight into the professional culture of pharmacy within Canada.

Objectives:

Objective 1: To gain insight into Canadian pharmacy's professional culture, using the organizational culture profile (OCP), and personality traits, using the big five inventory (BFI).

Objective 2: Investigate possible relationships between pharmacists' responses to the OCP and BFI and proxy measures of advanced practice.

Objective 3: Using demographic data including pharmacy practice setting, pharmacist role, level of education and region of practice to investigate possible sub-group differences in responses provided on the OCP and BFI.

Methods: A cross-sectional survey design was used in each of the 5 studies included in this work. Participants included Alberta hospital pharmacists (Chapter 2), pharmacists with Additional Prescribing Authority participating in a pharmacy practice research trial (Chapter 3), a national sample of hospital pharmacists (Chapter 4), Alberta pharmacists with Additional Prescribing Authority (Chapter 5), and British Columbia pharmacists (Chapter 6). With the exception of the second study (Chapter 3) all surveys were administered online. A variety of measures, in addition to the OCP and BFI, were collected some examples of included measures include: number of years in practice, level of education, number of patients recruited into a pharmacy practice trial, region of practice, integration of Additional prescribing Authority into practice, and number of prescription adaptations provided each month. The results from each study were first analysed using descriptive statistics, and then using ANOVA analyses, with *post-hoc* testing, or regression analyses, as appropriate.

Conclusions: One OCP factor, *competitiveness* was consistently repeated across the studies. Results from the BFI also identified one trait, *conscientiousness*, repeated across each of the 5 studies. A number of significant relationships were observed between the adoption of advanced practice opportunities and the factors of the OCP and the traits of the BFI. Finally, a number of important possible sub-group differences were also identified. Taken together these findings provide insight into the context of pharmacy practice. This

improved understanding of context can be used in the development of future knowledge translation intervention studies to advance pharmacists' practice.

PREFACE:

Ethics:

This thesis is an original work by Meagen Marie Rosenthal. The research projects (Chapters 2-5) for this thesis received ethics approval from the University of Alberta Ethics Board, project title “Relationship between personality traits ad pharmacist performance in pharmacy practice research trials” (Pro00024238). The research project “(Chapter 6) “Understanding Pharmacy Culture and Personality using the Organizational Culture Profile and the Big Five Inventory”, received ethics approval from University of British Columbia Behavioural Research Ethics Board, project number H13-01793.

Collaborations:

Some of the research conducted for this thesis forms part of an international collaboration. Dr. Jane Sutton, from the University of Bath, suggested the use of the Organizational Culture Profile and Big Five Inventory as measures of professional culture of pharmacy and the personality traits of pharmacists, respectively. Dr. Carlo Marra collected the data outlined in Chapter 6. Dr. Jill Hall, University of Alberta and Melissa Chung, Pharmacy student, assisted with data collection in Chapters 2 and 4. The data analysis and interpretation in Chapters 2-6, concluding Chapter analysis and introduction are my original work.

Published work:

Chapter 2 of this thesis has been published as Jill Hall, Meagen Rosenthal, Hannah Family, Jane Sutton, Kevin Hall, and Ross T. Tsuyuki, “Personality Traits of Hospital Pharmacists: Toward a Better Understanding of Factors Influencing Pharmacy Practice Change,” Canadian Journal of Hospital Pharmacy 2013; 66(5): 289-295.

In this work I supervised protocol development and data collection with Dr. Jill Hall. I was primarily responsible for data cleaning, analysis and interpretation. Dr. Jill Hall and I co-authored the published manuscript.

No other work in this thesis has been previously published.

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CHAPTER 1:

Introduction

1.0 Current pharmacy practice in Canada:

Pharmacists across Canada, and around the world, are being encouraged to expand their practices through the increasing numbers of clinical pharmacy services being developed and legislated by governments and pharmacy advocacy groups (1-4). In Canada, Alberta became the first province to allow independent prescribing by pharmacists in 2007 (5). More recently pharmacists in British Columbia, Alberta, Ontario, New Brunswick and Nova Scotia have gained the right to provide injections to patients (1). Pharmacists in Alberta, New Brunswick and Nova Scotia can also order laboratory test results (1). Further expansions in pharmacists' services are also being investigated and implemented in many of the other provinces (1) and jurisdictions around the world (6-8).

1.1 The value of pharmacists' interventions:

The provision of these expanded services has, and continues to be justified by evidence from numerous research studies. For example, in a number of recent systematic reviews pharmacists' interventions including dosage adjustments, verbal instructions regarding the patients' disease, drug therapy, diet and exercise, patient education, medication therapy management, and prescribing have been shown to positively contribute to the care of patients with conditions

such as heart failure, diabetes, hypertension, dyslipidemia and osteoporosis (9-16).

Economic analyses suggest that pharmacist interventions can be linked to decreasing patients' hospital stays and preventing future hospitalizations, as well as reducing patients' pharmaceutical drug costs (9, 15). Other economic modeling suggests pharmacists' management of hypertension offers an important cost savings by reducing future cardiovascular events (17). Despite this statistically, and clinically, significant evidence of benefit, pharmacists appear not to have changed their practices to incorporate these services on a large scale.

In a recently published Canadian survey, pharmacist respondents stated that they spend the more than 70% of their time on dispensing related duties, but the majority also stated that they wanted to begin performing more patient-centred care activities in the next 5 years (18). Another study conducted in Spain found that pharmacist respondents had not yet widely adopted pharmaceutical care approaches, despite recognizing that transitions to this form of practice was important (19). A systematic review examining pharmacists' attitudes towards the provision of public health revealed that pharmacists recognized the importance of public health provision, but see it as being of secondary importance to their role (20).

The prevalence of chronic diseases such as diabetes, hypertension and dyslipidemia continue to rise (21-25). For example, recent surveys of diabetes prevalence state that nearly 27% of all Americans, over the age of 65, had diabetes in 2010 (22); similar results were also reported in Canada (21).

Projections suggest that by 2030 the number of people with diabetes, worldwide, will reach 438 million (21). Furthermore, by 2020 it is expected that diabetes will cost the Canadian healthcare system roughly $16.9 billion per year (21). Perhaps most importantly, the percentage of patients achieving guideline targets for control of diabetes remains less than optimal (26). Pharmacists have an opportunity to improve the operationalization of clinical guidelines for diabetes, and those from other chronic conditions, to demonstrate their value to the healthcare system, by assisting patients to better manage these conditions.

1.2 Reasons for lack of practice change:

Efforts to understand the slow integration of these clinical activities into practice by pharmacists has led to numerous research studies designed to examine barriers to practice change within pharmacy. The barriers identified include lack of time, space, support, payment, education/training and vision for what advanced pharmacy services may look like in day-to-day practice (27-30). Interestingly, many of the barriers to change, as well as the opportunities for pharmacists to adopt alternative practice roles, have been discussed since the 1970s (31, 32), and while many changes have taken place within the profession, these changes have not been widespread or sustained.

It is important to note that the barriers identified are real in their consequences to efforts to change pharmacy practice, however, it might be suggested that they do not comprise the total picture of influences on the uptake of expanded pharmacy services. For instance, there has been research to

suggest that even after the removal of some of the barriers, uptake has not been widespread or sustained (33, 34). In particular, a systematic review of payment models within pharmacy found that after strong initial interest by pharmacists, the actual provision of these services waned over time (33). Moreover, even where initial uptake was good, less than 50% of eligible patients were being enrolled in the program (33). Another study, examining the completion of medication interventions by pharmacists in British Columbia, found that, over a one-year period, these services accounted for only 0.2% of all prescriptions filled in the province (34).

In studies examining the implementation of advanced pharmacy services, researchers have focused on community pharmacies' structural capacity for change through things like "organizational flexibility" (35), and the influence of "entrepreneurial orientation" and "resource adequacy" (36). In analyses from one of these studies a multiple linear regression found that these variables explain roughly 28% of the variance in the model (36). While within the confines of social research this model fits relatively well, it would seem that there remains a significant proportion of the variance that is unexplained. As such, other researchers suggest that in addition to accounting for structural factors, the influence of the human element must also be taken into consideration (37, 38).

In fact the change management (39-45) and knowledge translation (46-49) literatures advocate for an appropriate understanding of the total context of a particular organization, or in this case the profession, in addition to accounting appropriately for systemic barriers like those mentioned above. One knowledge

translation framework, the Promoting Action on Research Implementation in Health Services (PARiHS) framework, offers particular insight into understanding the current context of pharmacy practice (38). In this framework, the successful integration of knowledge into practice becomes a function of the nature and type of *evidence* available, the *context* into which the evidence is being integrated and the manner in which that process of integration is *facilitated* (38).

Evidence, in this case, can be understood as the confluence of research evidence, clinical expertise and patient choice (46). While it would be difficult to state with certainty that this facet has been totally optimized in pharmacy practice, the previous section suggests research evidence demonstrating pharmacists' value is available (9-16) and there is also evidence to suggest that patient satisfaction is greater for patients receiving expanded services from pharmacists (51, 52). Facilitation is the process by which someone makes the act of change within a particular setting easier (46). However, before this process can begin the facet of context has to be explicitly addressed.

Context involves "an understanding of the prevailing *culture*, the nature of human relationships as summarized through *leadership roles* and the organizations approach to routine *monitoring of systems and services*" (pg. 152) (46). There has been previous work completed in improving pharmacy practice through the measurement of pharmacists' services (53, 54), and other work has focused on the challenge of orienting pharmacy leadership to prepare for practice change (55, 56). While each of these areas of study requires further consideration, insufficient attention has been paid to understanding the influence

of the professional culture of pharmacists on practice change. For example, authors studying change management within healthcare, more broadly, have argued that understanding research use can be improved through an understanding of organizational culture (41).

In one study, in particular, authors developed the hypothesis, based on extensive observation, that nursing staff may approach their work from the perspective of needing to be seen “doing” nursing related work, such as checking patient vital signs (41). For this reason taking time to seemingly stop “doing” the work of nursing and to read research studies to improve one’s practice is not considered as important (41). That is, the nursing culture, observed by these authors, has developed in such a way that nurses become implicitly expected to read and assimilate research on their own time (41). However, this expectation also sends the message that assessing and assimilating research is less important, because it is not happening during regular working hours (41). Having this knowledge about how nurses view their work and role becomes very important in the development of future strategies to more actively integrate research use into this particular setting.

The previous example demonstrates the value in gaining insight into context, through culture (46). As such, the aim of this work was to begin this process of understanding the context of pharmacy practice by gaining insight into the professional culture of pharmacy within Canada.

1.3 Culture:

1.3.1 Professional culture:

Research investigating professional culture, in general, has been conducted in a number of health professions including nursing and medicine. Professional culture in nursing has been characterized by some as revolving around essential stories (57). For example, some nurses relate, what the author refers to as, “war stories”, which not only provide examples of difficult care situations to new nurses, but also relate how effectively the nurse protagonist was able to manage the situation (57). Other stories convey “nursing folklore”, such as talking to comatose patients, and “never again” stories wherein nurses tell of distressing circumstances in which the nurse should have put the patient’s needs ahead of the medical imperative (57). Research into nursing culture has also focussed on particular practice settings. One study examined the culture and habits of perioperative nurses and found that some of the habits of the nurses promoted ethical values, while others served to hinder progress towards improved practice approaches, and reinforced traditional systemic power structures and norms (58).

Research into the culture of physicians suggests that it may, in fact, be a “culture of no culture” (59). That is, physicians believe that the scientific knowledge they apply to patient care is “True”, and therefore not influenced by the social construction of knowledge in the Western world (59). Consequently, physicians are allowed to apply their knowledge unimpeded by considerations of the assumptions that went into its creation. In response to this assumption other authors have suggested that before physicians’ cultural sensitivity towards

patients can be improved, they must be brought to understand that medicine is also in possession of a particular culture (60). One method proposed to achieve this objective was to introduce an analysis of such cultural factors as the physician's white coat, and use of language, to demonstrate the constructed nature of these traits, and their influence on future physicians (60).

Cultural differences have also been noted between health care professionals. For example, physicians and social workers were noted to have differing attitudes towards ideas life-saving versus quality of life, making treatment goals versus acknowledging patient autonomy and how each profession respectively approaches their role on a health care team (61). Differences have also been noted between physicians and nurses (62).

In general, much of this literature is focused on leveraging, or changing, the professions' culture to improve the care to patients (60, 63) or team functioning (61, 62, 64). As such one of the underlying assumptions of this work is that, at some level, the identified culture is not the right one. Furthermore, when examining those studies which have made comparisons between professional cultures, the assumptions of the authors seem to be weighted towards showing one group's culture as being superior to that of the other (61, 62). Interestingly, the language used to describe how the authors have conceptualized the term "culture", in these works, is often vague, or non-existent. In general it seems to assume that culture is only about values or attributes that are shared by group members. However, culture is much more complex than simple consensus amongst group members. So while these observations should

not take away from the value of these previous works, the identified limitations have meaning for the conclusions one may be able to draw from them.

1.3.2 Defining culture – the monolith:

A possible explanation for the lack of clarity in the definition of culture in these previous works is that it is a reflection of the lack of clarity in the study of organizational culture more broadly. The term culture has been defined in a plethora of fashions, and its study has been plagued by much debate (39). One such debate surrounds the distinction between organizational culture and organizational climate (65). Traditionally researchers examining organizational culture focussed on obtaining a deep understanding of a group, its underlying assumptions and the individual meaning given by group members to particular events (65). In this way the study of organizational culture was similar to that of cultural anthropology, with its emphasis on a deep understanding of one, or perhaps two cultures. For example, consider Latour and Woolgar's examination of the creation of knowledge within scientific laboratories, wherein one of the authors worked for over a year as a scientific author and lab assistant in an effort to develop an understanding of how scientific knowledge is greater (66).

On the other hand, researchers examining organizational climate were said to be more interested in members' perceptions of observable practices and procedures, as identified by researchers, and largely located on the surface level of understanding of a group (65). These types of work have largely been undertaken with the application of large surveys and few traditionally qualitative

methodological approaches. One example, that is often pointed to is the work of Geert Hofstede (67).

However, applying the work of Denison (1996) the following discussion of culture assumes that the traditional differentiation between culture and climate is not about a true difference in the underlying phenomenon. Rather, the discussion of climate versus culture can be understood as more as the difference in the methodological and epistemological perspectives taken to the problem under study (65). However, before continuing it is important to note that this discussion is not intended to be all-inclusive and offers one, primarily organizationally focussed approach to the understanding of professional culture.

One of organizational culture's best known treatise's is "Organizational Culture and Leadership", by Edgar Schein, who defines organizational culture as "*a pattern of shared basic assumptions that [were] learned by a group as it solved its problems of external adaptation and internal integration, that* [have] *worked well enough to be considered valid*…" (pg. 17) (68). From Schein's perspective culture develops to ensure stability for its members by providing them with a framework for approaching day-to-day situations (68).

According to Schein, there are three levels within culture: artifacts, espoused values and beliefs and underlying assumptions (68). *Artifacts* are the visible aspects of a culture (68), and include things like the physical layout of a company's office space or the façade of its building. Schein ties *espoused values and beliefs* to ideas about how tasks ought to be accomplished that result in group success, or ideas, which may not be testable, but that become embedded

by repetition in how the group approaches challenges (68). According to Schein founding leaders within the organization develop many of the groups' espoused values and beliefs (68). Espoused values and beliefs may be identified in an organizations mission statement or by asking group members directly. However, these observations and declarations cannot be taken at face value. In fact, Schein makes an important distinction between the espoused and "actual" values of the organization (68).

This is where *underlying assumptions* come into play. Underlying assumptions are unconscious and taken for granted thought processes that guide the behaviour of group members in day-to-day interactions (68). Thought of in another way, underlying assumptions are like the flagstone from which group members' work to build interactions with each other and the outside world. An example of an underlying assumption, provided by Schein, in the engineering profession is that designs should be first and foremost safe, meaning that sometimes aesthetics are sacrificed for function and safety (68).

The nature of these underlying assumptions, as being taken for granted, is such that, according to Schein, they become incredibly difficult to identify through conventional means. Unlike espoused values and beliefs that may be gleaned by asking group members directly, underlying assumptions are not generally part of a group member's conscious understanding. Therefore, Schein advocates for in-depth observation and immersion in the culture by a researcher to gain access to these underlying assumptions (68). Furthermore, these assumptions are even more difficult to change because they have become such an integral part of the

group that any proposed change threatens the very identify of that group (68). However, Schein does leave space for the possibility of changing groups' underlying assumptions, but qualifies this by saying that it is a long and arduous process that must be overseen by someone with experience in this procedure (68).

As with all theoretical perspectives, Schein's work makes a number of assumptions regarding the nature of culture. To begin he assumes that the culture pre-exists the integration of new members, thereby implying that they enter the culture as blank slates and have no influence on that culture. This assumption of cultural superiority leads to another assumption, that all people who might be identified as belonging to a particular culture ultimately share that culture to the same degree, or that all cultural members have an equal level of "buy-in" to the culture. Finally, Schein's description of culture assumes that it is an actual and knowable entity that can be uncovered with the correct application of in-depth emersion into that group.

1.3.3 Defining culture – the interpreter:

Joanne Martin offers an alternative perspective on culture (39). Martin defines culture as "*patterns of* [subjective] *interpretation composed of meanings associated with various cultural manifestations, such as stories, rituals, formal and informal practices, jargon and physical arrangements*" (pg. 330) (39). In this definition, "culture" informs, but does not dictate, how people interpret their every-day lives (39). Furthermore, she cites established sub-group differences

within organizational cultures as evidence that culture is not monolithic (39). As such, Martin has left a space for the possibility of individual influence on the manifestation of the culture of particular groups.

Moreover, turning culture into a set of individual interpretations means that it can no longer be defined and contained within a set of specific boundaries. For this reason Martin advocates the use of a three-perspective theory on the study of culture. This theory suggests that to obtain a more complete understanding of culture researchers must take integrative, differentiated and fragmented perspectives on the group in question (39). The integrative perspective is characterized by the notion that “some aspects of the culture will be shared by most members, producing consistent [and] clear interpretations of [cultural] manifestations” (39). Using Schein’s work, the integration perspective may be linked to the identification of a group’s espoused values and beliefs (68). Martin points to examples of this perspective manifesting itself in consistent descriptions of a particular company’s “family like atmosphere” (39).

The differentiated perspective focuses on aspects of the culture that have “inconsistent interpretations” (p. 94) (39). Again borrowing from the parlance of Schein’s work this perspective may be linked to the investigation of slips between espoused and actual values and beliefs (68). One example, used by Martin, is an observation of a female employee from the company with the “family-like atmosphere”, that “along with this very nice, humanitarian theme goes the Midwestern mommy and daddy: Daddy makes the decisions and Mommy does the supplementary stuff” (p. 125) (39). This comment points to two important, but

intimately related aspects of the study of culture. First she is recognizing that a group's culture is not equally distributed across all members. Second, her recognition of this inequality also points to the possibility of a sub-group of female employees, within this company, who likely do not have the same level of buy-in into the integrative perspective's version of the company culture.

In the fragmented perspective the researcher adopts the position that cultural manifestations are "neither clearly consistent, nor clearly inconsistent" (p. 94), meaning that attention must be paid to the context of the interaction (39). This perspective is slightly less straightforward than the previous two, but is most easily understood through an example of a state-run company in Turkey that was facing the need to overhaul its production process to become more efficient and market driven (39). While employees stated that they appreciated this need to change, they were also ambivalent towards it, as they saw it as compromising their previous way of life (39). As such, the fragmentation perspective is like the manifestation of the consequence of slippage between espoused and actual values and beliefs to group members.

Similarly to Schein's definition of culture Martin's first perspective, integrative, makes allowances for the notion that there are some aspects of culture which group members share. However, unlike Schein's definition of culture, Martin's cannot be neatly contained when a researcher adopts the three-perspective approach to studying culture. This approach also greatly complicates both the data collection and analytic process as the researcher must stand inside and out of the culture to take each perspective. In addition to extending and

complicating the examination of a professional culture Martin's work also allows for the influence of individuals on the manifestation of culture.

1.4 Individuals and personality traits:

Personality traits are commonly understood to be a set of stable characteristics that influence an individual's behaviour (69). The study of modern personality traits appears to have begun in earnest in the late 1930s with the work of Allport and Odbert (70). This work stemmed from the lexical hypothesis, which suggests, "*most of the socially relevant and salient personality characteristics have become encoded in the natural language*" (p. 117) (70). These authors searched the English dictionary for terms that could be used to distinguish human behaviour and identified roughly 18,000 terms (70). These terms were then further sub-divided into four categories; "personality traits", "temporary states", "highly evaluative judgements of personal conduct and reputation" and "physical characteristics" (70).

By focusing specifically on the "personality traits" subgroup, researchers were then able to cut the number of terms down to approximately 4,500. Cattell (1943), began this process, identifying just 35 variables for his 16 Personality Factor (16PF) instrument (70). While Cattell's findings have been contested, his pioneering work prompted others within the field and ultimately led to the development of the Big Five Dimensions (i.e., broad categories), which have subsequently come to dominate the study of personality traits (70). These dimensions include extraversion, agreeableness, conscientiousness, neuroticism,

and openness and represent an attempt to bring a level of standardization to this field of study (70-73). Recent research has found that these traits are represented across national culture groups, which suggests that they may be universal and biological in nature (74, 75). Research also suggests that they remain stable over time – once a respondent has reached adulthood (74).

The trait “extraversion” describes behaviours such as being “energetic” and “enthusiastic”, “social”, “assertive”, “confident”, and “ambitious” (71). “Agreeableness” describes behaviours such as being “altruistic”, “cooperative”, “willing to conform to group norms”, and “displaying warmth and kindness” (71). “Conscientiousness” includes the ability to “control impulses” to “facilitate goal-directed behaviour”, to “follow norms and rules”, and “efficiency in planning, organizing and prioritizing tasks” (71). “Neuroticism” as opposed to emotional stability, describes behaviours associated with “feelings of anxiety”, “nervousness”, and “depression”. People who score more highly on neuroticism in Big Five measures of personality may also display “self-consciousness”, be more “moody”, “impulsive”, and “stress-prone” (71). Finally, people who score more highly on the “openness to experience” trait are likely to have a “wide, deep and complex level of experience in the world” (71). Such people are also likely to be “knowledgeable”, “perceptive” and “analytical”, “seek out new experiences”, and are more “artistic” and “investigative” (71).

1.4.1 Personality research in healthcare:

Turning to the healthcare literature, there has been some work examining the

role of personality traits, measured using a number of instruments, and work satisfaction, student success and ultimate career paths of professionals. For example, a longitudinal study from nursing found that those nurses with the highest degree of empathy and low sensitivity to aggressiveness, measured using the Questionnaire Measure of Emotional Empathy and Profile of Non-verbal Sensitivity scales, respectively, had the greatest work-satisfaction at the ten-year follow-up (76).

A study using the Big Five Dimensions, examining medical students and residents, found that students scored more highly on the scale conscientiousness suggesting that they may be more likely to demonstrate the ability to control impulses to facilitate goal-directed behaviour (77). In another study, which also used the Big Five Dimensions, scoring differences were noted between medical students attending rural and urban schools (78). In particular, students attending rural schools scored higher on agreeableness and conscientiousness (OR = 1.06 and 1.03 respectively) (78), meaning that these students may be more likely to exhibit characteristics such as altruism and the ability to follow rules and norms.

There has even been some work conducted on the personality of pharmacists. One study found a high degree of correlation between pharmacists' scores on the Gordon Personal Profile Inventory and their level of satisfaction with their particular career path within the profession (79). In another study using the Myer-Briggs Type Indicator, pharmacy students with a preference for extraversion and perception were found to have a lower academic performance and were slower to advance through the pharmacy course (80).

1.5 Culture and the individual:

An examination of the social psychology literature suggests three broad approaches to the study of personality traits and culture. The first, more traditional approach, posits the influence of national culture on the personalities of group members through the process of childrearing and socialization within the group (75). This perspective was based largely on the popularity of the psychoanalytic theory of personality (75). However, over the last century a transition has taken place within the field of psychology away from this perspective to a focus on the influence of in-born personality traits like the Big Five Dimensions (75). This led to an alternative approach to the study of culture and personality wherein it was suggested that personality traits influenced culture (74, 81).

However, neither of these approaches to the study of personality and culture offers a compelling argument for the supremacy of either nature (personality) or nurture (culture). There is, however, a third approach, put forward by Robert McCrae (2001), suggesting that personality and culture are two distinct variables, which independently influence people's behaviour (74). Insight into this influence can be observed through characteristic adaptations (74). Characteristic adaptations are the specific "skills, habits, attitudes, interests, roles and relationships that are manifest within a particular group of people" (p. 821) (74). For example, a person born in France and another born in Korea may both score as being more likely to exhibit behaviours in line with extraversion, but manifest

those behaviours in culturally specific manners (74).

Much of the literature treating culture and personality as independent variables has focused on identifying differences of culture and personality between nations. For example, in a large-scale study conducted by McCrae et al. in 2005, similarities in personality traits were identified between cultures that had historical associations (e.g. Northern Irish, English, Australians, New Zealanders, Canadians and Americans were clustered) (82). The authors also found that when conducting multidimensional scaling there were significant differences between nations on their self-reported levels of neuroticism and extraversion (82).

1.6 The operationalization of culture and the influence of the individual:

Based on this discussion of culture and personality traits, it is Martin's definition of culture that has been used as the foundation from which the professional culture of pharmacy is investigated. Specifically, this definition's emphasis on individual interpretation as the core of cultural understanding has been woven into the data analysis and description of results by framing them as the pharmacists' perception of their professional culture's values (39). Care has also be taken to avoid language suggesting that the professional culture stands outside of these perceptions, as the definition of culture provided by Schein implies (68). The extending of the definition of culture, and its possible relationship to behaviour has been continued with the integration of McCrae's proposition that culture and personality are independent variables for the

purposes of data analysis and interpretation (74). However, possible interactions between these culture and personality will not be explored as part of this work.

Furthermore, Martin's integrative approach (39), has been taken to collect the data, on both cultural and personality, in all of the proceeding Chapters. Again, the integrative perspective focuses on shared cultural manifestations and is characterized most strongly by consistency, consensus and clarity (39). To investigate these consistencies two instruments, one measuring culture and the other personality traits, have been applied, following McCrae's treatment of culture and personality as distinct variables.

In light of this review of the literature the original aim of this thesis, to begin this process of understanding the context of pharmacy practice by gaining insight into the professional culture of pharmacy, has been adjusted to include gaining insight into personality traits.

Objective 1: To gain insight into Canadian pharmacy's professional culture, using the Organizational Culture Profile (OCP), and personality traits, using the Big Five Inventory (BFI).

1.6.1 The Organizational Culture Profile (OCP):

The OCP was originally developed to assess person/organization fit (83). The instrument's authors developed it by searching the academic literature for statements said to depict "strong cultures" (39). A total of 54 value statements were eventually identified and used (39). Recent applications of the OCP have

shown that it is sensitive enough to detect sub-group (i.e., professional cultures) differences within wider cultures (84). Originally the instrument was administered to participants using a Q-sort approach (39). In this approach participants are asked to rank statements according how important the value is to them. The ranking generally takes the form of a pyramid (83). One of the benefits of this particular approach is that respondents are given the opportunity to determine which values are most relevant to them (39). However, this approach also demands involvement from researchers in the administration of the instrument to ensure that participants completely understand the task (40).

A 40-item version of the instrument was developed by Sarros et al. (2005) (40), and has replaced the Q-sort approach with a Likert scale (see Appendix 1 for OCP instrument). As such, this latest version of the OCP can be self-administered by respondents. While this method introduces greater researcher bias, as respondents are no longer given the freedom to identify which values are most or least important, the ease of use of the Likert scale format cannot be overlooked.

This new version of the instrument comprises of 7 cultural factors: innovation, supportiveness, social responsibility, competitiveness, stability, and performance and reward orientation. Groups that perceive value in being “quick to take advantage of opportunities”, “risk taking” and taking “individual responsibility”, may score higher on the trait of innovation (19). Groups that perceive value in being “team and people oriented”, “sharing information freely”, and are “collaborative”, may score higher on “supportiveness” (19). Groups that

perceive value in being “reflective”, “having a good reputation”, and a “clear guiding philosophy”, may score higher on “social responsibility” (19). Groups that perceive value in being “achievement oriented”, “emphasize quality”, and “being distinctive and different from other groups”, may score higher on “competitiveness” (19). Groups that perceive value in being “calm”, “having low conflict” and a “sense of job security”, may score higher on “stability” (19). Groups that perceive value in having “high expectations for performance”, “enthusiasm for their job”, to be “results oriented” and “highly organized”, may score higher on “performance orientation” (19). Groups that perceive value in being “fair”, “providing opportunities for professional growth”, and having “high pay and praise for good performance”, may score higher on “reward orientation” (19).

The value statements are ranked from 1 = Not recognized to 5 = Very Much recognized using a guiding statement which reads, “To what extent is your [blank] (the term “profession” was used in each of the studies outlined below) recognized for its…” (40). This version of the instrument has proven to be both valid (40) and reliable (see Table 1 for reliabilities) (40). To our knowledge this is the first application of this instrument investigating the culture of a health profession. As such, the tone of this work will be descriptive in nature (39).

1.6.2 The Big Five Inventory (BFI):

To measure the personality traits of pharmacists the Big Five Inventory (BFI) (see Appendix 2 for complete BFI instrument), a validated, reliable instrument

(71) that measures the Five Personality Dimensions (outlined pg. 16) was used (see Table 2 for reliabilities). The BFI was designed to allow for the “efficient” and “flexible” measurement of the Big Five Dimensions without the “need for more differentiated measurement of individual facets” (p. 129) (70). The BFI is considered to be a short instrument, suitable for self-administration, utilizing 44 short phrases measured on 5-point Likert scales from “strongly disagree” to “strongly agree” (71). The value of the use of short phrases is that they have been shown to be more accurately interpreted than single words accompanied by definitions (70). As with the OCP, scoring the BFI involves combining the Likert responses, to a specific sub-set of the 44 phrases, related to each of the identified personality traits.

1.7 Culture, personality, and the adoption of advanced scopes of pharmacy practice:

To gain some preliminary insight into possible relationships between the OCP and BFI findings and pharmacist behaviour, whenever possible, data about the adoption of advanced practices by pharmacists will also be collected. Advanced pharmacy practices have been defined as those services legislated in the province in which the pharmacist respondent resided, at the time of survey completion that extends beyond dispensing medications (1). For example, in Alberta pharmacists who have obtained Additional Prescribing Authority will be considered to have an advanced practice. In British Columbia pharmacists who

regularly provide prescription adaptations, medication reviews and immunizations will be considered to have an advanced practice.

Objective 2: Investigate possible relationships between pharmacists' responses to the OCP and BFI and proxy measures of advanced practice.

1.7.1 Possible limitations:

There are a number of limitations with the primarily survey-based, integrative perspective, adopted for the collection and interpretation of this data. First are general limitations of survey data. As outlined by Martin, the use of surveys to characterize an organization's culture introduces bias because they utilize the language of the researcher, not the members of the culture (39). For this reason this etic data cannot be assumed to stand in directly for group member specific language, phraseology and meaning. To adjust for this limitation in this study, and as discussed earlier, interpretation will be primarily descriptive in nature (39). Careful conclusions about the wider implications of identified cultural values and personality traits will be drawn only as part of the concluding Chapter.

A second limitation of this type of survey data is related to the level of measure of the variables comprising the OCP and BFI. As outlined above both of these instruments measure cultural factors and personality traits using 5-point Likert scales, which according to the authors, are then scored by summing and averaging the distinct contributing sub-set of variables for each factor or trait (40, 70). This mean score is then used to stand in for whether or not a particular

factor, for example, may be perceived as being valuable by the group. However, it is important to note that the numbers in Likert scale data do not have intrinsic meaning (85). As such, it is not possible to say that a mean score of 4.0 on the trait of extraversion, for example, represents a 14.3% greater expression in the trait versus a mean score of 3.5. Moreover, qualifying this difference using the definitions of the factors or traits is not possible.

There has been debate surrounding the treatment and interpretation of this kind of data (86-89). To begin to address this issue the mean scores from the OCP and/or BFI, in each study, are first characterized by making a comparison to the population mean scores available for each instrument (40, 90). Second, whenever inferential statistics are used on OCP and BFI results, care again is taken to present the results descriptively. This means that language suggesting that the results are deterministic in nature will be avoided.

The OCP and BFI offer important insights into the culture and personality of respondents', but they do not measure actual behaviour. Rather they only measure respondents' perceptions of particular phrases, which are proxies for larger constructs, which have not been measured as part of this work (91). As such, this data alone cannot be assumed to directly stand in for actual behaviours of respondents in everyday interactions. These data do provide important insights into pharmacy practice and could be used to develop future studies to investigate whether or not the identified cultural factors and personality traits fit in with pharmacists' self-descriptions.

The third limitation relates to the integrative approach. In particular, this approach traditionally does not allow space for the discussion of differences within groups. As Martin suggests, not all group members share cultural values equally (39). Therefore, wherever possible data allowing for the examination of the differentiated perspective, through sub-group analyses, has also been collected and analyzed.

Objective 3: Using mean scores of respondents and demographic data to investigate possible sub-group differences in responses provided on the OCP and BFI.

Another limitation of the integrative approach relates to its principal use by organizational managers to characterize culture for the sole purpose of leveraging it to improve efficiencies within the company (39). Taking only the point of view of management creates space for non-management group members' point of view to be overlooked, thereby enabling larger systemic issues to be glossed over (92). Consequently, the risk of individual-blame bias, meaning that reasons for slower changes in practice within pharmacy can be attributed solely to pharmacists as individual, rather than taking into consideration the larger system of which they are a part, become severe (92). Part of this concern will be addressed through meeting objective 3, as differences between sub-groups within pharmacy will be identified. However, as this work is not also measuring systemic issues in pharmacy practice change, the possibility of

individual-blame bias overtaking the interpretations of data collected must be considered (92). A return to this discussion will be made in the concluding Chapter, where a contextualization of these findings from a systemic viewpoint will be provided.

1.8 Chapter overview:

Five separate studies will be presented as part of the thesis. The first study called, “Personality Traits of Hospital Pharmacists: Toward a Better Understanding of Factors Influencing Pharmacy Practice Change”, examined the personality traits of Alberta hospital Pharmacists (Chapter 2). The second study, “The Relationship between Personality Traits and Pharmacist Performance in Pharmacy Practice Research Trials”, a sub-study of the “Community Based Approach to Dyslipidemia Management: Pharmacist Prescribing to Achieve Cholesterol Targets (RxACT Study)”, sought to gain insight into possible relationships between pharmacists’ personality traits and their performance in a pharmacy practice research trial (Chapter 3). The third study is a national survey of hospital pharmacists called, “The professional culture and personality traits of hospital pharmacists across Canada: a fundamental first step in developing effective knowledge translation strategies” (Chapter 4). In this study pharmacist respondents were asked to complete the OCP and BFI, as well a number of basic demographic questions designed to gain some insight into any possible relationships between the tools and pharmacists’ practices. The fourth study, a survey of Alberta pharmacists who obtained Additional Prescribing Authorization,

examined not only their integration of this ability into their practices, but also their responses to the OCP and BFI (Chapter 5). This study is called “Prescribing by pharmacists in Alberta and its relation to culture and personality traits”. The fifth, and final study, is a survey of pharmacists from British Columbia containing the OCP, BFI and numerous questions asking after pharmacists’ integration of advanced scopes of practice into daily practice (Chapter 6). This study is called “Understanding pharmacy culture and personality using the Organizational Culture Profile and the Big Five Inventory”.

1.9 Conclusion:

The aim of this work was to provide initial and descriptive discussion of the professional culture of pharmacy and the personality traits of pharmacists in Canada. This will be accomplished through the application of Martin’s definition of culture and further through the primary use of the integrative approach, and then secondarily through the differentiated approach to data analysis. Primary data collection has taken place through the use of two instruments, the OCP and BFI. Additional data regarding respondent demographics, practice setting, pharmacist type and the adoption of advanced scopes of practice were also gathered depending on the particular study.

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1.0.1 Table 1. Reliability scores for OCP Factors (40)

OCP Factor	Cronbach's Alpha
Innovation	0.80
Supportiveness	0.87
Social responsibility	0.74
Competitiveness	0.75
Stability	0.66
Performance orientation	0.74
Reward orientation	0.80

1.0.2 Table 2. Reliability scores for BFI Traits (69)

BFI Trait	Cronbach's Alpha
Extraversion	0.86
Agreeableness	0.79
Conscientiousness	0.82
Neuroticism	0.87
Openess	0.83

CHAPTER 2:

Personality Traits of Hospital Pharmacists: Toward a Better Understanding of Factors Influencing Pharmacy Practice Change

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2.0 Background:

The Blueprint for Pharmacy has articulated a vision for the profession of pharmacy in Canada that focuses on patient-centred care (1). Recently, health system pharmacy organizations in both Canada and the United States have developed vision statements to guide the improvement of patient outcomes and safety by advancing practice excellence (1-3). However, advancement toward this objective has been slow and incomplete (4-9). For example, a survey conducted in 2007 found that the majority of pharmacist respondents spent their work time on dispensing-related activities, although they were interested in and recognized the need for practice change (7). British Columbia pharmacists have had the authority to adapt prescriptions since 2009 (8); however, adapted prescriptions accounted for only 0.2% of all prescription claims in that year (9). In Alberta, pharmacists have been allowed to apply for additional prescribing authorization since 2007 (10), but only 215 of the roughly 4000 pharmacists in

the province have received this authority (D Cooney, Deputy Registrar, Alberta College of Pharmacists; personal communication by e-mail, January 24, 2013).

Recent work in the area of practice change in pharmacy is beginning to suggest that pharmacists themselves may be the most important barrier to the adoption of more advanced forms of practice (11,12). In previous work exploring the professional culture of pharmacy, we posed the question "What does a pharmacist do?" to randomly selected samples of community and hospital pharmacists from Alberta, Canada (11,12). In the community pharmacist sample, 45% of responses were considered product-focused (e.g., "fill prescriptions"), whereas only 29% were patient-centred (e.g., "address patients' medication needs") (11). Among hospital pharmacists, only 24% of responses to this question were patient-centred (e.g., "work as a member of the health care team to improve individual patient's health"), whereas over half of the responses were related directly to drugs (rather than patients, e.g., "calculating pharmacokinetics for certain medications") or were focused on drug distribution (e.g., "dispense prescriptions") (12). Taken together, the results of these studies suggest that pharmacy culture remains rooted in the traditional function of dispensing medications.

Although continued work to understand the professional culture of pharmacy is important, culture provides only part of the picture of pharmacy practice change. A better understanding of the personality traits of members of the profession is also needed, to provide a holistic picture of the way in which pharmacists respond to attempts to innovate practice. Theories of personality

have shown that individuals' personalities comprise a number of traits, the blend of which characterizes human beings as individuals (13). In particular, 5 personality traits are widely recognized: extraversion, agreeableness, conscientiousness, neuroticism, and openness (Table 1). Together, these characteristics form the "Big Five" model of personality traits (13).

A review of the personality literature reveals that these Big Five traits, alone or in combination, often influence work performance (14-18). For example, a recent study examining the relationship between work role performance and the Big Five traits revealed that openness was positively related to individual proactivity (17), whereby an individual finds a better way of accomplishing some work-related objective. Openness was also positively related to organizational proactivity or the efforts a person makes to improve efficiencies for the company (19). However, openness was negatively related to team and organizational proficiency (17) (speaking well of the company to those on the outside). Interestingly, agreeableness had an inverse relationship with individual proactivity (17) (the likelihood of individuals to challenge current circumstances to change or improve a situation). Conscientiousness was positively related to individual task proficiency (the ability to complete a task correctly) (19), while the inverse was true for neuroticism and extraversion (17).

A narrative review found that extraversion was positively related to Holland's social (helping) and enterprising (persuading) job interests, that agreeableness was positively related to social (helping) job interests, and that openness was related to artistic (creative) and investigative (thinking) job

interests (18). Conscientiousness was also shown to relate to having "conventional" interests (18). Finally, in a meta-analysis, Barrick and others (20) found that conscientiousness was a valid predictor of job performance across all job types tested and that neuroticism was inversely related to at least some job success predictors. To the best of our knowledge, however, there has been no research into the personality traits of pharmacists, especially as such traits relate to practice change. This study was undertaken to characterize the personality traits of hospital pharmacists practising in Alberta, Canada.

2.1 Methods:

A cross-sectional survey of hospital pharmacists was undertaken in Alberta, Canada. Invitations to participate in an anonymous web-based questionnaire were sent via e-mail to all 766 hospital pharmacists practising in urban and rural centres within the 2 health service organizations that provide all institutional care in the province. The survey invitations were distributed by the health care organizations, which ensured that no personal identifying information was available to members of the research team.

For this study, the Big Five Inventory was used to measure personality traits. This inventory is a validated, reliable instrument that measures extraversion, agreeableness, conscientiousness, neuroticism, and openness to new experiences (Table 1) (13). It is considered a short instrument, using 44 phrases (hereafter referred to as "items") to describe personality traits (13). Each respondent ranks the 44 items on a Likert scale from 1 (strongly disagree) to 5

(strongly agree). The authors of the Big Five Inventory also developed a scoring scheme, which assigns a distinct subgroup of the 44 items, between 8 and 10 items, to each of the 5 personality traits (21).

[Insert Table 1]

The primary purpose of this study, to characterize the personality traits of hospital pharmacists, was not revealed to potential participants. Rather, the study was described as intending “to better understand pharmacist learning styles and traits to enable us to support staff in the adoption of patient-centred care as articulated in the Blueprint for Pharmacy”. This slight ambiguity was used to minimize any social desirability bias. The study received approvals from the Health Research Ethics Board of the University of Alberta and the operational leadership of the health care organizations.

Pharmacists’ responses to the questionnaire were first scored according to the scheme provided by the authors of the Big Five Inventory, which treats the data at an interval level of measurement (21). A second analysis was then undertaken to account for the controversy surrounding the treatment of ordinally measured data as if it were interval data (22-24). In this second analysis, frequency counts of the responses to each item composing the Big Five personality traits were performed following the approach advocated by Clawson and Dormody (22). For the purposes of this count, both ends of the Likert scale were truncated, to combine the “agree” and “disagree” options (i.e., responses of

1 and 2 [strongly disagree and disagree] were combined, as were responses of 4 and 5 [agree and strongly agree]). These combined options will be referred to as “agree” and “disagree”. These item counts were then collated by personality trait to develop a visual scale of the total frequency of item responses. This presents an alternative view of the data that is more consistent with the level of measurement of Likert scales and provides a higher level of interpretability of the personality traits as they relate to pharmacy practice.

Measures of central tendency, as well as reliability analyses, were calculated for each personality trait. Additional analyses, using ANOVA, were performed to assess any differences in responses related to age, duration of practice, role (front line versus management), full-time equivalence, location of hospital (urban versus rural), and whether or not pharmacists had additional prescribing authorization (10) (received or planned for sometime within the next 6 months). The a priori level of significance for all statistical tests was 0.05. Data were analyzed using SPSS software (version 19; SPSS Inc., Chicago, Illinois).

2.2 Results:

Of the 766 pharmacists invited to participate, 347 (45%) completed the questionnaire. Of these, 297 (86%) were staff pharmacists, 24 (7%) were clinical practice leaders, and 22 (6%) were managers. Eighty-two percent of respondents (267 of 326) were from urban practice centres, and 63% (218 of 347) worked full-time. The average age of respondents was 41 years (standard deviation [SD] 11 years), and the average period in practice was 17 years (SD 11 years) (Table 2).

Respondents' mean scores were 3.2 (SD 0.7) on extraversion, 3.8 (SD 0.4) on agreeableness, 4.0 (SD 0.4) on conscientiousness, 2.5 (SD 0.7) on neuroticism, and 3.5 (SD 0.6) on openness. Further analyses revealed high reliability for each BFI trait (Table 3).

[Insert Table 2]

[Insert Table 3]

ANOVA analysis demonstrated a number of subgroup differences. Managers and staff pharmacists ($F_{2,340} = 4.63$, $p = 0.010$) and full-time and part-time pharmacists ($F_{1,343} = 7.23$, $p = 0.008$) differed on the extraversion trait. Specifically, managers were more extraverted than staff pharmacists and full-time staff more extraverted than part-time staff, with mean differences between the pairs of 0.45 ($p = 0.014$) and 0.22 ($p = 0.008$), respectively.

There was also a difference between staff pharmacists and clinical practice leaders on the trait of conscientiousness ($F_{2,309} = 4.35$, $p < 0.05$). The mean difference between the groups was 0.23 ($p < 0.05$), with clinical practice leaders scoring slightly higher than staff pharmacists. Finally, there was a difference between urban and rural pharmacists on the trait of agreeableness ($F_{1,326} = 4.48$, $p < 0.05$). The mean difference was 0.12 ($p < 0.05$), with rurally based pharmacists scoring slightly higher than their urban counterparts. Subgroup analysis showed no difference between pharmacists who self-

identified as having obtained additional prescribing authorization and those who had not done so.

Figure 1 shows the proportional representation of item responses for each of the personality traits. For the trait of extraversion, roughly 50% of the item responses fell into the “agree” category, with the remaining 50% split between the “neutral” and “disagree” categories. For agreeableness, nearly 80% of the item responses were in the “agree” category, while only 13% fell into the “neutral” category and 7% in the “disagree” category. For the conscientiousness trait, 71% of item responses were clustered in the “agree” category, with 22% and 7% in the “neutral” and “disagree” categories, respectively. For the neuroticism trait, more than half (52%) of the item responses fell into the “disagree” category, while the remaining 50% was spilt between the “neutral” and “agree” categories. For the openness trait, 53% of the item responses fell into the “agree” category, while 27% and 19% of the item responses fell into the “neutral” and “disagree” categories.

[Insert Figure 1]

2.3 Discussion:

This study represents the first consideration of the personality traits of hospital pharmacists. We found that hospital pharmacists tended toward stronger expressions of the traits of extraversion, agreeableness, conscientiousness, and openness and were emotionally stable. Understanding the personality traits of

hospital pharmacists may help to understand how practice can be shifted toward patient-centred care. It may also help in the development of training and support programs tailored specifically to the traits of hospital pharmacists or perhaps even to an individual's personality traits.

The trait with the greatest difference in item response frequencies between "agree" and "disagree" is agreeableness. Agreeableness is characterized by behaviours such as helpfulness, unselfishness, trusting, and compassion (13). In many respects these characteristics are operationalized in the satisfaction ratings obtained in public opinion polls and surveys, wherein pharmacists are described by patients as being caring and compassionate health care providers (25). People who more strongly identify with this trait are also less apt to start quarrels or be rude to others (13). With respect to work behaviours, people who tend to exhibit this trait are more collectively or socially oriented in their interests (17,18). An exemplification of these aspects of agreeableness may be observed in the pharmacy literature's traditional surrogate measure, physicians' acceptance of pharmacists' recommendations (26-29). This focus on physicians' acceptance of pharmacists' recommendations, to indicate the value of pharmacists' contributions, could also have been obtained with a chart review looking at changes in medication therapy. However, measurement of physicians' acceptance may simply demonstrate the importance to pharmacists of gaining approval from other members of the medical team, as opposed to indicating improvement in patient outcomes.

The trait of conscientiousness, which also had a substantial difference in response frequencies, is characterized by reliability, thoroughness, tenacity, efficiency, and organized behaviours (13). Furthermore, people who identify more with the items composing this trait are focused and careful (13) and consequently less likely to make errors in job performance (17,19). These are important characteristics for traditional dispensing roles in the pharmacy, where such focused and careful attention is key to preventing medication errors (30,31). This drive to perfection in job performance may also be intuited from the proliferation of pharmacy research papers examining numbers of medication errors in various settings, so that they can be minimized (32-34).

Openness, the third trait with a relatively strong difference in response frequencies, is characterized by originality, ingenuity, curiosity, and an artistic orientation (13). Within work settings, people who exhibit this trait also tend to be drawn to artistic or investigative types of work (18). The manifestation of this trait may be witnessed in the proliferation of literature from a subpopulation of the pharmacy profession, typically in academic and advanced practice settings, admonishing pharmacists to abandon their “traditional” roles and adopt new practices (1,35,36). However, manifestation of this trait may be complicated by the characteristics expressed by the conscientiousness trait, focusing on mastery of tasks, which may not be compatible with the uncertainty and “greyness” that come with the new practice approaches being touted. Indeed, Farrell and others (37), examining the integration of pharmacists into family medicine teams, found

a distinct difference in comfort levels between pharmacists and physicians when approaching direct patient care.

The remaining 2 traits showed less difference between “agree” and “disagree” for trait items. One of these traits, extraversion, is characterized by talkativeness, energy, and an outgoing disposition (13). People who identify more strongly with this trait have an assertive personality and are neither shy nor inhibited (13); they have also been found to have a higher degree of social (helping) and enterprising (persuading) job interests (17) but lower proficiency in work-related tasks that they must complete on their own (18). A possible explanation for the greater similarity between the “agree” and “disagree” categories for this trait may be found in an examination of subgroup differences (Figure 2). It appears that pharmacists who had already obtained their prescribing authorization were slightly more likely to agree with items related to this trait, which suggests that something distinguishes them from their non-prescribing colleagues. Further research into this difference is required before any stronger conclusions can be drawn.

[Insert Figure 2]

The other trait with less difference in response frequencies was neuroticism, a trait characterized by behaviours that include feeling “blue” or depressed, tense, moody, and nervous (13). People who more strongly identify with this trait are less able to handle stress and worry more than other people

(13). In terms of work, people who more strongly identify with this trait tend to have a lower ability to complete work tasks properly (17) and tended to be less successful on some job success measures (20). However, most of the respondents in the current study did not agree with the items for this trait, which suggests that they did not feel tense or stressed, but instead felt quite emotionally stable.

Our study into the personalities of hospital pharmacists offers an alternative approach to exploring the reasons why change within the profession has been spotty and incomplete. The interpretation of the results provides some insight into pharmacists' (and pharmacy researchers') persistence in seeking approval from other health care professionals and their possible trepidation in adopting practices wherein perfection is more difficult to attain or define. We propose that future research into the personality traits of pharmacists focus more specifically on the potential malleability of trait manifestations. This could be achieved by coupling the Big Five Inventory with instruments such as the Expanded Skills Confidence Inventory, an instrument based on the self-efficacy themes that are thought to be amenable to intervention (38,39).

Another possible research approach comes from work conducted by Hackman and Oldham (40), who studied the design of work. The authors advocated change in the structure of work itself, rather than an expectation that employees will adapt to the work in its existing form (40). That is, rather than merely telling pharmacists that they need to adopt new practice opportunities out of professional obligation, leaders in the profession might be able to achieve

greater change by completely disrupting traditional work routines (e.g., by removing all dispensing responsibilities) and putting into place supports to integrate new models of practice. However, such an approach also demands that the wider pharmacy profession accept that many pharmacists would not be able to make the necessary changes to allow expansion of roles without significant support.

This study had several limitations which merit consideration. First, no measures were used to determine the effect of intentional “faking” on the survey, although steps were taken to minimize socially desirable responses through the promise of anonymity of data and a slight misrepresentation of the study’s purpose. Second, the results describe the personality traits of only the hospital pharmacists who responded; it is not known if these respondents are representative of all hospital pharmacists. Finally, the Big Five Inventory is not intended as an explanatory tool. However, it does allow for the generation of hypotheses about how various personality traits may manifest in a particular working environment.

To the authors’ knowledge, this is the first study of personality traits among hospital pharmacists. The research team believes that the Big Five Inventory, coupled with knowledge gained about the culture of pharmacy, will be useful for improving the understanding of work-related behaviours of pharmacists. Such understanding will allow conceptualization of how new practice opportunities may best be realized, which will benefit the profession and, most importantly, patient care.

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2.5 Table 1. Personality Dimensions of the Big Five Inventory (15)

Dimension	Description
Extraversion	Describes an energetic and enthusiastic approach and includes traits such as sociability, assertiveness, confidence, and ambitiousness.
Agreeableness	Describes the person's level of altruism, cooperation, and willingness to conform to group norms, and warmth or kindness.
Conscientiousness	Describes the ability to control impulses to facilitate goal-directed behaviour; those high in this trait follow norms and rules, and are efficient in planning, organizing, and prioritizing tasks.
Neuroticism	Contrasts emotional stability with feelings of anxiety, nervousness, and depression. Those high in this trait are self-conscious, moody, impulsive, and prone to stress.
Openness	Describes the breadth and depth of one's life, including the originality and complexity of experiences. Individuals high in openness are knowledgeable, perceptive, and analytical; they seek out experiences and are more artistic and investigative.

2.6 Table 2. Baseline Characteristics of Participating Hospital Pharmacists (*n* = 347)

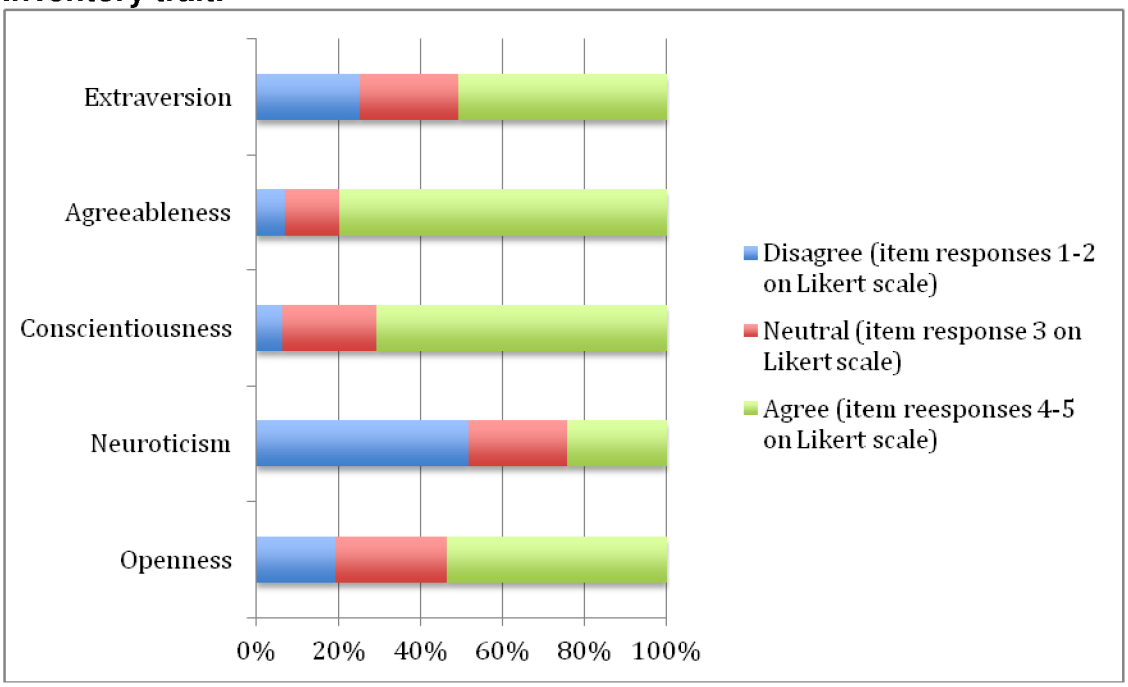
Characteristic		No. of respondents (%)*
Age, mean ± SD (years)		41 ± 11
Time in practice, mean ± SD (years)		17 ± 11
Proportion of time spent in clinical practice	≤ 25%	83 (24)
	26%–50%	105 (30)
	51%–75%	103 (30)
	≥ 76%	56 (16)
Additional prescribing authorization	Has already obtained	48 (14)
	Has not obtained	299 (86)
Plan to obtain additional prescribing authorization in next 6 months	Yes	43 (12)
	No	168 (48)
	No response	136 (39)

*Except where indicated otherwise.

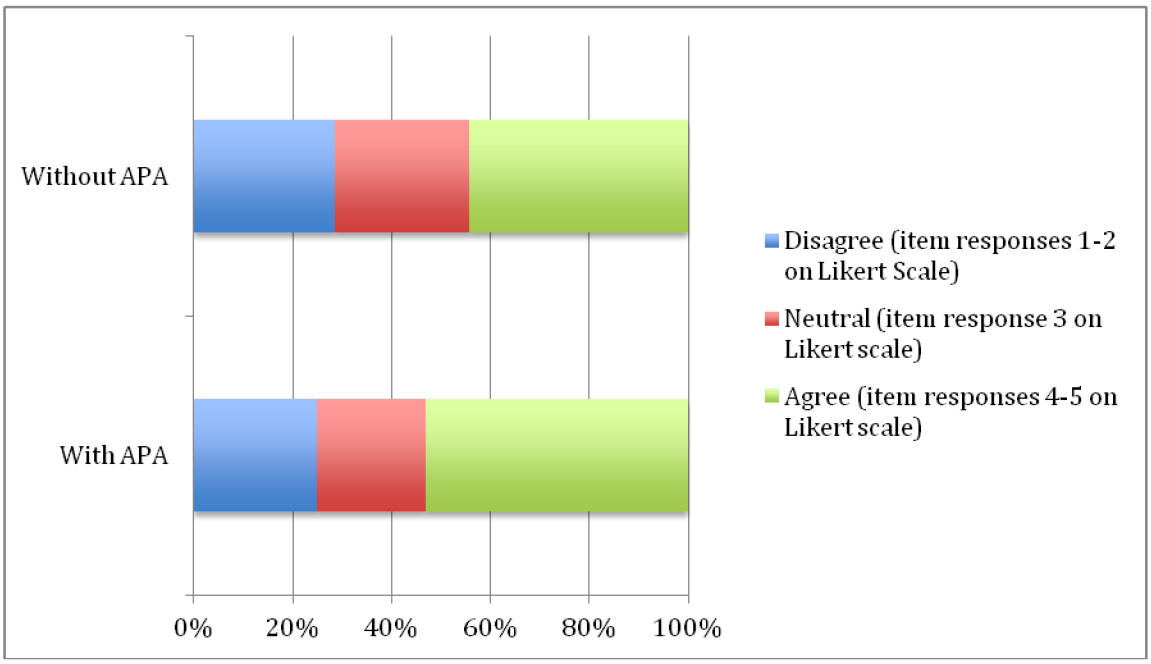
2.7 Table 3. Reliability scores for BFI Traits

BFI Trait	Cronbach's Alpha
Extraversion	0.85
Agreeableness	0.75
Conscientiousness	0.79
Neuroticism	0.79
Openess	0.76

2.8 Figure 1. Proportional representation of item responses by Big Five Inventory trait.



2.9 Figure 2. Differences in frequency of item responses for the trait of "extraversion" between pharmacists with and without Additional Prescribing Authorization (APA).



CHAPTER 3:

The Relationship between Personality Traits and Pharmacist Performance in a Pharmacy Practice Research Trial

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3.0 Background:

Pharmacy practice research is the primary source of data for both the implementation and justification of new scopes of practice for pharmacists. In particular, this research often focuses on the evaluation of pharmacy practice, and pharmacists' roles in delivering a variety of clinical services to patients (1). Recently published systematic reviews of pharmacists' interventions in a variety of conditions, including diabetes, hypertension, dyslipidemia, and osteoporosis, have provided an even greater level of evidence of pharmacists' efficacy (2-8). In addition to providing evidence of the clinical value of pharmacists' interventions, it has been assumed that this research serves as the primary vehicle for the integration of new knowledge into the daily practice of pharmacists (9).

However, this integration has not been pervasive, despite recognizing that it is important (10). While there are numerous, and significant, reasons that these changes have not taken place (11-13), a singular focus on them belies the second important assumption made about pharmacy practice research. That is,

that those pharmacists taking part in pharmacy practice research each take part to the same extent. However, research examining pharmacists and pharmacy practice research reveal numerous additional barriers including lack of time and onerous study related paperwork (9, 14). As such, it would seem that this particular assumption might require further inquiry.

According to Joanne Martin's "three perspectives approach" to the study and understanding of culture, it is important to understand values on which a group differs (i.e., the differentiated perspective), as well as those on which they agree (15). Furthermore, it is also important to understand how group members may express these differences in interactions with both group and non-group members (15). By extension, awareness of possible differences within the group of pharmacists who agree to participate in pharmacy practice research will provide further knowledge of the current pharmacy practice environment. This knowledge is, in fact, key to facilitating practice change conforming to the Promoting Action on Research Implementation in Health Services (PARiHS) framework (16). In particular, this framework posits that an incomplete understanding of the context in which the change is to take place will result in incomplete change initiatives (15).

An important component of understanding behaviour within the context of participating in pharmacy practice research is gaining knowledge of the personality of these pharmacists. Robert McCrae, a personality psychologist, who studies personality traits across time and culture, has proposed the idea that

culture and personality contribute equally as independent variables to human behaviour (17).

3.0.0 Personality trait research:

Preliminary work into the measure of personality traits began in the late 19th century (18) with a listing of personality terms. Over the next 50 years this original list of over 18,000 personality terms was refined until in the 1980s and 1990s the Big Five personality traits were developed (19). These traits include extraversion, agreeableness, conscientiousness, neuroticism, and openness (19).

The trait “extraversion” describes behaviours such as being “energetic” and “enthusiastic”, “social”, “assertive”, “confident”, and “ambitious” (19). “Agreeableness” describes behaviours such as being “altruistic”, “cooperative”, “willing to conform to group norms”, and “displaying warmth and kindness” (19). “Conscientiousness” includes the ability to “control impulses” to “facilitate goal-directed behaviour”, to “follow norms and rules”, and “efficiency in planning, organizing and prioritizing tasks” (19). “Neuroticism” as opposed to emotional stability, describes behaviours associated with “feelings of anxiety”, “nervousness”, and “depression”. People who score more highly on neuroticism in Big Five measures of personality may also display “self-consciousness”, be more “moody”, “impulsive”, and “stress-prone” (19). Finally, people who score more highly on the “openness to experience” trait are likely to have a “wide, deep and complex level of experience in the world” (19). Such people are also likely to

be “knowledgeable”, “perceptive” and “analytical”, “seek out new experiences”, and are more “artistic” and “investigative” (19).

To measure pharmacists’ personality traits as part of this study, the Big Five Inventory (BFI), a validated, reliable instrument has been used (19). The BFI is considered to be a short instrument, suitable for self-administration, utilizing 44 phrases measured on 5-point Likert scales (19). Scoring the BFI involves summing and then averaging the Likert scale responses, on a specific sub-set of the 44 phrases, related to each of the identified personality traits.

3.0.1 Personality and work:

Within the work environment the manifestation of particular personality traits has been shown to impact various aspects of work performance (20-25). For example, in research by Hans Eysenck (20), participants who were more anxious used a greater number of compensating resources in order to complete tasks such as reading under test conditions (20), potentially leading to higher worker burnout and exhaustion. In a pharmacy related example, a positive relationship was found between a pharmacy simulation task of checking prescriptions and levels of neuroticism (21). However, it is difficult to determine if this same relationship would hold for pharmacists working in an actual clinical setting.

A relationship between specific personality traits and the volume of mistakes committed and identified when filling prescriptions in community pharmacy settings has also been identified (22). In particular, those pharmacists who had a “cognitive style of attending to details and focusing their attention (i.e.,

conscientiousness) made fewer errors" (22) when filling prescriptions. Notably, none of this work examines the new paradigm of patient centred care for pharmacists. This distinction is important because the provision of patient centred care demands that the pharmacist not only assesses the patient, identify and resolve drug therapy problems, but also develop therapeutic goals and follow up and evaluate the patient to ensure targets are met (26). The objective of this project is to extend this previous work into an examination of pharmacy practice research participation by pharmacists. In this study pharmacy practice research participant pharmacists' personality traits were measured, using the BFI, and then compared with performance indicators from a pharmacy practice research study called the Community Based Approach to Dyslipidemia Management: Pharmacist Prescribing to Achieve Cholesterol Targets (RxACT Study).

3.0.2 The pharmacy practice research study: RxACT:

Pharmacists agreeing to participate in the Community Based Approach to Dyslipidemia Management: Pharmacist Prescribing to Achieve Cholesterol Targets (RxACT Study), were asked to participate in this study (see Appendix 1 for study results). The RxACT study was a randomized trial measuring the effect of pharmacists' with independent prescribing authority, management of patients with dyslipidemia on the number of patients achieving guideline targets for LDL-c after 6 months (27). Originally pharmacists from one medium-sized chain pharmacy within Alberta were invited to participate in the study. However, this invitation was extended to all interested pharmacists within the province to

improve flagging patient recruitment rates. All interested pharmacists were provided assistance with obtaining the right to provide independent prescriptions (called “additional prescribing authority” in Alberta), if they did not already have this ability, training in study procedures and ongoing support over the course of the study. Patient recruitment and follow-up began in December 2011 and concluded in June 2013.

3.1 Hypotheses:

A number of hypotheses have been developed based on the literature outlined above examining personality traits and work performance. However, due to the exploratory nature of this study several additional analyses were performed to explore, more thoroughly, the data collected. The first hypothesis has been developed based on previous research suggesting people who “exhibit traits associated with a strong sense of purpose, obligation and persistence”, all of which are associated with the personality trait conscientiousness, perform better than those who do not (28).

1. There will be a positive relationship between obtaining additional prescribing authority and pharmacists’ scores on conscientiousness as measured by the BFI.

Previous research also suggests that those people who exhibit behaviours associated with the trait extraversion, such as sociability, gregariousness, talkativeness, assertiveness and activeness, in positions where interaction with

other people is a key feature, tend to be more successful (28). The second and third hypotheses were developed based on this information.

2. There will be a positive relationship between the number of patients recruited by each pharmacist and pharmacists' scores on the extraversion scale of the BFI

3. There will be a negative relationship between the number of patients lost to follow-up and pharmacists' scores on the extraversion scale of the BFI (2-tailed)

The fourth and final hypothesis is exploratory in nature as no specific literature in this area was identified.

4. There will be no relationship between the proportion of patients achieving target LDL-c levels and the pharmacists' scores on any factors on the BFI

3.2 Methods:

3.2.0 Design:

This study was an observational, cross-sectional survey of pharmacists participating in a pharmacy practice research trial. Ethics approval for this study was received from the Health Research Ethics Board at the University of Alberta.

3.2.1 Participants:

Participants were all pharmacists who expressed interest in participating in the RxACT study. An important prerequisite for participation in this study was that the pharmacists possess their additional prescribing authority. As discussed in the background all pharmacists who did not have additional prescribing authority (independent prescribing in Alberta) were offered assistance in completing their application by EPICORE Centre staff, with experience in assisting pharmacists with this process.

3.2.2 Procedures:

All pharmacists expressing interest in participating in the RxACT study were provided with a brief introductory letter and the BFI instrument shortly after expressing interest in participating in the study. The primary purpose of this study was not be revealed to pharmacist participants. Rather the purpose of asking for their completion of the BFI was explained as being part of a larger study seeking insight into personality as a means of improving training and education programs for pharmacists. The reason for this approach was to minimize the impact of social desirability bias (29), more specifically, it was felt that knowledge of the primary purpose of this study might have unduly influenced pharmacists' conduct within the RxACT study. Pharmacists were allowed to return the completed instrument via mail or email. Completing the instrument was not mandatory and all pharmacists received the same level of support and training, regardless of whether or not they completed the BFI.

3.2.3 Measures:

The first set of measures included pharmacists' responses to the BFI, and more specifically scores on the traits of extraversion, agreeableness, conscientiousness, neuroticism, and openness. Performance within the study was determined using the following measures: 1) whether or not pharmacists achieved the ability to independently prescribe medications, if they did not already have it, 2) the number of recruited patients achieving guideline target LDL-c, 3) the proportion of reduction in LDL-c from baseline to 6 months, 4) the total number of patients recruited, and 5) the number of patients lost to follow-up.

3.2.4 Analysis:

Data analysis was completed using SPSS® 20.0 for windows. First scoring of the BFI was completed in accordance with guidelines set out by instrument authors (http://www.ocf.berkeley.edu/~johnlab/bfi.htm). It is important to note that the BFI is not a demonstrative measure of personality, and as such it is inappropriate to state that respondents are "extraverted" or "conscientious". In particular, the results from the BFI describe respondents as being "more likely to exhibit behaviours" in line with a particular trait. A reliability analysis was also conducted on each of the traits from the BFI.

All hypothesis testing was performed using these scores. For these analyses a significance level of 0.05 was established. Hypothesis 1 was tested using ANOVA. Where significant differences/relations are identified further analyses was conducted to identify the nature of that relation using exploratory

post-hoc testing. Hypotheses 2-4 were tested using a simple linear regression analysis. Exploratory analyses were also conducted with non-specified hypotheses and truncated versions of the performance variables and the BFI traits to fully explore the data. These results are presented separately from the pre-specified hypotheses.

3.3 Results:

A total of 30 pharmacists originally expressed interest in participating in the RxACT study. Fourteen of these pharmacists actively participated in patient recruitment and follow up. The majority (87%) of the originally interested pharmacists worked in a chain pharmacy setting. Just less than half (48%) of the interested pharmacists' already had additional prescribing authority, 33% of pharmacists who did not have additional prescribing authority went on to obtain it for the purposes of participation in the study. Twenty-three pharmacists completed the BFI. The participating pharmacists, who completed the BFI, recruited a total of 76 out of the 99 patients randomized, assisted 24 out of a total of 29 patients to LDL-c guideline targets and lost a total 6 out of a total of 12 patients were to follow up.

The mean scores (SD) of pharmacists on the BFI traits were as follows: 3.56 (0.92) on extraversion, 4.21 (0.46) on agreeableness, 4.01 (0.71) on conscientiousness, 2.51 (0.76) on neuroticism, and 3.67 (0.65) on openness. For a comparison of the sample mean scores to the population mean scores see Table 1. Further analyses each trait has relatively high reliability (Table 2).

Results from the pre-specified hypotheses are presented here first. There was no support for hypothesis 1, measuring a positive association between obtaining additional prescribing authority and the conscientiousness score ($t(21) = 0.93$, $p = 0.372$); hypothesis 2, measuring a positive linear relationship between the number of patients recruited and extraversion score ($b = 0.08$, $t(10) = 1.38$, $p = 0.199$); or hypothesis 3, measuring a negative linear relationship between the numbers of patients lost to follow-up and extraversion score ($b = -0.62$, $t(10) = -1.74$, $p = 0.113$). There was support for hypothesis 4, measuring a null, or no, relationship between the number of patients achieving LDL-c guideline targets and pharmacists scores on any of the traits of the BFI (Extraversion = $b = 0.12$, $t(10) = 0.95$, $p = 0.364$; agreeableness = $b = 0.03$, $t(10) = 0.50$, $p = 0.628$; conscientiousness = $b = 0.06$, $t(10) = 0.82$, $p = 0.432$; neuroticism = $b = -0.11$, $t(10) = -0.98$, $p = 0.352$; openness = $b = -0.05$, $t(10) = -0.47$, $p = 0.647$).

The following results are from the exploratory analyses of non-specified hypotheses and truncated performance variables and BFI traits. A significant relationship was also noted between pharmacist scores on extraversion and whether or not they ultimately decided to participate in the RxACT study ($t(21) = 2.24$, $p = 0.036$). On average, pharmacists who scored more highly on the extraversion trait ($M = 3.94$, $SE = 0.25$) were more likely to participate than those pharmacists whose score was not as high ($M = 3.15$, $SE = 0.25$). The effect of extraversion BFI score on participation was medium, $r = 0.31$. Significant differences were also noted for whether or not a pharmacist, who did not have additional prescribing authority at the time they expressed interest in participating

the RxACT study, went on to obtain it and scores on the BFI trait of extraversion ($t(12) = 3.00$, $p = 0.013$). On average, pharmacists who went on to obtain their additional prescribing authority scored higher on the trait extraversion (M = 4.41, SE = 0.27) than those pharmacists who did not obtain their additional prescribing authority (M = 3.06, SE = 0.26). The effect of extraversion score on whether or not the pharmacist went on to obtain additional prescribing authority was medium, $r = 0.45$.

When the variable "lost to follow-up" was dichotomized (i.e., patients lost to follow-up as yes or no) an independent sample t-test revealed a significant difference between on extraversion scores for pharmacists who did and did not lose patients to follow-up ($t(10) = -3.04$, $p = 0.013$). On average, pharmacists who possessed a higher extraversion score (M = 4.42, SE = 0.19) had fewer patients lost to follow-up than pharmacists with a lower extraversion score (M = 3.26, SE = 0.38). Furthermore, the effect of the extraversion score on loss to follow-up was large, $r = 0.66$.

3.4 Discussion:

This study represents a preliminary step in understanding the possible relationship between pharmacists' personality traits and behaviour in pharmacy practice research studies. This section will begin with an outline and interpretation of the BFI results from the pharmacist sample as they relate to the population means. Next a summary and interpretation of the pre-specified hypotheses and exploratory analyses will be provided.

The comparison of the results from pharmacy practice research pharmacists' sample on the BFI to the general population reveals that this group of pharmacist respondents might be more likely to exhibit behaviours in line with the traits of extraversion, agreeableness, and conscientiousness (29). Using the definitions of each of the traits offered in the background, these respondents might be more likely to exhibit energy and enthusiasm, altruism, and goal-directed behaviour.

Moving onto the pre-specified hypotheses, only the fourth, null, hypothesis stating that there would be no relationship between the traits of the BFI and whether or not a patient achieved LDL-c guideline targets, was confirmed. Further exploratory analyses revealed that the trait extraversion demonstrated links to whether or not a pharmacist, who expressed interest in participating in the study, actually did participate, whether or not pharmacists obtained additional prescribing authority, and the number of patients lost to follow-up.

These findings suggest that there may be important differences between pharmacists who participate in pharmacy practice research. In particular, pharmacist participants' personality traits, like the degree to which they exhibit behaviours in line with the trait extraversion, may influence how they recruit and follow-up with patients and the degree to which they actively engage with the study protocol. It is also possible that these factors play a role in whether or not the pharmacist continues to implement positive study findings in their practices upon the completion of the study itself. This suggests the importance of

integrating Martin's differentiated perspective into the future study of the context of pharmacy practice (15).

If further research determines that pharmacists indeed hold differing perspectives on what it means to participate in pharmacy practice research, the assumption that this research acts as a vehicle for the integration of new knowledge into practice needs to be re-examined. It would seem that pharmacy practice research, and researchers, have adopted the approach taken by evidence-based medicine, in so far as, knowledge produced by research is to be integrated into practice unaltered (30, 31). However, as has been posited by researchers working in knowledge translation, the expectation that research be adopted without careful consideration of the context into which it is being integrated may be crippling its value to practitioners (16, 32).

There are a number of important limitations to this study that must be addressed. To begin the sample of pharmacists participating in this study was small. This likely had consequences for the findings of the predetermined hypotheses. As such, before a firm conclusion can be drawn about the lack of relationship between the BFI traits and study performance measures, used herein, can be drawn further data is needed. It is also important to recognize the limitations of this type of survey data. As outlined in the methods section, the BFI uses a Likert scale, which is an ordinal measure, to score respondents' responses on each of the traits. For this reason these results should not be considered definitive, but rather as generating hypotheses for further investigation.

3.5 Conclusion:

This would seem to be the first study that links pharmacists' results on the BFI to their performance in a pharmacy practice research study. The results suggest that there may be a possible connection between the trait extraversion and some pharmacy practice research outcomes, including whether or not the pharmacist ultimately chose to participate in the study. Past explanations for the lack of success in pharmacy practice change have not been well characterized; the information gathered from this study provides some insight into this area. Future research should work to better characterize this possible relationship thereby gaining further insight into the context of pharmacy practice.

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3.7 Table 1. Sample mean scores (SD) versus population mean scores (SD) (29)

Trait	Sample mean score (SD)	Population mean score (SD)
Extraversion	3.56 (0.92)	3.25 (0.90)
Agreeableness	4.21 (0.46)	3.82 (0.68)
Conscientiousness	4.01 (0.71)	3.73 (0.71)
Neuroticism	2.51 (0.76)	3.13 (0.86)
Openness	3.67 (0.65)	3.90 (0.69)

3.8 Table 2. Reliability scores for BFI Traits

BFI Trait	Cronbach's Alpha
Extraversion	0.90
Agreeableness	0.69
Conscientiousness	0.86
Neuroticism	0.83
Openess	0.82

CHAPTER 4:

The Professional Culture and Personality Traits of Hospital Pharmacists Across Canada: An Important First Step in Developing Effective Knowledge Translation Strategies

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4.0 Background:

Evidence for the value of pharmacists' intervention in patient care is strong and continues to grow (1-8). Patient care activities include developing relationships with patients and actively managing and taking responsibility for patients' medication therapy outcomes, developing care plans, and communicating with other health team members (9). However, some would argue that the adoption and spread of these new practices has been too slow to be of any public health benefit (10-12). The knowledge translation (13-17) and change management (18-24) literatures argue that for change to occur a better understanding of current pharmacy practice is needed. Two aspects of the current practice environment that have yet to be well understood in pharmacy are the professional culture and personality traits of pharmacists.

Professional culture has been defined broadly as the "patterns of [subjective] interpretation composed of meanings associated with various cultural

manifestations, such as stories, rituals, formal and informal practices, jargon and physical arrangements" (pg. 330) (18). This means that culture is to be understood as a part of the conceptual framework used by pharmacists to make sense of their everyday interactions. More specifically, in this work an integrative approach (18), which focuses on aspects of culture shared between group members', will be the focus, through the application of the organizational culture profile (OCP) (19).

The OCP was originally developed to assess person/organization fit (25); however, it has been adapted herein to measure professional culture. The 40-item version of the instrument developed by Sarros et al. (2005) (19), has been used because it utilizes 5-point Likert scales and can be self-administered. The instrument is comprised of 7 cultural factors, described in detail below. The degree to which a group identifies with each of these factors is determined by scoring responses to a particular sub-set of the items.

Groups that perceive value in being "quick to take advantage of opportunities", "risk taking" and taking "individual responsibility", may score higher on the trait of innovation (19). Groups that perceive value in being "team and people oriented", "sharing information freely", and are "collaborative", may score higher on "supportiveness" (19). Groups that perceive value in being "reflective", "having a good reputation", and a "clear guiding philosophy", may score higher on "social responsibility" (19). Groups that perceive value in being "achievement oriented", "emphasize quality", and "being distinctive and different from other groups", may score higher on "competitiveness" (19). Groups that

perceive value in being “calm”, “having low conflict” and a “sense of job security”, may score higher on “stability” (19). Groups that perceive value in having “high expectations for performance”, “enthusiasm for their job”, to be “results oriented” and “highly organized”, may score higher on “performance orientation” (19). Groups that perceive value in being “fair”, “providing opportunities for professional growth”, and having “high pay and praise for good performance”, may score higher on “reward orientation” (19).

While there has been debate around the nature of the relationship between culture and personality (26-28), the approach adopted for this work, suggests that culture and personality are independent factors that interact to produce a particular set of behaviours in individuals (28). As such, it is also important to account for the personality of group members. However, it must be noted that there has been no study of how culture and personality may interact with each other to produce some behaviour in this work. Rather, cultural factors and personality traits independent interaction with other variables are considered.

The most commonly recognized personality traits are the Big Five Factors, which include extraversion, agreeableness, conscientiousness, neuroticism, and openness (29-32). The trait “extraversion” describes behaviours such as being “energetic” and “enthusiastic”, “social”, “assertive”, “confident”, and “ambitious” (29). “Agreeableness” describes behaviours such as being “altruistic”, “cooperative”, “willing to conform to group norms”, and “displaying warmth and kindness” (29). “Conscientiousness” includes the ability to “control impulses” to “facilitate goal-directed behaviour”, to “follow norms and rules”, and “efficiency in

planning, organizing and prioritizing tasks" (29). "Neuroticism" as opposed to emotional stability, describes behaviours associated with "feelings of anxiety", "nervousness", and "depression". People who score more highly on neuroticism in Big Five measures of personality may also display "self-consciousness", be more "moody", "impulsive", and "stress-prone" (29). Finally, people who score more highly on the "openness to experience" trait are likely to have a "wide, deep and complex level of experience in the world" (29). Such people are also likely to be "knowledgeable", "perceptive" and "analytical", "seek out new experiences", and are more "artistic" and "investigative" (29).

To measure these traits, the Big Five Inventory (BFI), a validated, reliable instrument was used (29). The BFI is considered to be a short instrument, suitable for self-administration, utilizing 44 phrases measured on five-point Likert scales (29). As with the OCP, primary scoring the BFI involves combining the Likert responses, on a specific sub-set of the 44 phrases, related to each of the identified personality traits. This study's objective was to gain insight into the culture of hospital pharmacy, using the OCP, and into the personality traits of hospital pharmacists, using the BFI.

4.1 Methods:

4.1.0 Design:

A cross-sectional survey of hospital pharmacists from Canada.

4.1.1 Population:

Hospital pharmacists across Canada.

4.1.2 Instrument:

The survey instrument contained three sections. The first section contained basic demographic and practice setting questions. More specifically, respondents were asked to indicate their gender, kinds of education received, province of practice, and number of years in practice and percentage of time spent performing clinical activities. The structure of these questions was based on a previous study (33). Section two contained the BFI and section three contained the OCP. A member of the research team translated the demographic questions, and practice setting questions, and the OCP, into French for use in Quebec. An existing French version of the BFI was used.

4.1.3 Data collection:

Both versions of the survey instrument were administered online. A student research assistant identified and contacted provincial branches of the Canadian Society of Hospital Pharmacy for assistance with distribution of the link. The methods of distribution varied with each provincial branch's regulations. For example, some were able to distribute the link directly to members, while other branches placed the link, along with a short explanation of the study, into monthly newsletters. To improve response rates, members of our research team also directly contacted various individuals working in pharmacy departments across

Canada seeking additional distribution. Data collection took place from August 2012 to September 2013 (data collection was not continuous during this time – there was a delay to allow time for the translation of the survey instrument).

This study received ethics approval from the Health Research Ethics Board at the University of Alberta. A waiver was provided precluding the need for respondents to provide written informed consent, by stating at the beginning of the survey instrument that completion and submission of the survey implied consent.

4.1.4 Analysis:

In preparing and cleaning the data for analysis, the demographic and practice setting questions were first examined descriptively. Based upon this analysis the education question was transformed into a variable called the “highest level of education”. The categories of this variable include bachelor’s degree in pharmacy (BSc Pharm/BSP), doctor of pharmacy degree (Pharm D), hospital residencies, Master of Clinical Pharmacy degree (MSc Pharm) and board of pharmacy specialization (BPS). The province in which the respondent currently practiced was also transformed into regions of the country: Western Canada, Ontario, Quebec and Atlantic Canada. No responses were obtained from any of the Territories. The years in practice question was also transformed into a variable called “years in practice by decade”. The categories of this variable became 1-10 years, 11-20 years, 21-30 years and 31 plus years.

The OCP and BFI were analyzed using the scoring guidelines provided by the authors of the instruments (19, 30). In each case this scoring process yields mean values for each factor or trait. This analytic approach allows for the comparison of scores from the factors and traits directly to demographic and practice location variables. The preliminary characterization of these mean scores was made by comparison to available population means (19, 34). It is important to note that neither the OCP nor the BFI are demonstrative measures of culture or personality. As such, it would be inappropriate to suggest that respondents' culture is innovative, or that respondents' personality is extraverted, for example. Rather, results from the OCP will be described as suggesting that respondents perceived value in the factors. Results from the BFI will describe respondents as being "possibly more likely to exhibit behaviours" in line with a particular trait. A reliability analysis was also performed for each OCP factor and BFI trait.

The comparisons between the scores of the OCP and BFI and other variables were made using analysis of variance (ANOVA). Measures of the effect size of the magnitude of any observed relationships were made using the Eta-square test (η^2). Small, medium and large effects, respectively, were determined using the following criteria: ≤0.04, >0.04, and >0.36 (35). Due to the exploratory nature of this study, *post-hoc* tests, including the Tukey and Games-Howell tests as appropriate, were used to determine where specific sub-group differences between means were located (36). All identified sub-group differences were evaluated using a 0.05 level of significance.

4.2 Results:

A total of 401 survey instruments were completed for a response rate of 7% (based on a population estimate of 5600 Canadian hospital pharmacists (37)). Most respondents were female (78%), and 42% of the respondents had achieved a BSc Pharm/BSP as their highest level of education. Thirty percent of respondents practiced in Ontario. The average number of years in practice was 17 years (SD 11). Most respondents spent less than 50% of their time completing clinical duties. See Table 1 for complete respondent characteristics.

[Insert Table 1]

Author guideline scoring on the OCP revealed that respondents scored an average of 3.05 (SD 0.77) out of 5 on innovation, 3.95 (SD 0.63) on supportiveness, 3.69 (SD 0.56) on social responsibility, 3.61 (SD 0.58) on competitiveness, 3.76 (SD 0.50) on stability, 3.89 (SD 0.62) on performance orientation and 3.32 (SD 0.66) on reward orientation. Scoring of the BFI revealed that pharmacist respondents' scored an average of 3.11 (SD 0.85) out of 5 on extraversion, 3.75 (SD 0.85) on agreeableness, 3.93 (SD 0.70) on conscientiousness, 2.53 (SD 0.71) on neuroticism and 3.32 (SD 0.59) on openness. See Table 2 for comparisons to population means. Further analyses of each OCP factor and BFI trait reveal moderate reliability scores (Tables 3 and 4).

[Insert Table 2]

[Insert Table 3]

[Insert Table 4]

In the following sections, the results of the ANOVA tests comparing respondents results from the OCP and BFI to various demographic and practice questions are presented. ANOVA results are presented first, followed by the results of the *post-hoc* analyses. Only significant results are outlined in the text. Complete mean scores and standard deviations for *post-hoc* analyses are located in Tables 5 and 6.

[Insert Table 5]

[Insert Table 6]

4.2.0 Highest level of education:

There was a significant association observed between of highest level of education and levels of OCP factors innovation, $F(1,4) = 5.85$, $p < 0.00$, $\eta^2 = 0.06$, and competitiveness, $F(1,4) = 4.07$, $p < 0.00$, $\eta^2 = 0.04$. *Post-hoc* analyses using innovation revealed respondents who obtained either an MSc Pharm degree or a BPS scored significantly higher on levels of innovation than those respondents with other levels of education. Analyses using competitiveness revealed that

respondents who obtained an MSc Pharm degree tended to score higher than respondents who obtained either a Pharm D degree or hospital residency.

A significant association was noted between highest level of education and levels of the BFI traits extraversion, $F(1,4) = 26.87$, $p < 0.00$, $\eta^2 = 0.22$; agreeableness, $F(1,4) = 60.16$, $p < 0.00$, $\eta^2 = 0.38$; conscientiousness, $F(1,4) = 40.00$, $p < 0.00$, $\eta^2 = 0.29$; neuroticism, $F(1,4) = 2.81$, $p < 0.05$, $\eta^2 = 0.03$; and openness, $F(1,4) = 17.34$, $p < 0.00$, $\eta^2 = 0.15$. *Post-hoc* analyses with extraversion, agreeableness, conscientiousness and openness suggest that respondents who obtained an MSc Pharm degree scored significantly less than respondents who obtained a BSc Pharm/BSP, a Pharm D degree or completed a hospital residency. Analyses completed for neuroticism found respondents who obtained an MSc Pharm degree scored significantly higher than respondents who obtained a BSc Pharm/BSP, a Pharm D degree or completed a hospital residency.

4.2.1 Canadian regions:

A significant association was noted between Canadian region and levels of the OCP factors innovation, $F(1, 3) = 11.06$, $p < 0.00$, $\eta^2 = 0.08$; supportiveness, $F(1, 3) = 6.37$, $p < 0.00$, $\eta^2 = 0.05$; social responsibility, $F(1, 3) = 5.14$, $p < 0.00$, $\eta^2 = 0.04$; and competitiveness, $F(1, 3) = 8.55$, $p < 0.00$, $\eta^2 = 0.06$. *Post-hoc* analyses with innovation, social responsibility and competitiveness revealed that respondents from Quebec scored significantly higher than respondents from the other Canadian regions. Analyses using supportiveness found respondents from

Western Canada scored significantly lower than respondents from the rest of Canada.

A significant association was observed between Canadian regions and levels of the BFI traits extraversion, $F(1,3) = 55.97$, $p < 0.00$, $\eta^2 = 0.30$; agreeableness, $F(1,3) = 178.33$, $p < 0.00$, $\eta^2 = 0.57$; conscientiousness, $F(1,3) = 102.29$, $p < 0.00$, $\eta^2 = 0.44$; neuroticism, $F(1,3) = 9.20$, $p < 0.00$, $\eta^2 = 0.07$; and openness, $F(1,3) = 37.07$, $p < 0.00$, $\eta^2 = 0.22$. *Post-hoc* analyses using extraversion, agreeableness, conscientiousness, and openness revealed respondents from Quebec scored significantly less. Analyses using neuroticism identified that respondents from Quebec scored significantly higher.

4.2.2 Years in practice by decade:

A significant association was noted between number of years in practice by decade and levels of the OCP factor competitiveness, $F(1, 3) = 3.90$, $p <0.00$, $\eta^2 = 0.03$, and BFI trait conscientiousness, $F(1,3) = 2.70$, $p <0.05$, $\eta^2 = 0.02$. *Post-hoc* analyses on this factor identified respondents who had been in practice for between 1 and 10 years scored significantly lower than those pharmacists who had been in practice for between 21 and 30 years. *Post-hoc* analyses on conscientiousness identified that respondents who had been in practice for more than 31 years scored significantly higher than pharmacists who had been in practice less than 10 year and those who had been in practice for between eleven and twenty years.

4.2.3 Time spent performing clinical activities:

A significant association was observed between time spent performing clinical activities and levels of BFI trait agreeableness, $F(1, 4) = 4.52$, $p < 0.00$, $\eta^2 = 0.04$, and conscientiousness, $F(1, 3) = 4.30$, $p < 0.00$, $\eta^2 = 0.03$. *Post-hoc* analyses using agreeableness and conscientiousness revealed that respondents who spend between 51 and 75% of their time performing clinical duties scored significantly less.

4.3 Discussion:

This examination of a national sample of hospital pharmacists has revealed a common set of cultural factors and personality traits, as well as a number of important sub-group differences. Beginning with the common cultural factors a comparison and interpretation of the mean scores of the pharmacist sample to the population means shows this sample scored higher on the OCP factors of supportiveness, competitiveness and stability. As such this sample of respondents may perceive value in being team and people oriented, sharing information freely and being collaborative (i.e., supportive) (19). Respondents may also perceive value in being achievement oriented, emphasizing quality, and being distinctive and different from other groups (i.e., competitive) (19). Furthermore, respondents may perceive value in being calm, having low conflict and a sense of job security (i.e., stable) (19).

Comparing respondents' results from this sample to population means on the BFI suggests that hospital pharmacist respondents may be more likely to

exhibit behaviours in line with the trait of conscientiousness. That is, they may be more able to behave in ways that control impulses to facilitate goal-directed behaviour, follow norms and rules and are efficient in planning, organizing and prioritizing tasks (i.e., conscientiousness) (30).

4.3.0 Sub-group differences

In the following sections a possible interpretation of the identified sub-group differences will be provided.

4.3.0.0 Highest level of education:

Moving away from the primarily integrative perspective adopted for this work, a number of sub-groups differences were noted within the data. These differences may be interpreted as reflecting Martin's (2002), differentiated perspective, which focuses on those aspects of a group's culture, which are not shared equally by group members (18). In particular, *post-hoc* analyses suggest that respondents with an MSc Pharm degree may be more likely to perceive value in innovation, and therefore, may adopt new opportunities more quickly and take individual responsibility for actions (19). It is also possible that these respondents perceive greater value in achievement orientation and highly value being different than other groups (i.e., performance oriented) (19). Those with MSc Pharm degrees may also be less likely to exhibit energy, enthusiasm (i.e., extraversion) and altruism (i.e., agreeableness), follow norms and rules (i.e., conscientiousness), and be open to wide and deep experiences (i.e., openness) (29).

4.3.0.1 Canadian region:

Similarly to MSc Pharm degree holders, Quebec hospital pharmacist respondents' may also perceive value in a quicker adoption of new practice opportunities and to be more achievement oriented (19). Furthermore, Quebec respondents may also perceive greater value in being more reflective (i.e., socially responsible) (19). Respondents from the Western Canadian region may perceive less value in teamwork and the importance of people (i.e., supportiveness). Quebec respondents also differed on all of the BFI traits, suggesting that they may be less likely to exhibit behaviours in line with the 5 BFI traits.

4.3.0.2 Years in practice by decade:

The variable years in practice by decade revealed that those pharmacists in practice for between 1-10 years were more likely perceive their profession as being performance/achievement oriented than those in practice for between 21-30 years. This analysis also revealed that respondents' in practice for more than 31 years might be more likely to exhibit behaviours in line with the trait of conscientiousness.

4.3.0.3 Time spent performing clinical duties:

The variable time spent performing clinical duties also revealed that those who devoted between 51-75% of their time to clinical work may be less likely to exhibit behaviours in line with the traits of agreeableness and conscientiousness.

4.3.1 Limitations:

There are a number of important limitations in this study. First the response rate to the survey was low. As such it is not possible to generalize these results to the wider hospital pharmacist population. Second, no back-translation was done to the French version of the survey instrument to increase the internal validity. Third, it is important to note that it is difficult to separate the influence of the unique provincial culture of Quebec from those influences that may be related specifically to sub-group differences within the profession of pharmacy. That said, the differences identified herein suggest that a single, one-size-fits all approaches to change within hospital pharmacy in Canada will likely not be successful. Local, and specific strategies, accounting as completely as possible for sub-group differences, will be needed if sustained change is to be achieved. Finally, the use of surveys in the study of professional culture is problematic as they utilize the phraseology of researchers and not that of members of the particular culture (18). Therefore, it would not be appropriate to suggest that this work has completely characterized the professional culture or personality traits of hospital pharmacists.

The results from this survey provide some initial insight into the culture and personality traits of Canadian hospital pharmacists. While several of the significant sub-group differences identified herein had a weak relationship they provide important insight for future work in the area. Similarly to a recent review of the literature examining the personality traits of medical students and performance in medical school (38), it may be possible to gain greater insight into the manifestation of the factors and traits, identified by this work, in actual behaviour. These results may then be used to develop facilitated knowledge translation intervention programs that guide pharmacists through the change process (13). It will be important to explore these results more completely to maximize the success of future practice change initiatives undertaken by organizations, like the Canadian Society of Hospital Pharmacists and the vision statements like CSHP 2015 (12).

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4.5 Table 1. Respondent Characteristics (N = 401)

Characteristic	Sub-groups	Proportion (n)
Gender (Missing = 3)	Female	78% (312)
	Male	21% (86)
Highest level of education (missing = 4)	1. BSc Pharm/BSP	42% (170)
	2. Pharm D	12% (46)
	3. Hospital residency	28% (113)
	4. MSc Pharm	15% (59)
	5. BSP	2% (9)
Canadian region (missing = 0)	1. Western Canada	28% (109)
	2. Ontario	30% (121)
	3. Quebec	18% (71)
	4. Atlantic Canada	25% (100)
Years in practice by decade (missing = 6)	1. 1 – 10 years	31% (126)
	2. 11 – 20 years	28% (114)
	3. 21 -30 years	23% (91)
	4. 31 + years	16% (64)

4.5 Table 1. Respondent Characteristics (N = 401) cont'd

Characteristic	Sub-groups	Proportion (n)
Time spent performing clinical duties (missing = 2)	1. 0 – 25%	36% (144)
	2. 26 – 50%	20% (80)
	3. 51 – 75%	24% (98)
	4. 76 – 100%	19% (77)

4.6 Table 2. Comparison of sample mean scores to population mean scores

Factor/Trait	Sample mean scores (SD)	Population mean scores (SD)[1]
Innovation	3.05 (SD 0.77)	3.50 (0.91)
Supportiveness	3.95 (SD 0.63)	3.70 (0.90)
Social Responsibility	3.69 (SD 0.56)	3.93 (0.74)
Competitiveness	3.61 (SD 0.58)	3.37 (0.65)
Stability	3.76 (SD 0.50)	3.46 (0.72)
Performance orientation	3.89 (SD 0.62)	4.02 (0.71)
Reward Orientation	3.32 (SD 0.66)	3.61 (0.90)
Extraversion	3.11 (SD 0.85)	3.25 (0.90)
Agreeableness	3.75 (SD 0.85)	3.82 (0.68)
Conscientiousness	3.93 (SD 0.70)	3.73 (0.71)
Neuroticism	2.53 (SD 0.71)	3.13 (0.86)
Openness	3.32 (SD 0.59)	3.90 (0.69)

[1.] Population mean scores for the OCP (19) and BFI (34) were taken from the literature.

4.7 Table 3. Reliability scores for OCP Factors

OCP Factor	Cronbach's Alpha
Innovation	0.73
Supportiveness	0.69
Social responsibility	0.48
Competitiveness	0.46
Stability	0.38
Performance orientation	0.63
Reward orientation	0.53

4.8 Table 4. Reliability scores for BFI Traits

BFI Trait	Cronbach's Alpha
Extraversion	0.88
Agreeableness	0.87
Conscientiousness	0.81
Neuroticism	0.78
Openess	0.77

4.7 Table 5. OCP *Post-Hoc* mean scores (SD)

Highest level of education[1.]	Innovation	Supportiveness	Social Responsibility	Competitiveness	Stability	Performance Orientation	Reward Orientation
1. BSc Pharm/BSP	3.04 (0.73)*^	3.93 (0.63)	3.65 (0.53)	3.61 (0.59)	3.36 (0.61)	3.94 (0.66)	3.35 (0.69)
2. Pharm D	2.76 (1.00)*^	3.94 (0.72)	3.70 (0.70)	3.45 (0.68)*	3.21 (0.60)	3.80 (0.68)	3.20 (0.76)
3. Hospital residency	2.99 (0.76)*^	3.92 (0.66)	3.67 (0.55)	3.54 (0.57)*	3.41 (0.45)	3.84 (0.63)	3.34 (0.59)
4. MSc Pharm	3.40 (0.64)*	4.01 (0.53)	3.86 (0.48)	3.85 (0.46)*	3.39 (0.59)	3.88 (0.50)	3.32 (0.64)
5. BPS	3.53 (0.32)^	4.22 (0.63)	3.65 (0.56)	3.81 (0.45)	3.44 (0.54)	3.81 (0.37)	3.28 (0.67)

[1.] Bachelor's degree in pharmacy (BSc Pharm/BSP), doctor of pharmacy degree (Pharm D), hospital residencies, Master of Clinical Pharmacy degree (MSc Pharm) and board of pharmacy specialization (BPS)

4.7 Table 5. OCP *Post-Hoc* mean scores (SD) cont'd

Canadian region	Innovation	Supportiveness	Social Responsibility	Competitiveness	Stability	Performance Orientation	Reward Orientation
1. Western Canada	2.82 (0.72)*	3.73 (0.69)*	3.58 (0.57)*	3.50 (0.62)*	3.78 (0.45)	3.93 (0.64)	3.25 (0.66)
2. Ontario	2.97 (0.81)*	4.05 (0.57)*	3.69 (0.54)*	3.55 (0.62)*	3.82 (0.54)	3.88 (0.66)	3.36 (0.68)
3. Quebec	3.46 (0.64)*	4.06 (0.44)*	3.90 (0.48)*	3.91 (0.46)*	3.75 (0.51)	3.89 (0.51)	3.34 (0.59)
4. Atlantic Canada	3.10 (0.76)*	3.97 (0.64)*	3.67 (0.58)*	3.59 (0.51)*	3.66 (0.47)	3.84 (0.62)	3.34 (0.69)
Years in practice by decade							
1. 1 – 10 years	3.00 (0.80)	3.95 (0.63)	3.62 (0.54)	3.53 (0.54)*	3.76 (0.53)	3.81 (0.59)	3.35 (0.61)
2. 11 – 20 years	3.01 (0.74)	3.95 (0.58)	3.69 (0.52)	3.55 (0.57)	3.80 (0.43)	3.84 (0.57)	3.19 (0.65)

4.7 Table 5. OCP *Post-Hoc* mean scores (SD) cont'd

Years in practice by decade	Innovation	Supportiveness	Social Responsibility	Competitiveness	Stability	Performance Orientation	Reward Orientation
3. 21 -30 years	3.09 (0.80)	3.93 (0.67)	3.77 (0.56)	3.74 (0.61)*	3.77 (0.48)	3.95 (0.67)	3.42 (0.66)
4. 31 + years	3.17 (0.78)	3.97 (0.70)	3.74 (0.64)	3.74 (0.59)	3.70 (0.49)	4.02 (0.70)	3.37 (0.75)
Time spent performing clinical duties	Innovation	Supportiveness	Social Responsibility	Competitiveness	Stability	Performance Orientation	Reward Orientation
1. 0 – 25%	3.05 (0.79)	3.92 (0.66)	3.69 (0.58)	3.64 (0.63)	3.74 (0.51)	3.92 (0.64)	3.34 (0.69)
2. 26 – 50%	2.94 (0.74)	4.00 (0.60)	3.69 (0.53)	3.64 (0.59)	3.78 (0.51)	3.94 (0.63)	3.38 (0.68)
3. 51 – 75%	3.16 (0.69)	3.98 (0.51)	3.70 (0.52)	3.59 (0.50)	3.80 (0.44)	3.84 (0.53)	3.31 (0.56)
4. 76 – 100%	3.05 (0.85)	3.91 (0.75)	3.71 (0.58)	3.56 (0.60)	3.73 (0.50)	3.83 (0.69)	3.26 (0.70)

* First group of significant mean differences

^ Second group of significant mean differences

⌘ Third group of significant mean differences

4.8 Table 6. BFI *Post-hoc* mean scores (SD)

Highest level of education[1.]	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
1. BSc Pharm/BSP	3.22 (0.79)*	4.06 (0.61)*	4.15 (0.59)*	2.43 (0.77)*	3.42 (0.58)*
2. Pharm D	3.46 (0.83)*	3.85 (0.81)*	4.03 (0.66)*	2.50 (0.80)*	3.57 (0.59)*
3. Hospital residency	3.29 (0.80)*	3.91 (0.67)*	4.05 (0.62)*	2.54 (0.67)*	3.34 (0.55)*
4. MSc Pharm	2.20 (0.45)*	2.50 (0.70)*	3.07 (0.45)*	2.78 (0.47)*	2.81 (0.36)*
5. BPS	2.69 (0.85)	3.31 (1.08)	3.36 (0.83)	2.65 (0.74)	3.04 (0.42)
Canadian region					
1. Western Canada	3.26 (0.74)*	3.96 (0.56)*	4.16 (0.52)*	2.48 (0.69)*	3.48 (0.52)*
2. Ontario	3.32 (0.83)*	4.05 (0.66)*	4.18 (0.65)*	2.37 (0.75)*	3.42 (0.60)*
3. Quebec	2.11 (0.33)*	2.37 (0.40)*	2.94 (0.32)*	2.90 (0.36)*	2.73 (0.29)*
4. Atlantic Canada	3.38 (0.75)*	4.14 (0.52)*	4.09 (0.50)*	2.51 (0.78)*	3.43 (0.55)*
Years in practice by decade					
1. 1 – 10 years	3.15 (0.85)	3. 69 (0.85)	3.88 (0.66)*	2.61 (0.63)	3.29 (0.60)
2. 11 – 20 years	3.01 (0.91)	3.69 (0.96)	3.87 (0.80)*	2.51 (0.80)	3.26 (0.67)
3. 21 -30 years	3.09 (0.84)	3.77 (0.82)	3.92 (0.70)*	2.53 (0.67)	3.29 (0.55)

4.8 Table 6. BFI Post-hoc mean scores (SD) cont'd

Years in practice by decade	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
4. 31 + years	3.15 (0.79)	3.94 (0.69)	4.15 (0.57)	2.39 (0.75)	3.49 (0.47)
Time spent performing clinical duties					
1. 0 – 25%	3.12 (0.86)	3.85 (0.84)*	4.00 (0.70)*	2.49 (0.75)	3.40 (0.63)
2. 26 – 50%	3.05 (0.76)	3.88 (0.77)*	3.98 (0.67)*	2.64 (0.75)	3.28 (0.51)
3. 51 – 75%	2.99 (0.87)	3.46 (0.87)*	3.71 (0.70)*	2.60 (0.59)	3.21 (0.54)
4. 76 – 100%	3.30 (0.91)	3.79 (0.85)*	4.03 (0.69)*	2.38 (0.73)	3.33 (0.63)

[1.] Bachelor's degree in pharmacy (BSc Pharm/BSP), doctor of pharmacy degree (Pharm D), hospital residencies, Master of Clinical Pharmacy degree (MSc Pharm) and board of pharmacy specialization (BPS)

* First group of significant mean differences

^ Second group of significant mean differences

CHAPTER 5:

Prescribing by Pharmacists in Alberta and its Relation to Culture and Personality Traits

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5.0 Background:

Around the world, health legislation is changing to enable pharmacists to provide a higher level of care to patients (1-3). Systematic reviews and meta-analyses provide strong evidence that pharmacists' interventions, including medication therapy management and prescribing, result in improved patient outcomes (4-11). While pharmacist prescribing has been implemented in the United States and United Kingdom in various forms (e.g., dependent prescribing in the United states) (3,12), Alberta became the first jurisdiction in North America where independent prescribing by pharmacists was introduced (13).

Alberta has 2 primary types of prescribing: prescription adaptation and initial access prescribing. Under prescription adaptation, pharmacists can alter a dosage, formulation, regimen or duration of a prescription initiated by another prescriber, provided they have access to the original prescription (14). All pharmacists licensed in Alberta can perform this activity. Initial access prescribing is prescribing based on either the pharmacist's assessment of the patient at the initial point of care, the recommendation of another prescriber, or in consultation with another health professional (14). To provide initial access

prescriptions, pharmacists must successfully complete a comprehensive application demonstrating their ability to implement and adhere to the Alberta College of Pharmacists' Standards of Practice for pharmacist prescribing (15). The successful completion of this application process is referred to as obtaining Additional Prescribing Authorization (APA).

While there were 394 pharmacists in Alberta who have obtained APA, as of the end of December 2013, this represents only 10% of the roughly 4000 pharmacists practicing in the province (16, 17). In an effort to understand the adoption of APA by Alberta pharmacists, an aspect of the Diffusion of Innovations Theory, developed by Everett Rogers, provides a useful framework. In particular, Rogers posits that 5 groups can be classified when examining the uptake of an innovation (18). The first group is called the "innovators". These are the first people to take on an innovation and are, according to Rogers, more likely to take risks, are generally of the highest social class, have access to financial resources and have the closest social contact with scientific sources (18).

The second group is called the "early adopters" (18). Rogers suggests that these individuals have a high degree of opinion leadership and, consequently, high social status (18). They also have access to financial resources, are highly educated and are socially forward (18). The third group is called the "early majority" and this group tends to take on the innovation after a longer period of time than the first two groups (18). This group is characterized by an average social status and some contact with early adopters, who act as proof of whether or not it is worth the risk for the early majority to take on the innovation (18). The

final 2 groups are the “late majority” and the “laggards” and, as the titles suggest, these are the final groups to take on the innovation (18). Rogers suggests that the late majority have high degree of scepticism and the laggards have low opinion leadership (18).

According to Rogers, the rate of adoption of an innovation can be traced across these 5 groups using a bell-shaped curve, with the innovators representing 2.5%, the early adopters representing 13.5%, the early and late majority representing 34% each and the laggards representing 16% of the total population of possible adopters of the innovation (18). If just the rough total percentage of Alberta pharmacists who have obtained APA to date (~10%) is taken into consideration, then the “critical mass” needed to prompt the next group, the early majority, to take on the innovation of pharmacist prescribing has yet to be achieved.

The knowledge translation literature suggests that understanding culture as part of the context in which health professionals, such as pharmacists, are working, is an important piece of knowledge needed to maximize the success of any change initiative (19-21). Working from Rogers’ assertion that innovators and early adopters are different from other adopter groups, an examination of the cultural characteristics and personality traits of Alberta pharmacists who currently have APA was undertaken.

For the purposes of this work, culture is defined as “patterns of [subjective] interpretation composed of meanings associated with various cultural manifestations, such as stories, rituals, formal and informal practices, jargon and

physical arrangements" (pg. 330) (22). Unlike other definitions of culture, the focus of this definition is upon how group members work to make sense of or interpret the manifestations of culture, like those mentioned above (23). Furthermore, the examination of the professional culture of pharmacy in this work will take on the integrative perspective, as outlined by Martin, which seeks to identify those aspects of culture which are shared by group members (22).

To gain insight into the shared aspects of professional culture of pharmacists with APA, the organizational culture profile (OCP) was used. This instrument is comprised of 7 cultural factors: competitiveness, social responsibility, supportiveness, innovation, rewards and performance orientation, and stability (24). The degree to which a group identifies with each of these factors is determined by scoring responses to a particular sub-set of the 40 Likert scale-measured items linked specifically to that cultural factor. The relationship between each factor and its' questionnaire items/themes is presented in Table 1.

An examination of the social psychology literature suggests that behaviour cannot be fully understood by only considering culture (25). As such, the approach, advocated by McCrae (2005), in which culture and personality are treated as separate, but interacting variables has been applied within this work (25). The personality traits of pharmacists were assessed using the Big Five Inventory (BFI), a validated, reliable instrument that measures 5 personality traits: extraversion, agreeableness, conscientiousness, neuroticism, and openness (26-28). The BFI is considered to be a short instrument, suitable for self-administration, utilizing 44 phrases measured on 5-point Likert scales (26).

As with the OCP, scoring the BFI involves combining the Likert responses into specific sub-sets of the 44 phrases related to each of the identified personality traits (26).

The trait *extraversion* describes behaviours such as being “energetic” and “enthusiastic”, “social”, “assertive”, “confident”, and “ambitious” (26). *Agreeableness* describes behaviours such as being “altruistic”, “cooperative”, “willing to conform to group norms”, and “displaying warmth and kindness” (26). *Conscientiousness* includes the ability to “control impulses” to “facilitate goal-directed behaviour”, to “follow norms and rules”, and “efficiency in planning, organizing and prioritizing tasks” (26). *Neuroticism*, as opposed to emotional stability, describes behaviours associated with “feelings of anxiety”, “nervousness”, and “depression” (26). People who score more highly on neuroticism in Big Five measures of personality may also display “self-consciousness”, be more “moody”, “impulsive”, and “stress-prone” (26). Finally, people who score more highly on the o*pen to experience* trait are likely to have a “wide, deep and complex level of experience in the world” (26). Such people are also likely to be “knowledgeable”, “perceptive” and “analytical”, “seek out new experiences”, and are more “artistic” and “investigative” (26).

5.1 Objectives:

The primary objective of this study was to gain descriptive insight into the culture and personality traits of a group of innovator and early adopter Alberta pharmacists with APA using the OCP and BFI. The secondary objective of this

study was to see how these factors and traits may be related to the self-described usage of APA in practice.

5.2 Methods:

5.2.0 Design:

A cross-sectional survey design was used to address the study objectives. Ethics approval was obtained from the Health Research Ethics Board at the University of Alberta.

5.2.1 Population:

The population consisted of all pharmacists with APA, who provided consent to the Alberta College of Pharmacists to be contacted for pharmacy practice research activities. This included 167 pharmacists with APA at the time the survey was administered.

5.2.2 Survey instrument:

The survey instrument contained three sections to enable to collection of different types of information. The first section included questions about demographic details such as years in practice, location of practice, age, gender, highest level of education and additional continuing education courses taken. Second, information on what had prompted respondents to apply for APA and in which

clinical practice area(s) they intended to first use their authority.[1] Third, respondents were asked to outline how they applied APA within their practices including which prescribing activities they engaged in most frequently, and how they were operationalizing these activities daily. Finally, respondents were asked to evaluate their level of success at integrating APA into their practices and to identify any outstanding barriers. Given the possibly diverse set of responses for some questions, open-ended question formatting was used as appropriate. A total of 26 questions were asked as part of this section of the survey. Sections two and three of the survey instrument contained the OCP and BFI, the contents of which were described above. Research team members reviewed all questions for relevance, but given the exploratory nature of this study no pilot testing of questions was undertaken. The complete survey instrument is available online (29).

5.2.3 Data collection:

All instruments were completed online. A letter of invitation, along with a secure link to the complete survey, was distributed to qualifying pharmacists with the assistance of the Alberta College of Pharmacists in September 2012. Two reminder emails were sent two weeks apart to all participants to improve response rates. The web-based survey was available for pharmacists' responses

[1] At the time the survey was administered the application for APA requested applicants identify primary practice areas for the use of the authority. This section has since been removed to better align with the notion that APA is not disease specific (https://pharmacists.ab.ca/Content_Files/Files/APAApplicationForm2013.pdf).

for a total of 5 weeks to allow adequate time for pharmacists to complete it after the final reminder was sent.

5.2.4 Analysis:

All analyses were completed using SPSS® version 19 (IBM SPSS, Armonk, NY, USA). Demographic and background survey questions were evaluated using descriptive statistics and central tendency measures, as appropriate, while the open-ended questions about motivation for obtaining APA, conditions treated and barriers were analysed using qualitative content analysis (30). These results are presented thematically with the first theme representing the one with the greatest number of mentions. Frequency counts were made of how and when respondents applied for APA, and in which clinical activities they were engaged.

Next, the mean scores of the OCP and BFI for this sample were calculated. In particular, the scoring guidelines provided by the authors of the respective instruments were used (24, 26). These results were used for the purposes of inferential analyses described in detail below. The characterization of this sample's mean OCP and BFI scores will be completed using population means available for each instrument (24, 31). Neither the OCP, nor the BFI are demonstrative measures, meaning that it is inappropriate, for instance, to suggest that a professional culture is innovative or that a group's personality is extraverted. As such, the results of the OCP are interpreted as suggesting that respondents "perceived value" in each of the factors, while the BFI results describe respondents as being "more likely to exhibit behaviours" in line with a

particular trait. Reliability analyses were also conducted for OCP factors and BFI traits.

Comparisons between the mean scores of the OCP and BFI and the variables from the first part of the survey were then made. Specifically, comparisons to the variables of the numbers of prescription adaptations and initial access prescriptions written by respondents were made. These comparisons were made using analysis of variance (ANOVA) and simple linear regression. Due to the exploratory nature of this study, post-hoc tests for ANOVA analysis, including the Tukey and Games-Howell tests, were used to determine where specific sub-group differences between means were located (32).

5.3 Results:

A total of 65 surveys were returned, for a response rate of 39%. On average, respondents were 40 (SD 10) years of age, had been in practice for 16 (SD 9) years and the majority of respondents were female (79%) (Table 2). When compared to the overall population of Alberta pharmacists with APA, according to records maintained by the Alberta College of Pharmacists, respondents here averaged two more years in practice. Respondents were also more likely to be female (+ 8%) and working in a primary care networks (+ 13%). When compared to the overall population of pharmacists with APA, respondents working in the hospital setting were underrepresented (- 6%).

Qualitative content analysis revealed that the top three reasons respondents cited for applying for APA included the desire to improve patient care, expanding professional roles, and employer requirements. The primary clinical practice areas listed most frequently by respondents were diabetes, dyslipidemia and hypertension, followed by smoking cessation, surgery, travel medicine and geriatrics. The therapeutic drug classes most frequently prescribed included antihypertensive drugs, anticoagulants, oral hypoglycaemic drugs, and statins. However, respondents also reported often prescribing acute therapies such as analgesics, immunizations and antibiotics.

Upon receiving APA, nearly 90% of respondents wrote their first prescription within the first month, with 58% of those using their APA within the first week of obtaining it. When asked about the number of prescription adaptations written per week, 72% of respondents wrote at least 1 prescription adaptation per week (median of 3). Sixty-four percent of respondents wrote at least 1 initial access prescription per week (median of 5).

Over three-quarters (77%) of respondents felt that they had successfully integrated APA into their practice, but identified a number of remaining barriers. One barrier was a lack of support from health care professionals (including other pharmacists), patients and managers/employers. Other barriers included a lack of time to complete documentation, to develop relationships with other health care professionals, and to keep up with the latest clinical data.

A total of 54 survey instruments contained completed OCP and BFI sections, meaning that 83% of respondents completed the entire instrument. This

makes for a total response rate of 29%. The following results are based on these 54 respondents' survey responses. The demographic characteristics of this subsample of respondents did not differ significantly from the larger pool of 65 respondents (Table 2).

Applying the OCP scoring guidelines, the mean scores of the 7 cultural factors were as follows: 3.70 (SD 0.81) for competitiveness, 3.69 (SD 0.81) for social responsibility, 3.89 (SD 0.76) for supportiveness, 2.99 (SD 0.82) for innovation, 3.37 (SD 0.76) for emphasis on rewards, 3.87 (SD 0.80) for performance orientation, and 3.67 (SD 0.64) for stability (24). Using the scoring guidelines from the BFI, the mean scores of the traits were as follows: 3.72 (SD 0.78) for extraversion, 4.18 (SD 0.56) for agreeableness, 4.39 (SD 0.47) for conscientiousness, 2.27 (SD 0.67) for neuroticism, and 3.59 (SD 0.51) for openness. Comparisons of the mean scores on the OCP and BFI from this sample to population means can be seen in Table 3 (26). Further analyses of each of the OCP factors and BFI traits revealed that each had high reliability (Table 4 and 5).

Inferential statistical analysis revealed a significant linear relationship between the OCP factors of social responsibility ($t(49) = 2.30$, $p = 0.03$, $\beta = 0.85$) and competitiveness ($t(49) = -2.21$, $p = 0.03$, $\beta = -0.082$) and the number of prescription adaptations completed by the respondents. No other significant relationships were observed.

5.4 Discussion:

To begin to understand the cultural factors and personality traits of pharmacists, we surveyed a group of “innovator” and “early adopter” pharmacists from Alberta, Canada who obtained their APA. The top reason identified by respondents for obtaining their APA was to improve patient care, and they were primarily caring for patients with chronic conditions. Upon obtaining their APA, most respondents began using it immediately and continued using it on weekly basis. Most respondents felt that they had successfully integrated this credential into practice; however, they also identified a number of important barriers to be addressed.

When compared to population means respondents’ from this sample generally perceived value in the factors of competitiveness, supportiveness, reward, and stability. Using the outline of the relationship between the OCP factors and their corresponding survey items from Table 1, these findings suggest that respondents perceived value in being achievement oriented (*competitiveness*), team oriented (*supportiveness*), and having low conflict (*stability*) (24).

BFI results suggest that these respondents may be likely to exhibit behaviours in line with the traits of extraversion, agreeableness, and conscientiousness. More specifically, pharmacist respondents may be more likely to be energetic and enthusiastic (*extraversion*), altruistic and cooperative (*agreeable*), and manage behaviour to achieve goals (*conscientious*) (26). Inferential analysis of the cultural factors and personality traits suggested a

possible interaction with how pharmacists' use APA in their day-to-day practices; however, given the small sample, no definitive conclusions can be drawn at this time. This could be interpreted as suggesting that respondents who saw the profession of pharmacy as being more socially responsible were more likely to complete prescription adaptations, while those who saw pharmacy as more competitive were less likely to write prescription adaptations.

There are several important limitations that must be considered with respect to these results. First, the questionnaires used to explore the professional culture of pharmacy provided predetermined cultural factors that were not developed specifically for the pharmacy profession. As such, there may be other values of more importance to pharmacists that are not represented. Second, as outlined in the methods section the population from which this sample of pharmacists was drawn was relatively small, and the response rate was also low. This may mean that these results are not representative of all pharmacists with APA in Alberta.

Future research into the culture and personality of pharmacy should determine if the factors and traits identified herein resonate with other pharmacists with APA. Further work should also be conducted to verify if indeed innovators and early adopters differ from their early and late majority or laggard colleagues. With a firmer grasp of the cultural and personality characteristics of pharmacists, the wider context in which pharmacists complete their work will be better understood. This will allow for the development of better-informed

knowledge translation intervention studies and, in so doing, a systematic and theory-driven approach to assisting pharmacy practice change can be achieved.

5.5 Conclusion:

Pharmacy practice change is an ongoing process and an improved understanding of the professional culture and personality of pharmacy of innovators and early adopters can be leveraged to develop tailored knowledge translation interventions. Future work in this area should endeavour to determine if the factors and traits identified herein are also important to a more general population of pharmacists. Any differences identified can be used to further improve knowledge translation interventions, and ultimately the care of patients.

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5.7 Table 1. OCP constructs and their relationship to question themes (24)

Construct	Defining characteristics / themes
Competitiveness	• Achievement orientation • An emphasis on quality • Being distinctive/different from other groups • Being competitive
Social Responsibility	• Being reflective • Having a good reputation • Being socially responsible • Having a clear guiding philosophy
Supportiveness	• Being team orientated • Sharing information freely • Being people oriented • Collaboration
Innovation	• Being innovative • Quick to take advantage of opportunities • Risk-taking • Taking individual responsibility
Reward Orientation	• Fairness • Opportunities for professional growth • High pay for good performance • Praise for good performance

5.7 Table 1. OCP constructs and their relationship to question themes (24) cont'd

Performance orientation	• **Having high expectations for performance** • **Enthusiasm for the job** • **Being result oriented** • **Being highly organized**
Stability	• Stability • Being calm • Security of employment • Low conflict

5.8 Table 2. Survey Respondent Demographics

		n = 65: mean (SD)	n = 54: mean (SD)
Mean number of years in practice		16 years (9 years)	15 years (8 years)
Mean Age		40 years (10 years)	39 years (10 years)
Gender		79% female	78% female
Highest level of education		73% BSc Pharmacy	74% BSc pharmacy
Obtained additional certifications *(e.g., Certified diabetes educator, travel medicine, injections certification)*		46%	54%
Primary practice area[a]	Community	22%	19%
	Hospital	23%	22%
	Ambulatory clinic	25%	28%
	Primary Care Network	26%	26%
	Long-term Care Facility	3%	4%

5.8 Table 2. Survey Respondent Demographics cont'd

Primary practice *(% of respondents spending > 20 hours/week providing direct patient care)*	**56%**	**57%**
Primary position	75% self-identified as staff pharmacists	78% self-identified as staff pharmacists
Mean time with APA	24 months (18 months)	24 months (18 months)

[a] One response was missing from this question

5.9 Table 3. Comparison of sample and population mean scores for OCP (24) and BFI (31)

Factor/Trait	Sample mean score (SD)	Population mean score (SD)
Competitiveness	3.70 (SD 0.81)	3.37 (0.65)
Social Responsibility	3.69 (SD 0.81)	3.93 (0.74)
Supportiveness	3.89 (SD 0.76)	3.70 (0.90)
Innovation	2.99 (SD 0.82)	3.50 (0.91)
Reward Orientation	3.37 (SD 0.76)	3.61 (0.90)
Performance orientation	3.87 (SD 0.80)	4.02 (0.71)
Stability	3.67 (SD 0.64)	3.46 (0.72)
Extraversion	3.72 (SD 0.78)	3.25 (0.90)
Agreeableness	4.18 (SD 0.56)	3.82 (0.68)
Conscientiousness	4.39 (SD 0.47)	3.73 (0.71)
Neuroticism	2.27 (SD 0.67)	3.13 (0.86)
Openness	3.59 (SD 0.51)	3.90 (0.69)

6.0 Table 4. Reliability scores for OCP Factors

OCP Factor	Cronbach's Alpha
Innovation	0.90
Supportiveness	0.96
Social responsibility	0.95
Competitiveness	0.94
Stability	0.93
Performance orientation	0.95
Reward orientation	0.90

6.1 Table 5. Reliability scores for BFI Traits

BFI Trait	Cronbach's Alpha
Extraversion	0.88
Agreeableness	0.83
Conscientiousness	0.78
Neuroticism	0.80
Openess	0.70

Chapter 6:

Understanding Pharmacy Culture and Personality using the Organizational Culture Profile and the Big Five Inventory

Meagen Rosenthal, Carlo Marra and Ross T. Tsuyuki

6.0 Background:

Across Canada, the United States and around the world health legislation is changing to allow pharmacists to provide additional health services to patients (1-3). For instance, pharmacists in British Columbia, Canada, now have the ability to adapt prescriptions, provide immunizations and conduct medication reviews (1). While progress has been made with respect to the integration of some of these new abilities into practice, uptake of these services by pharmacists has not been ubiquitous (4-6). With the advent of these new abilities, renewed and increasingly urgent, calls have been made for all pharmacists to integrate these services into their daily practices (7-10).

However, evolving, transforming, changing and adapting pharmacy practice has been a preoccupation of the profession since the 1970s (11, 12). In that time, many studies have been conducted examining why substantial and sustained change has not taken place, and have consequently identified numerous barriers to practice change (13-16). Some of the most frequently mentioned barriers include a lack of time, payment, support and resources (13-16). While these barriers are important, they represent just one explanatory

factor in the lack of substantial and sustained change within the profession of pharmacy.

An examination of the change management literature reveals that understanding organizational culture (17), or the manner in which group members come to conceptualize, and therefore enact, their role (18), is of key importance to understanding how those group members approach different practice opportunities. The importance of culture is also echoed in the knowledge translation literature (19). In particular the Promoting Action on Research Implementation in Health Services (PARiHS) framework contains a component, "context", which demands gaining insight into not only leadership roles and monitoring systems, but also the prevailing *culture* of the groups wherein the change is to take place (20). To gain insight into the culture of the profession of pharmacy an integrative approach, focusing on the aspects of culture, which group members' share, was used in this work, through the application of the organizational culture profile (OCP) (21).

The OCP was originally developed to assess person/organization fit, however it has a demonstrated ability to gain insight into integrative aspects of a groups culture (22, 23). The 40-item version of the instrument developed by Sarros et al. (2005) (21), was used because it uses 5-point Likert scales for measuring respondent's evaluation of OCP values and can be self-administered. The instrument is comprised of 7 cultural factors: innovation, supportiveness, social responsibility, competitiveness, stability, performance orientation, and reward orientation. The degree to which a group identifies with each of these

factors is determined by summing Likert responses to a particular sub-set of the 40 items linked specifically to a cultural factor.

Groups that perceive value in being “quick to take advantage of opportunities”, are “risk taking” and “take individual responsibility”, may score higher on the trait of innovation (21). Groups that perceive value in being “team and people oriented”, “sharing information freely”, and “collaboration”, may score higher on “supportiveness” (21). Groups that perceive value in being “reflective”, “having a good reputation”, and a “clear guiding philosophy”, may score higher on “social responsibility” (21). Groups that perceive value in being “achievement oriented”, “emphasizing quality”, and “being distinctive and different from other groups”, may score higher on “competitiveness” (21). Groups that perceive value in being “calm”, “having low conflict” and a “sense of job security”, may score higher on the OCP factor “stability” (21). Groups that perceive value in having “high expectations for performance”, “enthusiasm for their job”, being “results oriented” and “highly organized”, may score higher on “performance orientation” (21). Groups perceiving value in being “fair”, “providing opportunities for professional growth”, and “high pay and praise for good performance”, may score higher on “reward orientation” (21).

Literature also suggests that culture cannot be considered in isolation when attempting to understand the behaviour of individuals. While there has been debate around the nature of the relationship between culture and personality traits (24-26), one approach, which was adopted for this work, suggests that culture and personality are independent variables interacting to

produce a particular set of behaviours in individuals (26). As such, when examining the cultural perspectives of members working within a group, like pharmacy, it is also important to account for the personality traits of the group. To measure pharmacists personality traits the Big Five Inventory (BFI), a validated, reliable instrument has been used (27). The BFI is a brief instrument, suitable for self-administration, utilizing 44 phrases measured on 5-point Likert scales (27). As with the OCP, scoring the BFI involves summing the Likert scale responses, on a specific sub-set of the 44 phrases, related to each of the personality traits.

The BFI measures 5 personality traits: extraversion, agreeableness, conscientiousness, neuroticism, and openness (27-30). The trait “extraversion” describes behaviours such as being “energetic” and “enthusiastic”, “social”, “assertive”, “confident”, and “ambitious” (27). “Agreeableness” describes behaviours such as being “altruistic”, “cooperative”, “willing to conform to group norms”, and “displaying warmth and kindness” (27). “Conscientiousness” includes the ability to “control impulses” to “facilitate goal-directed behaviour”, to “follow norms and rules”, and “efficiency in planning, organizing and prioritizing tasks” (27). “Neuroticism” as opposed to emotional stability, describes behaviours associated with “feelings of anxiety”, “nervousness”, and “depression”. People who score more highly on neuroticism in Big Five measures of personality may also display “self-consciousness”, be more “moody”, “impulsive”, and “stress-prone” (27). Finally, people who score more highly on the “openness to experience” trait are likely to have a “wide, deep and complex level of experience in the world” (27). Such people are also likely to be “knowledgeable”,

“perceptive” and “analytical”, “seek out new experiences”, and are more “artistic” and “investigative” (27).

The primary purpose of this study was to gain insight into pharmacy’s professional culture using the OCP and pharmacist personality traits using the BFI. The secondary purpose of this work was to investigate possible relationships between the factors of the OCP and the traits of the BFI and the uptake of advanced practice opportunities by pharmacists in British Columbia, Canada.

6.1 Methods:

6.1.0 Design:

The design of this study was a cross-sectional survey.

6.1.1 Population:

The population of respondents for this survey was composed of licensed and practicing pharmacists from British Columbia, Canada. Ethics approval for the conduct of this study was received from the Health Research Ethics Board at the University of British Columbia.

6.1.2 Instrument:

The survey instrument contained four sections. The first section contained basic demographic and practice setting questions. More specifically, respondents were asked to indicate their gender, birth year, primary practice site, primary pharmacy

role, and number of years in practice. Whenever feasible, predetermined response categories were provided for respondents. Section two contained questions about the respondents' current practice setting and the kinds of advanced practice services they offer to patients. In particular, questions were asked about the number of prescription adaptations and immunizations provided, and the number medication reviews conducted each month by the respondent. The final two sections of the instrument contained the OCP and BFI.

6.1.3 Administration:

The survey was administered online with the assistance of the British Columbia Pharmacists Association. All registered pharmacists in the province were sent an email invitation describing the survey and inviting them participate. A link was embedded within the email invitation that could be used by respondents to complete the survey instrument. The data was collected from October 1st through November 10, 2013.

6.1.4 Analysis:

Data analysis was completed using SPSS® 19.0 for windows. In preparing and cleaning the data for analysis, the demographic and practice setting questions were first examined descriptively. Based upon this examination several of the questions were transformed prior to inferential analyses (see https://coreweb01.hli.ubc.ca/limesurvey/index.php?sid=56189 for original question formulation). For example, in the practice setting variable ambulatory

and long term care responses were combined, under the primary pharmacist role variable, clinical and specialist pharmacist respondents were combined, as were relief and casual pharmacists. The subgroups within the advanced practice services variables were also collapsed intuitively to allow for equal distribution of responses across three groupings (see Table 1 for details).

The OCP and BFI were analyzed using the scoring guidelines provided by the authors of the instruments (21, 28). This procedure yields mean scores for each factor of the OCP and trait of BFI, which were compared to the population means for each instrument. It is important to note that neither the OCP nor the BFI are demonstrative measures of culture or personality. As such, it is inappropriate to suggest that respondents' culture *is* innovative, or that respondents' personality *is* extraverted. Results from the OCP will described respondents as *perceiving value* in the cultural factors. Results from the BFI will describe respondents as being *"possibly more likely to exhibit behaviours"* in line with a particular trait. Reliability analyses were then conducted for each OCP factor and BFI trait.

The mean scores on both the OCP and BFI were then compared to demographic and advanced practice implementation questions. These comparisons were made using analysis of variance (ANOVA). Measures of the effect size of any observed relations were made using the Eta-square test (η^2). Small, medium and large effects, respectively, were determined using the following criteria: ≤0.04, >0.04, and >0.36 (31). Due to the exploratory nature of this study *post-hoc* tests, including the Tukey and Games-Howell tests, were

used to determine where specific sub-group differences between means were located (32). All *post-hoc* tests were measured to a 0.05 level of significance.

6.2 Results:

A total of 945 completed instruments were returned, for a response rate of 19%. The majority of respondents were female (61%), the average age of respondents was 42 years (SD 12) and the average number of years in practice was 19 years (SD 12). Most respondents practiced in chain community pharmacies (56%) and classified their primary pharmacy role as being staff pharmacists (53%). The majority of respondents provided between 0 and 5 prescription adaptations and medication reviews per month. Most respondents either did not have the certification to provide immunizations or did not provide any immunizations. See Table 1 for complete sample characteristics.

[Insert Table 1. Sample Characteristics]

The mean scores for the OCP were as follows: innovation 3.14 (SD 0.81), supportiveness 3.49 (SD 0.92), social responsibility 3.37 (SD 0.81), competitiveness 3.44 (SD 0.82), stability 3.28 (SD 0.60), performance orientation 3.52 (SD 0.76) and reward orientation 3.04 (SD 0.90). The mean scores for the BFI were as follows: extraversion 3.34 (SD 0.68), agreeableness 4.09 (SD 0.49), conscientiousness 4.23 (SD 0.52), neuroticism 2.38 (SD 0.67) and openness 3.45 (SD 0.55). Comparisons of the mean scores from this sample of OCP and

BFI respondents to the population means can be seen in Table 2. Further analyses of each OCP factor and BFI trait revealed each has a high level of reliability (Tables 3 and 4).

[Insert Table 2]

[Insert Table 3]

[Insert Table 4]

The relationship between demographic and practice variables and OCP and BFI are shown below. Complete mean scores and standard deviations for the *post-hoc* analyses are located in Tables 3 and 4. Significant differences between sub-groups have been marked accordingly in the tables.

[Insert Table 5]

[Insert Table 6]

6.2.0 Demographic variables: practice setting and primary role:

6.2.0.0 Practice setting:

There was a significant association between practice setting and scores on the OCP factors of innovation, $F(1,5) = 8.87$, $p < 0.00$, $\eta^2 = 0.05$, supportiveness, $F(1,5) = 6.18$, $p < 0.00$, $\eta^2 = 0.03$, social responsibility, $F(1,5) = 5.41$, $p < 0.00$, $\eta^2 = 0.03$, competitiveness, $F(1,5) = 10.47$, $p < 0.00$, $\eta^2 = 0.05$, stability, $F(1,5) =$

4.04, $p < 0.00$, $\eta^2 = 0.02$, performance orientation, $F(1,5) = 3.20$, $p < 0.00$, $\eta^2 = 0.02$, and reward orientation, $F(1,5) = 8.85$, $p < 0.00$, $\eta^2 = 0.05$.

Post-hoc analyses using innovation, supportiveness and social responsibility revealed respondents who worked at either an independent pharmacy or a compounding pharmacy scored significantly higher on innovation than respondents from other practice settings. Analyses for competitiveness found in-patient hospital pharmacy and ambulatory/long term care pharmacy respondents scored significantly lower than the other groups. Analyses for stability revealed that chain pharmacy respondents scored significantly lower than either independent or in-patient hospital pharmacy respondents.

The *post-hoc* analyses using performance orientation identified in-patient hospital pharmacy respondents scored significantly lower on performance orientation than either independent or chain pharmacy respondents. Finally, analyses for reward orientation revealed independent pharmacy respondents scored significantly higher than chain, in-patient hospital and ambulatory/long term care pharmacy respondents.

There was also an association between practice setting and scores of the BFI trait of openness, $F(1,5) = 3.97$, $p < 0.00$, $\eta^2 = 0.02$. *Post-hoc* analyses for openness revealed that respondents from non-traditional pharmacy/pharmaceutical roles scored significantly higher on openness than pharmacists from chain pharmacies.

6.2.0.1 Primary role:

There was also a significant association between primary role and scores on the OCP factors of innovation, $F(1,4) = 8.87$, $p < 0.00$, $\eta^2 = 0.04$, supportiveness, $F(1,4) = 9.59$, $p < 0.00$, $\eta^2 = 0.04$, social responsibility, $F(1,4) = 10.64$, $p < 0.00$, $\eta^2 = 0.05$, competitiveness, $F(1,4) = 11.89$, $p < 0.00$, $\eta^2 = 0.05$, stability, $F(1,4) = 6.98$, $p < 0.00$, $\eta^2 = 0.03$, performance orientation, $F(1,4) = 11.53$, $p < 0.00$, $\eta^2 = 0.05$, and reward orientation, $F(1,4) = 15.21$, $p < 0.00$, $\eta^2 = 0.06$.

Post-hoc analyses for innovation revealed that pharmacy manager respondents scored significantly higher on innovation, social responsibility, and performance and reward orientation than staff or clinical/specialist pharmacists. Analyses for the factors supportiveness and competitiveness revealed pharmacy managers scored significantly higher than staff pharmacists and clinical/specialist pharmacists, respectively. Interestingly, *post-hoc* analyses for stability found staff pharmacists scored significantly lower than either clinical/specialist pharmacists or pharmacy managers.

There was also a significant association between primary role and scores of the BFI traits of extraversion, $F(1,4) = 8.18$, $p < 0.00$, $\eta^2 = 0.04$, neuroticism, $F(1,4) = 6.26$, $p < 0.00$, $\eta^2 = 0.03$, and openness, $F(1,4) = 6.43$, $p < 0.00$, $\eta^2 = 0.03$. *Post-hoc* analyses for extraversion revealed staff pharmacists scored significantly lower on extraversion than pharmacy managers. Analysis for neuroticism identified staff pharmacists scored significantly higher on neuroticism than the other groups. Analysis for openness revealed staff pharmacists scored

significantly lower on openness than either clinical/specialist pharmacists or pharmacy managers.

6.2.1 Advanced practice variables:

6.2.1.0 Prescription adaptations performed/month:

There was a significant association between the number of prescription adaptations completed/month and scores of the BFI traits neuroticism, $F(1,2) = 3.34$, $p < 0.05$, $\eta^2 = 0.007$, and openness, $F(1,2) = 8.51$, $p < 0.00$, $\eta^2 = .0.02$. *Post-hoc* analyses for neuroticism revealed that respondents who provided more than 15 prescription adaptations/month scored significantly lower than those who provided fewer than 5 prescription adaptations. Analyses for openness revealed respondents who provided more than 15 prescription adaptations/month scored significantly higher than other groups.

6.2.1.1 Immunizations provided/month:

There was a significant association between the number of immunizations provided/month and scores on the OCP factors of innovation, $F(1,2) = 12.87$, $p < 0.00$, $\eta^2 = 0.03$, social responsibility, $F(1,2) = 7.48$, $p < 0.00$, $\eta^2 = 0.02$, competitiveness, $F(1,2) = 14.51$, $p < 0.00$, $\eta^2 = 0.03$, stability, $F(1,2) = 5.23$, $p < 0.00$, $\eta^2 = 0.01$, performance orientation, $F(1,2) = 12.98$, $p < 0.00$, $\eta^2 = 0.03$, and reward orientation, $F(1,2) = 6.77$, $p < 0.00$, $\eta^2 = 0.01$. *Post-hoc* analyses revealed respondents who were not certified or never provided immunizations scored significantly lower on innovation and competitiveness than other respondents.

Furthermore, those respondents who provided between 1 and 10 immunizations also scored significantly lower on competitiveness than those pharmacists who provided more than 11 immunizations/month.

Analyses for social responsibility revealed respondents who were not certified or did not provide immunizations also scored significantly lower than those respondents who provided more than 11 immunizations/month. Respondents not certified or not providing immunizations also scored significantly higher on stability than those respondents providing between 1 and 10 immunizations/month. Analyses for performance orientation revealed those respondents not certified or not providing immunizations scored significantly lower than the other groups. Those respondents providing more than 11 immunizations/month scored significantly higher on performance and reward orientation than those providing between 1 and 10 immunizations and those respondents not certified or providing immunizations, respectively.

Results from the BFI demonstrated a significant association between immunizations provided/month and scores on extraversion, $F(1,2) = 8.34$, $p < 0.00$, $\eta^2 = 0.02$, agreeableness, $F(1,2) = 5.16$, $p < 0.00$, $\eta^2 = 0.01$, neuroticism, $F(1,2) = 4.66$, $p < 0.05$, $\eta^2 = 0.01$, and openness, $F(1,2) = 8.70$, $p < 0.00$, $\eta^2 = 0.02$. *Post-hoc* analyses for extraversion and agreeableness revealed respondents providing more than 11 immunizations/month scored significantly higher than those not certified or providing immunizations and all other groups, respectively. Analyses for neuroticism revealed respondents providing more than 11 immunizations/month scored significantly lower on neuroticism than the other

groups. Analyses for openness found that respondents who provided between 1 and 10 immunizations scored significantly lower than the other groups.

6.2.1.2 Medication reviews conducted/month:

There was a significant association between the number of medication reviews conducted/month and scores of the OCP factors innovation, $F(1,2) = 5.83$, $p < 0.00$, $\eta^2 = 0.01$, and performance orientation, $F(1,2) = 8.48$, $p < 0.00$, $\eta^2 = 0.02$. *Post-hoc* analyses for innovation revealed respondents conducting more than 16 medication reviews/month scored significantly higher than those respondents conducting fewer than 5 reviews/month. Analyses for performance orientation found respondents who conducted fewer than 5 medication reviews/month scored significantly lower than the other groups.

There was a significant association between the number of medication reviews conducted/month and BFI scores for extraversion, $F(1,2) = 9.87$, $p < 0.00$, $\eta^2 = 0.02$, neuroticism, $F(1,2) = 3.61$, $p < 0.05$, $\eta^2 = 0.008$, and openness, $F(1,2) = 14.85$, $p < 0.00$, $\eta^2 = 0.03$. *Post-hoc* analysis on extraversion and openness revealed respondents conducting more than 16 medication reviews/month scored significantly higher than the other groups. Analyses for neuroticism revealed respondents conducting more than 16 medication reviews/month scored significantly lower than those respondents providing fewer than 5 medication reviews.

6.3 Discussion:

Gaining insight into the professional culture of pharmacy, and the personality traits of pharmacists is the first step in understanding how these factors and traits may impact pharmacists' conceptualization of the new and advanced practice opportunities that are available. This section will begin with a summary and interpretation of overall results of British Columbia pharmacists' responses on the OCP and BFI. Then a summary and interpretation of the sub-group analyses, and a summary of the analyses of the adoption of advanced practices by pharmacist respondents, will be provided.

6.3.0 Relationships of overall British Columbia pharmacist results OCP and BFI to the general population

When compared to the population means, British Columbia pharmacists perceived value in the OCP factor of competitiveness and more likely to behave in line with the BFI traits of extraversion, agreeableness and conscientiousness. Similar surveys have also been conducted with hospital pharmacists across Canada and pharmacists from Alberta who have obtained the ability to independently prescribe medications (33, 34). Looking across the three respondent groups the OCP factor competitiveness was consistently presented. The BFI trait conscientiousness is also repeated. However, there were also some differences. Canadian hospital pharmacists and Alberta pharmacists perceived greater value in the OCP factors of supportiveness and stability than the British Columbia sample (33, 34). Furthermore, Alberta pharmacists and British

Columbia pharmacists may be more likely to exhibit behaviours in line with extraversion and agreeableness than the national sample of hospital pharmacists (34).

6.3.1 Relationships to practice setting and primary role (sub-group differences): Analyses comparing respondents' scores on the OCP and BFI to demographic and pharmacy practice characteristics revealed a number of significant subgroup differences. Beginning with the demographic variable of practice setting respondents identifying as working in an independent or compounding pharmacies scored significantly higher on the OCP factors of innovation, supportiveness, and social responsibility. Respondents from chain or inpatient hospital pharmacy settings scored significantly lower on the factor of stability and performance orientation, respectively. Independent pharmacy respondents scored significantly higher on reward orientation. Finally, respondents from non-traditional pharmacy/pharmaceutical roles scored significantly higher on openness (28).

Turning to the demographic variable of primary role, findings suggest that pharmacy manager respondents scored significantly higher on innovation, supportiveness, competitiveness, and performance and reward orientation. Staff pharmacist respondents scored significantly lower on the factor stability and trait of openness. Staff pharmacist respondents' had significantly higher scores on neuroticism.

6.3.2 Relationships to advanced practice opportunities:

Beginning with the advanced practice variable “number of prescription adaptations provided/month”, respondents providing more than 15/month scored significantly lower on the trait of neuroticism. However, this group scored higher on the trait of openness. Turning to the advanced practice variable of number of immunizations provided/month those respondents who were not certified or never provided immunizations scored significantly lower on the OCP factors innovation, social responsibility, competitiveness, and performance and reward orientation. These respondents were also most likely to score significantly higher on the factor of stability. Respondents who provided between 1 and 10 immunizations scored significantly lower on competitiveness and performance orientation. Respondents providing more than 11 immunizations/month scored significantly higher on the BFI traits of extraversion and agreeableness, but significantly lower on neuroticism. Respondents providing between 1 and 10 immunizations scored significantly lower on openness.

Finally, with respect to the advanced practice variable number of medication reviews conducted/month, respondents providing more than 16 scored significantly higher on innovation. Respondents providing fewer than 5 medication reviews/month score significantly lower on performance orientation. Results using the BFI revealed that respondents providing more than 16 medication reviews/month scored significantly higher on extraversion and openness, while scoring lower on neuroticism.

6.3.3 Limitations:

There are several limitations to this study that must be addressed. To begin the response rate to the survey was relatively low. As such, it is not possible to state with any certainty whether or not these results are generalizable to the larger pharmacist population in British Columbia. However, the confirmation of these findings by comparison with the national sample of hospital pharmacists and the Alberta pharmacists with independent prescribing is promising. Second, as mentioned in the methods outline, both the OCP and BFI are measured using Likert scales, which are ordinal in nature (35). While inferential statistics were used to determine possible sub-group differences on the OCP and BFI mean scores, all interpretations of these results have been cautious and described in an exploratory, hypothesis generating fashion. Finally, this study was not designed prospectively to identify the sub-group differences, and was rather examined herein using *post-hoc* testing. While this approach has been questioned in the literature (32), it seems a reasonable approach as an exploratory and hypothesis-generating nature exercise.

6.3.4 Implications and Future Directions:

While an integrative approach, which seeks to identify those aspects of a culture most group members agree with, was primarily taken in this study, these results also demonstrate that important differences exist within the pharmacy profession (18). Using the parlance of Joanne Martin's work in organizational culture, these results suggest that sub-cultures may exist within the wider pharmacy profession

(18). The identification of sub-group differences also provides initial insight into the varying degrees to which advanced scopes of practice have been adopted within profession.

This information will prove particularly useful in the design of future knowledge translation interventions, wherein contextual knowledge, which includes insights into things like the professional culture and personality traits, plays a key role in ensuring the successful integration of practice innovations (36). More specifically, the presence of sub-group differences makes it necessary to develop interventions, which are unique to individual practice settings and pharmacists. Or thought of in another way broad, one-size-fits-all, solutions to pharmacy practice change are no longer tenable. However, before firm conclusions regarding the nature of these differences can be made, further investigation employing qualitative methodological should be undertaken.

6.4 Conclusion:

This preliminary work suggests that British Columbia pharmacists perceive value in the cultural factor of competitiveness and may be more likely to exhibit behaviours in line with the BFI traits of extraversion, agreeableness and conscientiousness. However, it is important to note that not all pharmacist respondents perceived value in the same cultural factors or may exhibit behaviours in line with the same BFI traits. The identification of these potential sub-cultures within the wider pharmacy profession provides insight into the observed differences in uptake of new practice opportunities, including the

provision of immunizations, by pharmacists. With this information specific, and targeted, knowledge translation interventions can be developed to help pharmacists provide better patient care.

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6.6 Table 1. Sample characteristics (N = 945)

Characteristic (n missing)	Sub-grouping	Percentage (n)
Gender	Male	39% (364)
	Female	61% (581)
Practice setting	1. Independent pharmacy	18% (173)
	2. Chain pharmacy	56% (553)
	3. Compounding pharmacy	1% (11)
	4. In-patient hospital pharmacy	12% (114)
	5. Ambulatory/long term care pharmacy	5% (48)
	6. Non-traditional pharmacy/pharmaceutical roles	5% (46)
Primary role (n = 31)	1. Staff pharmacist	53% (499)
	2. Clinical/specialist pharmacist	11% (105)
	3. Pharmacy manager	27% (250)
	4. Regional pharmacy manager	1% (13)
	5. Relief/casual pharmacist	5% (47)

6.6 Table 1. Sample characteristics (N = 945) cont'd

Characteristic (n missing)	Sub-grouping	Percentage (n)
Prescription adaptations completed/month (n = 7)	1. Never through 1-5 times/month	57% (540)
	2. 6-10 through 11-15 times/month	27% (250)
	3. More than 15 times/month	16% (148)
Immunizations provided/month (n = 7)	1. Never/not certified	44% (419)
	2. 1-5 through 6-10 times/month	37% (352)
	3. 11-15 through more than 15 times/month	18% (167)
Medication reviews completed/month (n = 7)	1. Never through 1-5 times/month	50% (470)
	2. 6-10 through 11-15 times/month	24% (231)
	3. 16-20 through more than 20 times/month	25% (237)

6.7 Table 2. Comparison of sample and population mean scores for the OCP and the BFI

Factor/Trait	Sample mean scores (SD)	Population mean scores (SD)[1]
Innovation	3.14 (SD 0.81)	3.50 (0.91)
Supportiveness	3.49 (SD 0.92)	3.70 (0.90)
Social Responsibility	3.37 (SD 0.81)	3.93 (0.74)
Competitiveness	3.44 (SD 0.82)	3.37 (0.65)
Stability	3.28 (SD 0.60)	3.46 (0.72)
Performance orientation	3.52 (SD 0.76)	4.02 (0.71)
Reward Orientation	3.04 (SD 0.90)	3.61 (0.90)
Extraversion	3.34 (SD 0.68)	3.25 (0.90)
Agreeableness	4.09 (SD 0.49)	3.82 (0.68)
Conscientiousness	4.23 (SD 0.52)	3.73 (0.71)
Neuroticism	2.38 (SD 0.67)	3.13 (0.86)
Openness	3.45 (SD 0.55)	3.90 (0.69)

1. Population mean scores for the OCP (19) and BFI (34) were taken from the literature.

6.8 Table 3. Reliability scores for OCP Factors

OCP Factor	Cronbach's Alpha
Innovation	0.79
Supportiveness	0.87
Social responsibility	0.81
Competitiveness	0.79
Stability	0.72
Performance orientation	0.75
Reward orientation	0.79

6.9 Table 4. Reliability scores for BFI Traits

BFI Trait	Cronbach's Alpha
Extraversion	0.84
Agreeableness	0.78
Conscientiousness	0.82
Neuroticism	0.82
Openess	0.78

6.8 Table 5: OCP *Post-hoc* mean scores (SD)

Practice Setting	Innovation	Supportiveness	Social Responsibility	Competitiveness	Stability	Performance Orientation	Reward Orientation
1. Independent pharmacy	3.45 (0.82)*	3.76 (0.84)*	3.59 (0.85)*	3.72 (0.80)*	3.36 (0.61)*	3.61 (0.78)*	3.39 (0.90)*
2. Chain pharmacy	3.09 (0.78)*	3.40 (0.92)*^	3.33 (0.77)*	3.43 (0.80)*^	3.21 (0.60)*	3.54 (0.74)*	2.99 (0.87)*
3. Compounding pharmacy	3.75 (0.76)^	4.25 (0.64)^	3.91 (0.58)^	3.89 (0.72)⌘	3.41 (0.45)	3.75 (0.57)	3.64 (0.74)^
4. In-patient hospital pharmacy	2.92 (0.81)*^	3.37 (0.89)*^	3.19 (0.84)*^	3.05 (0.83)*^⌘	3.39 (0.59)*	3.28 (0.82)*	2.83 (0.87)*^
5. Ambulatory/long term care pharmacy	3.06 (0.72)*	3.58 (0.87)	3.31 (0.76)	3.32 (0.62)*	3.44 (0.54)	3.43 (0.69)	2.86 (0.73)*
6. Non-traditional pharmacy/pharmaceutical roles	3.14 (0.87)	3.48 (1.09)^	3.53 (0.92)	3.49 (0.82)⌘	3.33 (0.52)	3.59 (0.86)	3.00 (1.06)

6.8 Table 5: OCP *Post-hoc* mean scores (SD) cont'd

Primary Role	Innovation	Supportiveness	Social Responsibility	Competitiveness	Stability	Performance Orientation	Reward Orientation
1. Staff pharmacist	3.02 (0.78)*	3.32 (0.94)*	3.23 (0.77)*	3.34 (0.79)*	3.20 (0.62)*	3.38 (0.74)*	2.87 (0.87)*
2. Clinical/specialist pharmacist	3.05 (0.84)*	3.52 (0.90)	3.28 (0.86)*	3.18 (0.88)*	3.45 (0.55)*	3.44 (0.79)*	2.91 (0.82)*
3. Pharmacy manager	3.37 (0.77)*	3.73 (0.82)*	3.62 (0.77)*	3.71 (0.78)*	3.36 (0.57)*	3.77 (0.73)*	3.38 (0.84)*
4. Regional pharmacy manager	3.17 (0.87)	3.65 (0.95)	3.58 (0.89)	3.50 (0.51)	3.46 (0.45)	3.60 (0.77)	3.12 (1.17)
5. Relief/casual pharmacist	3.23 (0.84)	3.65 (0.87)	3.43 (0.81)	3.46 (0.85)	3.11 (0.53)	3.51 (0.75)	2.99 (0.91)

6.8 Table 5: OCP *Post-hoc* mean scores (SD) cont'd

Prescription adaptations completed/month	Innovation	Supportiveness	Social Responsibility	Competitiveness	Stability	Performance Orientation	Reward Orientation
1. Never through 1-5 times/month	3.10 (0.77)	3.47 (0.92)	3.36 (0.78)	3.43 (0.77)	3.25 (0.60)	3.51 (0.75)	2.99 (0.87)
2. 6-10 through 11-15 times/month	3.17 (0.82)	3.49 (0.91)	3.39 (0.82)	3.46 (0.87)	3.32 (0.60)	3.49 (0.79)	3.11 (0.92)
3. More than 15 times/month	3.22 (0.90)	3.53 (0.93)	3.38 (0.87)	3.44 (0.90)	3.31 (0.61)	3.56 (0.77)	3.10 (0.95)
Immunizations provided/month	Innovation	Supportiveness	Social Responsibility	Competitiveness	Stability	Performance Orientation	Reward Orientation
1. Never/not certified	3.01 (0.78)*^	3.43 (0.92)	3.28 (0.85)*	3.30 (0.81)*	3.32 (0.60)*	3.39 (0.81)*	2.94 (0.90)*
2. 1-5 through 6-10 times/month	3.18 (0.79)*^	3.48 (0.91)	3.39 (0.76)	3.49 (0.77)*^	3.20 (0.60)*	3.55 (0.70)*^	3.06 (0.85)

6.8 Table 5: OCP *Post-hoc* mean scores (SD) cont'd

Immunizations provided/month	Innovation	Supportiveness	Social Responsibility	Competitiveness	Stability	Performance Orientation	Reward Orientation
3. 11-15 through more than 15 times/month	3.37 (0.85)*	3.62 (0.94)	3.56 (0.77)*	3.68 (0.84)*^	3.31 (0.58)	3.74 (0.72)*^	3.24 (0.95)*
Medication reviews completed/month							
1. Never through 1-5 times/month	3.05 (0.76)*	3.44 (0.90)	3.33 (0.78)	3.38 (0.80)	3.28 (0.58)	3.41 (0.77)*	2.99 (0.89)
2. 6-10 through 11-15 times/month	3.19 (0.78)	3.55 (0.92)	3.40 (0.82)	3.49 (0.80)	3.25 (0.63)	3.61 (0.69)*	3.09 (0.88)
3. 16-20 through more than 20 times/month	3.26 (0.91)*	3.51 (0.94)	3.42 (0.83)	3.51 (0.86)	3.31 (0.62)	3.62 (0.80)*	3.08 (0.91)

* First level of significant mean differences between groups

^ Second level of significant mean differences between groups

⌘ Third level of significant mean differences between groups

6.9 Table 6: BFI *Post-hoc* mean scores (SD)

Practice Setting	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
1. Independent pharmacy	3.44 (0.72)	4.10 (0.54)	4.18 (0.60)	2.30 (0.69)	3.51 (0.57)
2. Chain pharmacy	3.32 (0.68)	4.09 (0.48)	4.23 (0.50)	2.42 (0.68)	3.40 (0.55)*
3. Compounding pharmacy	3.41 (0.88)	4.20 (0.46)	4.30 (0.46)	2.42 (0.90)	3.27 (0.51)
4. In-patient hospital pharmacy	3.33 (0.62)	4.08 (0.45)	4.27 (0.47)	2.31 (0.64)	3.55 (0.54)
5. Ambulatory/long term care pharmacy	3.19 (0.67)	4.12 (0.54)	4.21 (0.52)	2.41 (0.52)	3.44 (0.52)
6. Non-traditional pharmacy/pharmaceutical roles	3.36 (0.70)	4.02 (0.51)	4.29 (0.50)	2.41 (0.69)	3.67 (0.45)*

6.9 Table 6: BFI *Post-hoc* mean scores (SD) cont'd

Primary Role					
1. Staff pharmacist	3.23 (0.67)*	4.06 (0.49)	4.21 (0.54)	2.48 (0.68)*	3.36 (0.56)*
2. Clinical/specialist pharmacist	3.31 (0.70)*	4.12 (0.47)	4.30 (0.42)	2.27 (0.60)*	3.59 (0.57)*
3. Pharmacy manager	3.51 (0.65)	4.12 (0.49)	4.25 (0.52)	2.31 (0.66)*	3.52 (0.50)*
4. Regional pharmacy manager	3.59 (0.55)	4.13 (0.55)	4.31 (0.56)	2.04 (0.80)	3.65 (0.56)
5. Relief/casual pharmacist	3.48 (0.71)	4.23 (0.36)	4.20 (0.38)	2.16 (0.61)*	3.52 (0.56)

6.9 Table 6: BFI *Post-hoc* mean scores (SD) cont'd

Prescription adaptations completed/month	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
1. Never through 1-5 times/month	3.30 (0.67)	4.08 (0.50)	4.23 (0.51)	2.43 (0.68)*	3.40 (0.54)*
2. 6-10 through 11-15 times/month	3.37 (0.69)	4.11 (0.49)	4.22 (0.51)	2.35 (0.65)	3.45 (0.51)^
3. More than 15 times/month	3.44 (0.73)	4.09 (0.48)	4.24 (0.56)	2.29 (0.68)*	3.61 (0.60)*^
Immunizations provided/month					
1. Never/not certified	3.26 (0.66)*	4.07 (0.49)*	4.26 (0.49)	2.43 (0.67)*	3.47 (0.56)*
2. 1-5 through 6-10 times/month	3.36 (0.67)	4.06 (0.50)^	4.18 (0.55)	2.41 (0.68)^	3.36 (0.52)*
3. 11-15 through more than 15 times/month	3.51 (0.73)*	4.20 (0.45)*^	4.26 (0.51)	2.24 (0.64)*^	3.57 (0.56)*
Medication reviews completed/month					
1. Never through 1-5 times/month	3.26 (0.67)*	4.06 (0.48)	4.21 (0.49)	2.45 (0.69)*	3.37 (0.53)*
2. 6-10 through 11-15 times/month	3.34 (0.66)*	4.12 (0.47)	4.21 (0.52)	2.34 (0.64)	3.45 (0.54)*
3. 16-20 through more than 20 times/month	3.50 (0.70)*	4.12 (0.53)	4.29 (0.56)	2.32 (0.67)*	3.61 (0.56)*

* First level of significant mean differences between groups

^ Second level of significant mean differences between groups

Chapter 7:

Conclusion

7.0 Outline:

The primary aim of this work, to begin the process of understanding the *context* (1), of the current pharmacy practice environment by gaining insight into the professional culture of pharmacy and the personality of pharmacists, was met through 3 objectives:

> *Objective 1: To gain insight into Canadian pharmacy's professional culture, using the organizational culture profile (OCP), and personality traits, using the big five inventory (BFI).*
>
> *Objective 2: Investigate possible relationships between pharmacists' responses to the OCP and BFI and proxy measures of advanced practice.*
>
> *Objective 3: Using demographic data including pharmacy practice setting, pharmacist role, level of education and region of practice to investigate possible sub-group differences in responses provided on the OCP and BFI.*

In this final Chapter, observations from each of the preceding five Chapters will be placed within a larger setting of the 3 objectives, and the theoretical discussion outlined in Chapter 1. Limitations of the 5 studies, which could not be

accounted for prior to data collection will also be outlined. Finally, possible future directions for this work will be provided. See Table 1 for summary of data collected as part of each study.

[Insert Table 1]

7.1 Objective 1:

7.1.0 Summary of findings for objective 1:

The first objective, to gain insight into the Canadian pharmacy's professional culture (using the OCP) and personality traits (using the BFI), was achieved throughout each of the 5 studies presented. In Chapter 2, comparisons of Alberta hospital pharmacists' mean scores on the BFI to the population mean scores suggested that pharmacist respondents may be more likely to exhibit behaviours in line with the traits of extraversion, agreeableness, conscientiousness, and openness.[2] The comparison of the BFI mean scores from Chapter 3's examination of pharmacists' actions in a pharmacy practice research study to population mean scores revealed that pharmacist respondents may be more likely to exhibit behaviour in line with the traits of extraversion, agreeableness, and conscientiousness.

In Chapter 4, responses to the OCP were collected, in addition to the BFI, from a national sample of hospital pharmacists. When the OCP sample mean

[2] AUTHOR NOTE: The analysis of the results from Chapter 2, presented herein, is different than that presented within the earlier Chapter. Taking the approach of comparing the BFI mean scores from the sample of Alberta hospital pharmacists to population mean scores has allowed for the comparison of results from across each of the five Chapters and represents the evolution of my thinking about this material over the course of my thesis work.

scores were compared to the population mean scores it was found that the national hospital pharmacist respondents might perceive greater value in the factors of supportiveness, competitiveness and stability. The comparison of the BFI mean scores from this sample to the population mean scores revealed that pharmacist respondents might be more likely to exhibit behaviours in line with the trait of conscientiousness.

The sample of Alberta pharmacists with Additional Prescribing Authorization (Chapter 5) also completed both the OCP and BFI. The comparison of the OCP mean scores from this sample to the population means found that this sample perceived value in the factors competitiveness, supportiveness, reward orientation, and stability. Comparisons of the sample BFI mean scores to population mean scores suggested that respondents might be more likely to exhibit behaviours in line with the traits of extraversion, agreeableness, and conscientiousness. Finally, comparisons from the sample mean scores of pharmacists from British Columbia (Chapter 6) to the population means suggested that respondents perceived value in items composing the OCP factor of competitiveness. The comparison of mean scores from this sample's BFI results to the population mean scores suggest that these respondents may be more likely to exhibit behaviours in line with traits of extraversion, agreeableness and conscientiousness.

7.1.1 Taking the integrative perspective:

Taking the findings of the 5 studies together, there were some OCP factors and BFI traits, which were consistently different from the population means. Beginning with the OCP, only the factor of competitiveness was consistently different from the population mean scores and repeated across each of the three studies for which this data was collected (see Table 2). Applying the definition assigned to this factor, it might be suggested that respondents in each of these studies perceived value in being “achievement oriented”, “[emphasizing] quality”, and “being distinctive and different from other groups” (2).

The factors of supportiveness and stability were identified in both the national sample of hospital pharmacists (Chapter 4) and the sample of pharmacists with additional prescribing authority (Chapter 5). That is, in at least 2 of the 3 studies, there was the perception by respondents that being “team and people oriented”, “sharing information freely”, and being “collaborative” was of value (“supportiveness”) (2). Furthermore, these respondents also perceived value in being “calm”, “having low conflict” and a “sense of job security” (“stability”) (2).

Moving onto the BFI, for which data was collected in each of the 5 studies, the trait conscientiousness was consistently different from the population mean scores and identified across the studies (see Table 2). That is, respondents from each of the 5 studies may be more likely, than the general population, to “control impulses” to “facilitate goal-directed behaviour”, to “follow norms and rules”, and “efficiently plan, organize and prioritize tasks” (3). In four of the 5 studies the

traits of “extraversion” and “agreeableness” were also consistently identified. Respondents from these four studies may be more likely to exhibit behaviours such as being “energetic” and “enthusiastic”, “social”, “assertive”, “confident”, and “ambitious” (“extraversion”) (3). These respondents may also be more likely to exhibit behaviours such as being “altruistic”, “cooperative”, “willing to conform to group norms”, and “displaying warmth and kindness” (“agreeableness”) (3).

[Insert Table 1.]

In line with the integrative perspective, wherein culture is made up of shared values and beliefs that manifest in an internally consistent fashion, agreed upon by all members of the group (4), the outcome of objective 1 has been a list of common cultural factors and personality traits. Delving further into the integrative perspective and the meaning and relationship of the three OCP factors identified in Chapters 4 and 5 it is also possible to interpret them as being mutually reinforcing (4). Considered in an alternative way, the factor of competitiveness cannot be understood within the context of pharmacy’s professional culture without also knowing that pharmacy culture perceives value in the factors supportiveness and stability.

For instance, consider the definition of the factor competitiveness, which includes valuing being “achievement oriented”, “[emphasizing] quality”, and “being distinctive and different from other groups” (2). It is possible to link these characteristics, tentatively, through the safe and effective distribution of

medications, to the factor supportiveness. Traditionally, medication distribution has been the sole domain of pharmacists, and as evidenced in the literature a particular preoccupation of the profession (5-8). More specifically, the factor of supportiveness, which emphasizes being “team oriented” (2), could be interpreted as implying that without the safe (i.e., quality) and effective distribution of medications by pharmacists (i.e., unique contribution), they could not perceive themselves to be successful health care team members.

Furthermore, the factor supportiveness may be linked, through literature examining acceptance of pharmacists’ recommendations by physicians (9), and perpetually high patient satisfaction ratings of pharmacists’ (10) and their services (11), to the factor stability. Beginning with the literature surrounding rates of acceptance of pharmacists’ suggestions by physicians, it could be posited that while it provides proof of the value of pharmacists’ contributions to the team (i.e., supportiveness), it also contributes to pharmacists’ sense of job security (i.e., stability) (2). Poor satisfaction ratings could result in discomfort on the part of the pharmacy profession by threatening the “status quo” as demonstrated by the factor stability.

Turning an integration perspective onto the BFI findings from the four Chapters outlined above, which identified the traits “extraversion”, “agreeableness”, and “conscientiousness”, it is also possible to interpret these traits as being mutually reinforcing with OCP factors. For example, both supportiveness and agreeableness focus on “collaboration” and “team play”, while “competitiveness” and “extraversion” may be linked through the OCP items

of “achievement orientation” and “being distinctive” and BFI items of “confidence” and “ambitiousness”.

The integrative interpretation of the data, collected as part of objective 1, makes the fundamental assumption that the OCP factors and BFI traits are equally agreed upon by all group members. More specifically, if asked what cultural factors characterize the pharmacy profession, it assumes members would respond similarly to respondents in each of the 5 studies conducted as part of this work. The validity of this assumption has been questioned, as outlined in Chapter 1, by many organizational culture researchers (4). Furthermore, objective 1 does not provide insight into how the factors and traits interact with other variables to possible influence the actual behaviours of respondents.

7.2 Objective 2:

7.2.0 Summary of findings for objective 2:

The second objective, to investigate possible relationships between pharmacists’ responses to the OCP and BFI and proxy measures of advanced practice by province, was accomplished through three studies. These included Chapter 3 and the examination of pharmacists’ behaviour within a pharmacy practice research study, Chapter 5 and the examination of pharmacists’ integration of additional prescribing authority into their practices and finally, Chapter 6 and the examination of British Columbia pharmacists’ integration of advanced scopes of practice into daily practice.

However, before turning to the relevant results, it is necessary to briefly restate that for the purposes of this discussion “advanced practices” are any services that may be offered by pharmacist, which are outside of those traditionally related to dispensing medications (12). No evidence, outside of that provided in Chapter 1, has been offered demonstrating whether or not the advanced practices discussed in these three Chapters have a positive clinical impact on patient outcomes. Therefore, it would be inappropriate to draw firm causal lines between the results offered below and possible improvements to patient outcomes. These results offer insight, and a place to begin further research into the possible relationships between the OCP, BFI and pharmacists adoption of advanced scopes of practice.

Beginning with Chapter 2’s examination of pharmacist behaviour in a pharmacy practice study, a statistically significant relationship was observed with the BFI trait extraversion. In particular, extraversion was positively associated with whether or not a pharmacist, who expressed interest in participating in the study, actually did participate, and whether or not a pharmacist obtained Additional Prescribing Authority. An inverse relationship was observed between extraversion and whether or not any of the patients, enrolled by the pharmacist, were lost to follow-up.

The examination of the integration of Additional Prescribing Authority into daily practice by Alberta pharmacists (Chapter 5) identified two statistically significant relationships with OCP factors. The first was between the OCP factor social responsibility and the number of prescription adaptations provided. Indeed,

pharmacists who perceived greater value in the factor social responsibility were more likely to provide prescription adaptations. The second statistically significant relationship was noted between the OCP factor competitiveness and the number of prescription adaptations provided. In this instance, the relationship was negative, suggesting that the greater value respondents perceived in competitiveness the less likely they were to provide prescription adaptations.

In Chapter 6 results from a survey of British Columbia pharmacists' uptake of several advanced practice opportunities, including providing prescription adaptations, immunizations and conducting medication reviews, revealed a number of significant relationships with factors of the OCP and traits of the BFI. Beginning with prescription adaptations, pharmacists who provided more than 15 per month scored significantly lower on the trait of neuroticism than those pharmacists who provided fewer than 5 prescription adaptations. Moreover, pharmacists who provided more than 15 prescription adaptations per month scored significantly higher on the trait of openness than all other groups. Thought of in another way pharmacists who provided more than 15 prescription adaptations per month may be less likely to exhibit behaviours in line with the trait neuroticism, while being more likely to exhibit behaviour in line with the trait openness.

With respect to the number of immunizations provided per month, those pharmacists who were either not certified, or did not provide immunizations, scored significantly lower on the OCP factors of innovation, social responsibility, competitiveness, and performance orientation. Pharmacists who provided

between 1 and 10 immunizations also scored significantly lower on the factor of competitiveness than did those pharmacists who provided more then eleven immunizations per month. However, those pharmacists who either were not certified or did not provide immunizations scored significantly higher on the factor of stability. Those pharmacists who provided more than eleven immunizations per month scored significantly higher on the OCP factor of performance orientation than pharmacists providing between 1 and 10 immunizations per month. Pharmacists providing more than eleven immunizations per month also scored significantly higher on the OCP factor reward orientation than those not certified or not providing immunizations.

In general those pharmacists not providing, or providing few, immunizations perceived less value in the OCP factors of innovation, social responsibility, competitiveness, and performance orientation than those pharmacists providing more immunizations. However, these pharmacists not providing immunizations perceived greater value in the OCP factor of stability. Pharmacists providing a greater number of immunizations perceived greater value in the OCP factors performance and reward orientation.

Significant differences were also noted in responses to the BFI and the number of immunizations provided. In particular, pharmacists who provided more than eleven immunizations per month scored significantly higher on extraversion and agreeableness. This group of pharmacists also scored significantly lower on the trait of neuroticism than other groups. Finally, those pharmacists who provided between 1 and 10 immunizations per month scored significantly lower

on the trait of openness. In general, pharmacists who provided a greater number of immunizations may be more likely to exhibit behaviour in line with the BFI traits of extraversion and agreeableness, and less likely to exhibit behaviour in line with the trait neuroticism.

Finally, moving on to the number of medication reviews conducted per month, those pharmacists who conducted more than 16 per month scored significantly higher on the OCP factor innovation and the BFI traits extraversion and openness. These pharmacists also score significantly lower on the BFI trait neuroticism. Pharmacists providing fewer than 5 medication reviews scored significantly lower on the OCP factor of performance orientation. In general, pharmacists conducting a greater number of medication reviews perceived greater value in the OCP factor innovation and may be more likely to exhibit behaviours in line with the BFI traits of extraversion and openness.

7.2.1 Tying pharmacy's professional culture and personality traits to action:
Taking the identified factors and traits from each of the three studies relating to objective 2, together with those identified through objective 1, it is tempting to conclude that that the pharmacy profession may be populated by some of the "wrong" sorts of pharmacists. That is, rather than needing pharmacists who perceive value in being supportive, and who are more likely to exhibit behaviour in line with the trait conscientious, perhaps the adoption of advanced scopes practice could be quickened if different cultural factors and personality traits dominated. In particular, perhaps more pharmacists who perceive value in being

innovative, socially responsible, competitive (but possibly not too competitive), performance and reward oriented and are more likely to exhibit behaviours in line with openness are needed. However, this faulty supposition begins from the position that there is, in fact, a direct and strong casual relationship between the particular factors and traits outlined above and the measures of adoption of advanced scopes of practice.

Evidence of this difficulty, and the caution required when interpreting these results, can be observed in the eta-square results from the ANOVA analyses specifically conducted on the results from the British Columbia pharmacists. In general they were small to medium in size. Furthermore, the magnitude of the linear relationships, in from the pharmacists participating in a practice research trial and those with Additional Prescribing Authority, were also smaller in size. That is, the actual behaviour of the pharmacists in the adoption of advanced pharmacy practices is not totally accounted for by either the OCP factors or BFI traits, meaning that further aspects of the context of pharmacy practice must be taken into consideration.

The results presented as part of objective 2 provide the opportunity to ask a number of new, and better-informed, questions. To begin, do these respondents differ in any other ways than providing varying amounts of clinical services to their patient populations? That is, do these pharmacist respondents also differ on the type of practice (i.e., community pharmacy vs. hospital pharmacy) they work in, or what kind of pharmacist they are (i.e., staff pharmacists vs. clinical/specialist pharmacist), or where they practice pharmacy

in Canada (i.e., Alberta or Ontario vs. Quebec)? Finally, do the respondents differ with respect to the length of time they have been in practice or their level of education?

7.3 Objective 3:

7.3.0 Summary of findings for objective 3:

The final objective of this work, to use the mean scores of respondent groups on the OCP and BFI and pharmacist demographic data to investigate possible sub-group differences, was achieved through each of the 5 studies, and specifically through the data collected from the national sample of hospital pharmacists and British Columbia pharmacists (Chapters 4 and 6 respectively). Beginning with a descriptive comparison of the OCP mean scores of respondents from Chapters 2 through 6, respondents from the national sample of hospital pharmacists scored higher on the factors of supportiveness, stability, and performance orientation. This sample also tied on the factor social responsibility, with the sample of respondents from the study examining the integration of Additional Prescribing Authority into practice. Pharmacist respondents with Additional Prescribing Authority scored highest on the factor of reward orientation. Pharmacists from the British Columbia sample scored highest on the factor of innovation.

Considering the responses to the BFI from each of the 5 studies, those from the national sample of hospital pharmacists scored highest on the trait neuroticism. Respondents with Additional Prescribing Authority scored highest on the traits of extraversion and conscientiousness. Respondents from the sub-

study examining pharmacist behaviour in a pharmacy practice research trial scored highest on the traits agreeableness and openness.

In Chapter 4, which examined a national sample of hospital pharmacists, a number of subgroup differences were also noted. Beginning with the highest level of education and responses to the OCP, pharmacists with a Master of Clinical Pharmacy degree scored significantly higher on the factor innovation than other groups. This group also scored significantly higher on the factor of competitiveness than those with either a Pharm D or hospital residency. Turning to the BFI, respondents with a Master of Clinical Pharmacy degree scored significantly lower on the traits of extraversion, agreeableness, conscientiousness, and openness than all other respondents. However, they did score significantly higher on the trait of neuroticism.

The respondents' region of practice also resulted in differing responses on both the OCP and BFI. Beginning with the OCP, respondents from Quebec scored significantly higher on innovation, social responsibility, and competitiveness than respondents from other regions. Western Canadian respondents scored significantly lower on supportiveness than other respondent groups. Quebec respondents also scored significantly lower on extraversion, conscientiousness, and openness than other respondents. However, Quebec respondents scored significantly higher on neuroticism.

The final demographic variable explored in Chapter 4 was pharmacist's number of years in practice by decade. Respondents who had been in practice for between 1 and 10 years scored significantly higher on the OCP factor of

competitiveness than those who had been in practice for more than 21 years. Respondents who had been in practice for more than 31 years scored significantly higher on the BFI trait conscientiousness than those in practice for less than 20 years.

In Chapter 6, outlining responses from British Columbia pharmacists, data were collected about respondents' current practice setting and primary role. Beginning with practice setting and the OCP factors of innovation, supportiveness, and social responsibility, respondents working in either independent or compounding pharmacies scored significantly higher than those from all other settings. On the factor of competitiveness, in-patient hospital pharmacy and ambulatory/long term care pharmacy respondents scored significantly lower than other groups. Chain pharmacy respondents scored significantly lower on the factor of stability than either independent pharmacy or in-patient hospital pharmacy respondents. On the factor performance orientation in-patient hospital pharmacy respondents scored significantly lower than independent and chain pharmacy respondents. Finally, independent pharmacy respondents scored significantly higher than other groups on the factor reward orientation.

Only one significant difference was noted in responses to the BFI and practice setting. In particular, those respondents who identified themselves as working in non-traditional pharmacy/pharmaceutical roles scored significantly higher on openness than respondents from chain pharmacies.

Turning to the primary role of the respondents, additional differences in responses to the OCP and BFI were also noted. Beginning with the OCP factors of innovation, and performance and reward orientation, pharmacy manager respondents scored significantly higher than staff and clinical/specialist pharmacist respondents. Pharmacy manager respondents also scored significantly higher on the traits of supportiveness and competitiveness, than staff and clinical/specialist pharmacist respondents respectively. Staff pharmacist respondents scored significantly lower on the factor stability than pharmacy manager and clinical/specialist pharmacist respondents. Staff pharmacist respondents also scored significantly lower on the BFI traits of extraversion and openness, than pharmacy manager respondents and clinical/specialist pharmacists. However, staff pharmacist respondents scored significantly higher on the trait of neuroticism, than the other groups.

7.3.1 Discovering possible sub-cultures within the wider profession:

Returning to the questions posed at the end of objective 2, the results from objective 3 suggest that, when treated as separate groups, respondents from each of the 5 studies indeed differ in their responses to the OCP and BFI. Furthermore, the specific findings from Chapters 4 and 6 also suggest that pharmacists differ from each other based on their practice setting, primary role, region of practice within Canada, number of years in practice and level of education.

It is important to note, similarly to the associations identified between adoption of advanced scopes of practice, that the magnitude of effect, as described by the eta-square value, of these demographic variables on OCP and BFI scores was generally medium to small (e.g., the significant association between practice setting and score on the OCP factor innovation, $F(1,5) = 8.87$, $p < 0.00$, $\eta^2 = 0.05$). However, the significant associations identified suggest that the integrative perspective's basic assumption, that all members of the pharmacy profession equally buy-into the culture, may not be completely accurate.

Assuming for the moment that the OCP factors are representative of the professional culture of pharmacy, taking a differentiated perspective to the data first allows for the consideration of possible sub-groups within the larger population of pharmacists (4). Second, while this work did not measure this directly, taking this perspective provides the possibility of beginning to uncover power struggles, "conflicts of interest between groups and differences of opinion" (13) within the profession. Power struggles between sub-cultures within the same profession have been noted in health professional groups such as nursing, where conflicts have between nursing managers, those with advanced degrees and bedside nurses and trainees have been identified (14, 15).

Using the differentiated perspective a number of additional questions, designed to gain further insights into the nature of these possible sub-group differences, will be posited. To begin, have independent pharmacy respondents come to perceive greater value in being innovative because they are forced to compete against larger chain pharmacy companies with greater access to

resources? Or did these respondents already value innovation and experienced the chain pharmacy setting as being too constrictive? Does the independent pharmacy setting provide greater opportunities for collaboration and teamwork (i.e., a manifestation of the perceived value in “supportiveness”)? Or, again, did these respondents already perceive value in this factor and seek out a venue in which it could be more fully realized?

Turning to another possible sub-group difference identified in Chapter 6 between those respondents who self-identified as being pharmacy managers and other groups, do pharmacy manager respondents score significantly higher innovation, an idea that is touted in much of the business literature (16, 17), because they developed it upon entering the management position? Or did they already possess it, allowing them to attain a managerial position? What might a valuing of innovation look like for staff pharmacists? Can a demonstration of valuing innovation be afforded staff pharmacists, who are also responsible for carrying out the day-to-day tasks of pharmacy management and dealing directly with the needs of patients? Looking at this differentiation from a patient-centred care perspective, what are the consequences to staff pharmacists of pharmacy managers whose innovative focus rests on a traditional business orientation?

These are just a few examples of further studies that can be developed from interpretations using the differentiated perspective. The identification of these possible sub-group differences could provide additional insight into the varying degrees to which advanced scopes of practice have been adopted. Furthermore, if these sub-group differences hold under additional study this

information will prove particularly useful in the design of unique and tailored knowledge translation interventions, which account for the unique individual practice settings (18).

7.4 Limitations:

As outlined in the introductory Chapter, there are a number of important limitations in this work. By way of reminder, these preliminarily identified limitations included the use of surveys to gain insight into the professional culture and personality of pharmacists, the measurement scale of the OCP and BFI, the integrative approach taken to part of the data analysis and its traditional association with a managerial perspective which may lead to individual-blame bias (19).

To the extent possible, the limitation of using survey instruments to gain insight into culture and personality was mitigated through the interpretations offered for the results. In particular, these findings were presented as being insights in need of further study, not demonstrations of inherent factors and traits of the pharmacy profession. A similar level of care was also taken when descriptive interpretations of the scores of the OCP and BFI, in relation to both the population means and the results of the inferential analyses, were provided.

Finally, great care has been taken to present the results of the 5 studies without laying blame for the current state of pharmacy practice change at the feet of individual pharmacists. The professional culture and personality traits of pharmacists, as outlined, are just one component of the overall practice

environment. As such, to the extent possible, consideration of other environmental factors of pharmacy practice must also be made when developing future change strategies.

There are also a number of additional limitations that could not be accounted for in advance. The first surrounds the response rates to both the national hospital and British Columbia pharmacists' studies, which were less than ideal meaning the generalizability of the identified cultural factors and personality traits must be questioned. Second, the OCP was not used in either the study of Alberta hospital pharmacists, or the study of the pharmacists' behaviour in a pharmacy practice research trial. Had data been collected from these samples, alternative OCP factors may have been identified.

The final limitation related to the use of the OCP as a measure of professional culture of pharmacy. Unlike the BFI, which has been well validated and has a significant database for the creation of population mean scores (20), the OCP was validated on a sample of Australian executives (2). As such, it is difficult to know whether or not an alternative sample of respondents, such as a group of health care professionals, would have yielded an alternative set of cultural factors and mean scores. However, since the primary aim of this study was to provide descriptive insight into the professional culture of pharmacy, and not to demonstrably characterize this culture, this limitation, while important to mention, does not invalidate the results discussed herein.

7.5 Implications for Pharmacy Practice:

While drawing firm conclusions from this work presently is not possible, there are a number of valuable points for pharmacy practice. Knowledge of the repeated characteristics from the OCP and BFI may be used to develop future pharmacy practice research studies designed to leverage them and measure changes in the adoption of advanced pharmacy practices. A possible example of such a study is provided below. The identification of sub-group differences observed by, for example, rates of adoption of advanced pharmacy practice, pharmacist type and practice location have important implications for the development of future pharmacy practice change programs. The presence of sub-group differences demands specific and tailored interventions, not wholesale national, provincial or local programs. Each and every pharmacy practice and pharmacist must be considered both within the larger context of the profession, and with the specific interpretive framework used by members.

7.6 Future Research:

There are a number of futures directions this work may take. To begin it will be important to determine whether or not the cultural factors and personality traits identified can be replicated in the study of other groups of pharmacists using more qualitative research methodologies. As mentioned in the limitations section, surveys force the language of researchers onto respondents, rather than allowing them to express their perceptions using their own words. A more qualitatively oriented study utilizing in depth interviews would allow pharmacists to first

discuss, in their own words, the professional culture. Second, the common cultural factors identified as part of objective 1 could be introduced to see what pharmacists' thought of them. This work would assist in determining if there are alternative cultural factors that fit more closely with the descriptions offered by pharmacists.

A second study that may be undertaken could involve the direct observation of pharmacist participants in an effort to better understand the manifestation of particular cultural factors and personality traits in every-day pharmacy practice. Such a study would follow closely to the approach to the study of culture as advocated by both Schein and Martin (4, 21). Objective 2 provided some insight into possible relationships between the OCP cultural factors and BFI personality traits and pharmacist behaviour. However, the advanced practice activities undertaken by respondents were self-reported and may not accurately reflect behaviour. As part of this project the observation periods could be broken down into two parts. The first observation period would involve observation and in depth interviews with pharmacists to determine whether or not the previously identified factors hold up against pharmacists' own descriptions. With a better-informed set of cultural factors, a second wave of observations could be undertaken to gain insight into how these factors may manifest themselves in the daily activities of pharmacists.

Finally, a third study involves the application of the findings from the previous 5 Chapters in the development of a knowledge translation intervention study. Using the Promoting Action on Research Implementation in Health

Services (PARiHS) framework (22), the results of this work, which represent an insight into the context component of the model, could be used to develop a facilitated intervention in the community pharmacy setting.

Beginning from the assumption that pharmacists perceive value in the OCP factor competitiveness, an intervention could involve the development of a computer system to assist pharmacists in providing more direct care to patients. More specifically, this program could be designed to automatically identify patients qualifying for a medication review and alert pharmacists 2-3 days in advance of the patient's next refill date to book an appointment. The system could also be designed to produce user friendly, and complete, electronic documentation. The specific information collected for each patient could also be entered into a larger table to track reductions in clinically significant indicators, levels of adherence, and prescription costs avoided, for instance.

Such a system would provide a consistent model for the identification of patients and the documentation of their care, accounting for the "emphasizing quality" component of the OCP factor competitiveness (2). It would also enable pharmacists to track the number of medication reviews conducted, and the clinical impact of their work. This would allow pharmacists to visualize their work and account for the "achievement orientation" item within the OCP factor competitiveness (2). Finally, in a larger chain pharmacy setting, results could be used to redirect resources in the company to particular pharmacies with patient populations in greater need of assistance. As such, pharmacies would no longer be treated as being equal and facing the same set of problems as all other

pharmacies within the organization. This systemic change would account for the last item within the OCP factor competitiveness, “being distinctive and different from other groups” (2).

A randomized trial, with the unit of randomization being the pharmacy, could then be designed. In this case the intervention would be the pharmacy’s access to the computer program. Outcome measures could then be the change in the number of medication reviews conducted over time, as well as, changes in clinically significant measures, between the intervention and usual practice pharmacies. This intervention would also help to offset the influence of “individual blame bias”, because it also takes a larger systemic approach to practice change (19). The success, or failure, of such a trial would provide insight into whether or not the factor of competitiveness, as defined by the OCP, plays a role in the delivery of patient care services in the settings of participating pharmacies.

7.7 Conclusion:

This work has identified a number of cultural factors, using the OCP, and personality traits, using the BFI, that appear consistent across the groups of respondents in each of the 5 studies discussed. Differing scores on OCP factors and BFI traits were also observed in an examination of the degree to which pharmacist respondents adopted particular advanced practice opportunities. Finally, potentially important sub-group differences within the larger professional culture of pharmacy were also identified. Taken together these findings represent an important first step in better understanding the context component of the

PARiHS framework. However, much more work is required before even a modest understanding of the professional culture of pharmacy could be claimed.

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7.9 Table 1. Study summary table

Body Chapter	Pharmacist Pop.	BFI Completed	OCP Completed	Additional outcomes
2	Alberta hospital pharmacists	√		Basic demographic information
3	Pharmacists participating in a pharmacy practice research trial	√		Basic demographic information, participating data, patient recruitment data
4	National hospital pharmacists	√	√	Basic demographic information, practice location, clinical time
5	Alberta pharmacists with Additional Prescribing Authority (APA)	√	√	Basic demographic information, integration of (APA) into practice
6	British Columbia Pharmacists	√	√	Basic demographic information, practice type, integration of advanced practice opportunities

7.10 Table 2. OCP factors and BFI traits repeated across 5 studies when compared to population means

		Chapter 2: Alberta Hospital Pharmacists	Chapter 3: Pharmacy practice research study	Chapter 4: National hospital pharmacists	Chapter 5: Pharmacists with additional prescribing authorization	Chapter 6: British Columbia pharmacists
OCP Factors	Innovation	NO DATA	NO DATA			
	Supportiveness			√	√	
	Social Responsibility					
	Competitiveness			√	√	√
	Stability			√	√	
	Performance Orientation					
	Reward Orientation					

Table 2. OCP factors and BFI traits repeated across 5 studies when compared to population means cont'd

BFI Traits	**Extraversion**	√	√		√	√
	Agreeableness	√	√		√	√
	Conscientiousness	√	√	√	√	√
	Neuroticism					
	Openness					

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APPENDIX 1. Organizational Culture Profile

Please rank the following items using the following statement.

1– Not at all	2 – Minimally	3 – Moderately	4 – Considerably	5 – Very Much

To what extent is your profession recognized for its…

1. ____ Adaptability
2. ____ Stability
3. ____ Being reflective
4. ____ Being innovative
5. ____ Being quick to take advantage of opportunities
6. ____ Taking individual responsibility
7. ____ Risk taking
8. ____ Opportunities for professional growth
9. ____ Autonomy
10. ____ Being rule oriented
11. ____ Being analytical
12. ____ Paying attention to detail
13. ____ Confronting conflict directly
14. ____ Being team oriented
15. ____ Sharing information freely
16. ____ Being people oriented
17. ____ Fairness
18. ____ Not being constrained by many rules
19. ____ Tolerance
20. ____ Informality
21. ____ Decisiveness
22. ____ Being competitive
23. ____ Being highly organized
24. ____ Achievement orientation
25. ____ Having a clear guiding philosophy
26. ____ Being results oriented
27. ____ Having high performance expectations
28. ____ Being aggressive
29. ____ High pay for good performance
30. ____ Security of employment
31. ____ Offers praise for good performance
32. ____ Being supportive
33. ____ Being calm
34. ____ Developing friends at work
35. ____ Being socially responsible
36. ____ Enthusiasm for the job
37. ____ Working long hours
38. ____ Having a good reputation
39. ____ An emphasis on quality
40. ____ Being distinctive / different from others

Appendix 2. Big Five Inventory

How I am in general

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others*? Please write a number next to each statement to indicate the extent to which **you agree or disagree with that statement.**

1 Disagree Strongly	2 Disagree a little	3 Neither agree nor disagree	4 Agree a little	5 Agree strongly

I am someone who…

1. _____ Is talkative
2. _____ Tends to find fault with others
3. _____ Does a thorough job
4. _____ Is depressed, blue
5. _____ Is original, comes up with new ideas
6. _____ Is reserved
7. _____ Is helpful and unselfish with others
8. _____ Can be somewhat careless
9. _____ Is relaxed, handles stress well.
10. _____ Is curious about many different things
11. _____ Is full of energy
12. _____ Starts quarrels with others
13. _____ Is a reliable worker
14. _____ Can be tense
15. _____ Is ingenious, a deep thinker
16. _____ Generates a lot of enthusiasm
17. _____ Has a forgiving nature
18. _____ Tends to be disorganized
19. _____ Worries a lot
20. _____ Has an active imagination
21. _____ Tends to be quiet
22. _____ Is generally trusting
23. _____ Tends to be lazy
24. _____ Is emotionally stable, not easily upset
25. _____ Is inventive
26. _____ Has an assertive personality
27. _____ Can be cold and aloof
28. _____ Perseveres until the task is finished
29. _____ Can be moody
30. _____ Values artistic, aesthetic experiences
31. _____ Is sometimes shy, inhibited
32. _____ Is considerate and kind to almost everyone
33. _____ Does things efficiently
34. _____ Remains calm in tense situations

35. _____ Prefers work that is routine

36. _____ Is outgoing, sociable

37. _____ Is sometimes rude to others

38. _____ Makes plans and follows through with them

39. _____ Gets nervous easily

40. _____ Likes to reflect, play with ideas

41. _____ Has few artistic interests

42. _____ Likes to cooperate with others

43. _____ Is easily distracted

44. _____ Is sophisticated in art, music, or literature

Appendix 3.

A Randomized Trial of a Community Based Approach to Dyslipidemia Management: Pharmacist Prescribing to Achieve Cholesterol Targets (RxACT Study)

Ross T. Tsuyuki, PharmD; Meagen Rosenthal, MA; Glen J. Pearson, PharmD

Submitted to JAMA May 2014

Abstract:

Importance: Dyslipidemia is an important modifiable risk factor for cardiovascular disease. Despite strong evidence and clear practice guidelines, it remains sub-optimally treated. Pharmacists are frontline primary care professionals, and, with expanded scopes of practice, could identify and treat patients with dyslipidemia.

Objectives: To evaluate the effect of enhanced pharmacist care on the proportion of participants achieving target LDL-c levels as defined by the 2009 Canadian Cardiovascular Society dyslipidemia guidelines.

Design: This was a randomized controlled trial, with 6-month follow-up, of enhanced pharmacist care taking place between December 2011 and June 2013, with the unit of randomization being the participant. Due to the nature of the intervention, blinding was not possible in this study.

Setting: Fourteen community pharmacies from across Alberta, Canada, participated in patient recruitment and follow-up.

Participants: The participant population was comprised of adults with uncontrolled dyslipidemia as defined by the 2009 Canadian Dyslipidemia Guidelines. Nearly 200 patients were approached to participate in this study, however, 99 of these patients were consented for participation in the study.

Intervention: The intervention was pharmacist-directed dyslipidemia care based on the 2009 CCS dyslipidemia guidelines. Pharmacists assessed each participant's overall cardiovascular risk, including reviewing LDL-c control, developed treatment goals and determined health behaviour interventions for the participant to undertake to help them manage their overall CV risk.

Main outcomes and measures: The primary outcome of this study was the proportion of participants achieving their target LDL-c (<2.0 mmol/L or ≥50% reduction in LDL-c) at 6 months in the intervention versus usual care groups.

Results: We enrolled 99 patients with a mean (SD) age of 63 years (13), 49% male and mean baseline LDL-c 3.37 (0.98) mmol/L. The unadjusted proportion of patients achieving LDL-c target was 43% of intervention group, vs. 18% of controls ($X^2(1) = 7.24$, $p < 0.001$). The odds of patients achieving target were 3.42 times higher if they were in the pharmacist intervention group and the intervention group subjects achieved a greater reduction in LDL-c (1.12 mmol/L, SD 1.09) vs. control (0.42 mmol/L, SD 0.66), $p<0.01$.

Conclusions and relevance: Pharmacist prescribing and follow-up in patients with dyslipidemia resulted in > 2-fold more patients achieving recommended target LDL-c levels. This could have major implications for prevention of cardiovascular disease in Canada.

Trial Registration: clinicaltrials.gov Identifier: NCT01581372

INTRODUCTION:

Heart disease in the number one cause of death for men and women in the United States (1) and cardiovascular disease (CVD) is the cause of one-third of all deaths in Canada (2). One important risk factor for CVD is dyslipidemia. The National Health and Nutrition Examination Survey from 2003-2006, found that roughly 32% of Americans aged 50-64 had unhealthy levels of LDL cholesterol (LDL-c) (3). The Canadian Health Measures survey, conducted from 2007-2009, found that roughly 36% of all Canadians had unhealthy levels of LDL cholesterol (LDL-c), and this prevalence increased with age, peaking at 43% in those aged 40-59 (4). Despite strong evidence and clear practice guidelines for the management of this risk factor, it remains sub-optimally treated (5-10). Some of this represents undertreatment due to patients not presenting to or failing to be screened by primary care physicians, or a reluctance to initiate or titrate lipid-lowering therapies (6), or due to poor adherence or reluctance to initiate medications by patients (8, 11).

Pharmacists are front-line primary care professionals who see patients at risk for CVD, and patients with dyslipidemia, more frequently than family physicians (12). A number of recent systematic reviews have demonstrated the effectiveness of a variety of pharmacists' interventions, including in the management of patients with dyslipidemia (13, 14). Furthermore, in 2007 pharmacists in the province of Alberta were granted the ability to apply for additional prescribing authority, allowing them to independently prescribe medications (15). To qualify to apply for this authority pharmacists must have

been in practice for at least one year and demonstrate a high level of clinical care and management through the submission of a detailed application and three patient cases (16). Alberta pharmacists have also recently been extended the privilege of ordering and interpreting laboratory tests for patients (17). All pharmacists in Alberta qualify to provide this service, as well as access to a comprehensive provincial electronic health records system, but they must apply for a practitioner identification number to write an order for a lab test.

As such, pharmacists could be well-positioned to systematically and proactively identify patients with unrecognized or undertreated dyslipidemia, as a public health approach to chronic disease management. To our knowledge there have not been any studies examining the outcome associated with pharmacists' use of independent prescribing authority to manage patients with dyslipidemia.

OBJECTIVES:

Primary Objective: To evaluate the effect of enhanced pharmacist care (i.e., participant identification, assessment, care plan development, education/counseling, prescribing/titration of lipid-lowering medications and close follow-up) on the proportion of participants achieving target LDL-c levels as defined by the 2009 Canadian Cardiovascular Society (CCS) dyslipidemia guidelines (2).

Secondary Objectives: To determine the effects of enhanced pharmacist care of dyslipidemia on the difference in change in LDL-c between enhanced and usual care

groups at 6 months. To determine the effects of enhanced pharmacist care of dyslipidemia on the difference in change in Apo-B between baseline and 6 months[c] in intervention patients.

METHODS:

Design: This was a randomized controlled trial of enhanced pharmacist care, with the unit of randomization being the participant. Due to the nature of the intervention, blinding was not possible in this study.

Ethical considerations: The Health Research Ethics Board at the University of Alberta approved the study protocol and procedures and all patients provided written informed consent to participate.

Sample size: Based upon a review of recent literature (18-20), we hypothesized that 70% of intervention participants would reach target LDL-c levels (<2.0 mmol/L for high and moderate risk patients and a 50% reduction in LDL-c, from baseline, for low risk patients) at 6 months. We estimated sample size of 82 would provide 80% power to detect a difference of 30% between the groups (based upon a 2 sided alpha of 0.05). As

[c] According to the 2009 Canadian Dyslipidemia Guidelines apoB can be substituted for LDL-c as an alternate primary target. Based on available evidence it appears that apoB may be a better marker of vascular disease and a better index of adequacy of LDL-c lowering therapy, especially for those patients with hypertriglyceridemia (i.e., with TG > 4.5 mmol/Ld) (1). This measure will be obtained for all participating patients.

a pragmatic, practice-based trial, the sample size was increased to 100 (~20%) to account for possible losses to follow-up.

Setting: Fourteen community pharmacies from across Alberta, Canada, participated in patient recruitment and follow-up. Each of the fourteen sites had at least one pharmacist with additional prescribing authorization.

Patient population: The participant population was comprised of adults with uncontrolled dyslipidemia as defined by the 2009 Canadian Dyslipidemia Guidelines (2). Participants were not required to be treatment naïve, but must have been willing to take statin therapy if prescribed by the pharmacist.

Participant identification/screening and enrollment: Pharmacists were encouraged to apply the principles of "case finding" as part of the recruitment procedures for this study (21). Case finding is the process by which healthcare professionals use patient characteristics such as demographics, risk factors and symptoms to direct their decision-making around whether or not that patient should undergo further testing for a particular condition (21). All risk factors and symptoms used in the identification of possibly eligible patients for this study were gathered from the guidelines developed for the treatment of dyslipidemia (2, 22). Unlike screening, which applies a particular test to an entire population, case finding judiciously applies tests to patients most likely in need

of an intervention based on knowledge of that patient's background and risk factors (21).

As part of this study, pharmacists were asked to develop a case finding strategy beginning with risk factors associated with dyslipidemia and thereafter use knowledge of the patients frequenting their pharmacy to identify possibly eligible patients for the study. Only patients who expressed interest in learning more about whether or not their LDL-c was in the recommended range were sent for the appropriate laboratory testing.

Eligibility criteria: All eligibility criteria were based on the 2009 CCS dyslipidemia guidelines (2). To be included in the study, all participants had to be >18 years of age and have sub-optimally controlled dyslipidemia defined by their CVD risk, as follows: 1) high risk patients, including those with known coronary artery disease (CAD), cerebrovascular disease (stroke/TIA), peripheral arterial disease, diabetes, or a calculated Framingham Risk Score (FRS) of ≥20%) and LDL-c ≥2.0 mmol/L; 2) moderate risk patients included patients with a calculated FRS of 10-19% and LDL-c >3.5 mmol/L if not treated, or LDL-c ≥2.0 mmol/L if treated; or 3) moderate risk (FRS 10-19%) in treatment naive males >50 years or females >60 years with an LDL-c of ≤3.5 mmol/L and hs-CRP $\underline{\geq}$ 2.0 mg/L (measured twice 1-2 weeks apart) ; or 4) low risk (FRS <10% and LDL-c ≥5.0 mmol/L(2, 23). Study exclusion criteria included that patients were unwilling/unable to use statins, were pregnant or nursing, or had renal impairment (defined as a creatinine clearance ≤30 mL/min using the Modification of Diet in Renal

Disease [MDRD] study equation) or significant hepatic dysfunction (ALT level > 120U/L).

Randomization: Once eligibility had been determined and the participant provided written informed consent, the participant was randomized by pharmacists in a 1:1 ratio via a centralized secure website, managed by the Epidemiology Coordinating and Research Centre (http://www.epicore.ualberta.ca), to ensure allocation concealment to either pharmacist enhanced care or usual care (Figure 1). Randomization was stratified by study centre (pharmacy) and a variable block size was used.

Intervention: The intervention (pharmacist enhanced care) was pharmacist-directed dyslipidemia care based on the 2009 CCS dyslipidemia guidelines (2). Pharmacists assessed each participant's overall cardiovascular risk, including reviewing LDL-c control, developed treatment goals and determined health behaviour interventions (e.g., smoking cessation, diet and exercise) for the participant to undertake to help them manage their overall CV risk. Pharmacists worked with the participant to determine the best treatment option and approach, along with a plan for the implementation of these strategies. In brief, the treatment algorithm can be found in Figure 2.

Whenever drug therapy was initiated or a dosage adjusted, the prescribing pharmacist ordered all appropriate laboratory tests (e.g., fasting lipid panel, Apolipoprotein-B (Apo-B), creatine kinase (CK), alanine aminotransferase (ALT), creatinine, fasting blood sugars, HbA1c – for diabetic patients) and monitored the

participant to ensure the treatment's efficacy and safety. Additionally, at each visit, participants were assessed for drug tolerability, including symptoms of myalgia and gastrointestinal tolerance. If any adverse event was noted, pharmacists intervened as necessary to ensure participant safety. Pharmacists worked closely with participants to determine the optimal drug therapy choices for each individual participant, taking into account drug interactions, medical conditions, and degree of LDL-c lowering required.

Participants in the intervention group received a copy of their laboratory results, their calculated FRS, and a participant information package on high cholesterol (24). Physicians of participants randomized into the intervention group in the study were made aware of participant's involvement in the study. The physician was also informed of all changes made to the participant's drug therapy regimen, as per the Alberta College of Pharmacists requirements (25).

Participants were followed up in person, or over the telephone, at 6, 12, 18, and 24 weeks post-randomization. Participants were given a laboratory requisition to have follow-up fasting lipid panel, along with treatment monitoring lab tests (e.g., ALT, CK), performed as needed and prior to each follow-up visit, to monitor treatment safety and efficacy. Interim telephone follow-up may have been performed at the discretion of the pharmacist investigator. Other cardiovascular risk reduction interventions, including discussion of smoking cessation, may be performed at the discretion of the pharmacist.

Usual Care: Participants randomized to usual care received a copy of their lab results, a pamphlet on cardiovascular disease (26) and usual care from their pharmacist and

physician. Usual care participants were seen at 12 and 24 weeks post-randomization. The rationale for including the 12-week visit was to minimize loss to follow-up. Participants in this group were also given a laboratory requisition to have follow-up fasting lipid profiles, Apo-B, CK and ALT measures performed prior to each visit. Physicians of a participant who has been randomized to the usual care group were not actively informed of their participation in the study, but participants were encourage to discuss their LDL-c levels with their physicians.

Outcomes: The primary outcome of this study is the proportion of participants achieving their target LDL-c (<2.0 mmol/L or ≥50% reduction in LDL-c) at 6 months in the intervention versus usual care groups. The secondary outcomes include the difference in change in change in LDL-c between the intervention and usual care groups at 6 months and the difference in change in Apo-B between baseline and 6 months in intervention patients.

Statistical analyses: All analyses were based on intention to treat and each patient's data was analyzed by originally assigned grouping. A comparison of baseline characteristics was performed using t-tests or nonparametric Wilcoxon test for continuous variables and chi-squared test for categorical variables. The primary outcome, proportion of participants to reach target LDL-c levels, was analyzed by the chi-squared test and binary logistic regression to adjust for any baseline differences

between variables ($p<0.1$). The secondary outcomes were analyzed using ANCOVA, adjusting for differences in baseline variables ($p<0.1$).

RESULTS:

Between December 2011 and July 2013, 200 possibly eligible patients were identified, of which 99 patients were eligible for participation in the study and randomized (49 patients were randomized to enhanced pharmacist care and 50 patients were randomized to usual care). Of those 101 patients who were not eligible for participation the majority of patients did not have elevated levels of LDL-c as defined by the 2009 CCS dyslipidemia guidelines (2), other patients did not complete baseline testing of their LDL-c levels, were not interested in participating in the study or could not tolerate taking a statin if one were prescribed. A total of 12 patients withdrew from the study early. As outlined in the methods section in the final analysis the last-observation carried forward method was applied.

Enhanced and usual care groups were similar at baseline, as described in Table 1, with the exception of the frequency of a diagnosis of heart failure between the groups. More specifically, a greater number of patients in the enhanced care group self-reported a diagnosis of heart failure than those in the usual care group (8% enhanced care vs. 0% usual care). The average age of participants was 63 years (SD 12.6), and there was an equal distribution of men and women enrolled. Most of the participants had a high level of risk according to the Framingham Risk Score calculation and were

secondary treatment patients. The majority of patients (63%) were not taking a statin therapy at baseline.

'Insert Table 1'

Primary outcome: The proportion of patients (n = 97) achieving the 2009 CCS dyslipidemia guidelines target for LDL-c levels at 6 months was 43% for patients assigned to the enhanced pharmacist care group and 18% for patients assigned to the usual care group for an absolute difference of 25% ($p<0.01$) (Figure 3). The adjusted relationship between treatment assignment and whether or not the patient's LDL-c reached target, controlling for the confounding effects of baseline self-report of a heart failure diagnosis, is outlined in Table 2. The adjusted odds ratio suggests that the odds of a patient achieving target LDL-c levels when assigned to the enhanced care group were 3.17 times greater compared to the usual care group.

'Insert Figure 3'

'Insert Table 2'

Secondary outcome: A reduction in LDL-c levels was observed for both the enhanced and usual care groups within this study. However, a reduction in LDL-c levels for the enhanced care group (n = 48) of 1.12 mmol/L (SD 1.09) was significantly greater than

the reduction of 0.42 mmol/L (SD 0.66) experienced by the usual care group (n = 46) ($p < 0.0001$) (Figure 4). ANOCVA analysis revealed that the covariate baseline LDL-c, was significantly related to change in LDL-c, $F(1,90) = 38.28$, $p < 0.0001$, $r = 0.55$. There was also a significant effect of treatment assignment on levels of change in LDL-c after controlling for the effect of baseline LDL-c, $F(1,90) = 11.92$, $p < 0.001$, $\eta^2 = 0.12$. Planned contrasts revealed that assignment to the intervention group significantly increased reduction in LDL-c compared to the usual care group, $t(90) = -3.45$, $p < 0.001$, $r = 0.33$. There was no significant difference in the change in Apo-B between the groups from baseline to 6 months. However, this data was not consistently collected as part of regular laboratory testing during the study, as it is only considered an alternate lipid target in the CCS guidelines. At 6 months, 74%% of patients in the enhanced pharmacist care group were taking a statin therapy.

'Insert Figure 4'

DISCUSSION:

To our knowledge, this is the first randomized trial of independent pharmacist prescribing in the care of patients with dyslipidemia. We found that pharmacist enhanced care, which included dyslipidemia assessment, patient education, lifestyle recommendations, and pharmacist prescribing of lipid-lowering therapies, as needed, resulted in an absolute 25% more patients achieving guideline targets for LDL-c levels ($p<0.01$). Patients in the enhanced pharmacist care group also experienced a higher

degree of LDL-c reduction than those patients in the usual care group (1.12 mmol/L (SD 1.09) versus 0.42 mmol/L (SD 0.66) ($p<0.0001$)).

In a recently published systematic review of 21 randomized trials examining enhanced pharmacist care for patients with dyslipidemia, authors found that intervention patients had a 0.28 mmol/L greater decrease in their LDL-c levels when compared to the usual care patients (14). This review also found that patients in the enhanced pharmacist care groups were 2.46 (95% CI 1.43-4.25) times more likely to achieve recommended guideline targets for LDL-c levels (14). While a review of what constituted enhanced pharmacist care in each of the 21 trials revealed that some pharmacists were allowed to actively alter patient medication therapies by protocol, the majority of interventions centreed around making medication therapy suggestions to primary care physicians, educating patients regarding their medication therapies and working to improve medication adherence (14). One possible explanation for the difference between these findings and those of our study is the introduction of independent pharmacist prescribing. As hypothesized by the SCRIP-*HTN* study, there may be a ceiling effect for the efficacy of pharmacist interventions when pharmacists only offer suggestions for changes to patients' medication therapy, as they depend upon the individual patient's physician accepting and implementing the recommendation (27). The pharmacists in the present study were able to use their clinical judgment and actively make adjustments to patients' medication therapy as needed, by assuming responsibility for prescribing.

Comparing the results obtained from this study to those of the Cholesterol Treatment Trialists Collaborations' meta-analysis of data from 90,056 participants randomized to 14 trials of statins a number of important clinical implications can be identified (28). In particular, the proportional reduction of 1.0 mmol/L LDL-c in the enhanced pharmacist care group were significant for coronary death or non-fatal myocardial infarction (24%, 95% CI 21–27;p<0·0001), coronary revascularisation (24%, 95% CI 20–27; p<0·0001), and ischaemic stroke (20%, 95% CI 14–26; p<0·0001) (28). Furthermore, a sustained 0.70 mmol/L LDL-c difference between the enhanced and usual care groups would translate into a 16.8% further reduction in coronary death or non-fatal MI, 16.8% further reduction in coronary revascularization, and a 14% reduction in ischemic stroke. As such, if patients participating in this study are able to maintain the LDL-c reduction observed, a significant number of serious health complications can be avoided, saving both patients' quality of life and hospital related expenses.

There are a number of limitations in this study that warrant comment. To begin, due to the nature of this study, it was not possible to blind patients or pharmacists to the treatment group to which they were allocated (although our outcome measure was objective). Second, it was not possible to accurately measure change in Apo-B, one of our secondary outcomes, as laboratory results were not consistently collected. This value was not historically collected as part of a typical lipid panel, and as such had to be added to the laboratory requisition form, meaning not only that the pharmacist had to remember to add it, but that the lab would also need to recognize the need to run that sample. Third as only about 15% of Alberta pharmacists currently have additional

prescribing authority, so it is possible that the group of pharmacists participating in this study is not representative of the wider population of practicing pharmacists. Moreover, the level of care provided by this group of pharmacists to usual care patients cannot be assumed to be equal to normal usual care in other pharmacy settings. In fact this usual care arm may be superior to “true” usual care in the community and may have minimized the true benefit of the enhanced pharmacist care.

The results of this study demonstrate that independent pharmacist prescribing yields a clinically significant increase in the proportion of patients achieving guideline treatment targets in the management of dyslipidemia and a clinically significant reduction in LDL-c levels after 6 months. This study, which was the first to examine the efficacy of independent prescribing by pharmacists in patients with dyslipidemia, lends further support to the value of pharmacist directed medication therapy management.

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Table 1. Study population

Characteristic		Usual care group (n = 51) Mean (SD)/Prevalence (n)	Intervention group (n = 49) Mean (SD)/ Prevalence (n)
Mean age		63 (11.91)	63 (13.34)
Gender	Male	52% (26)	47% (23)
Mean baseline LDL-c (mmol/L)		3.21 (0.81)	3.52 (1.12)
Mean systolic blood pressure (mm Hg)		133 (18.39)	129 (14.14)
Mean diastolic blood pressure (mm Hg)		79 (10.47)	77 (10.05)
Mean BMI		31.35 (5.55)	31.80 (10.49)
Baseline Framingham risk score	High risk	63% (31)	67% (34)
	Moderate risk	29% (14)	26% (13)
	Low risk	4% (2)	2% (1)

Table 1. Study population cont'd

Secondary treatment patients	88% (43)	86% (42)
Baseline statin prescription	42% (21)	31% (15)
Cerebrovascular disease/stroke/TIA	12% (6)	8% (4)
Coronary heart disease/Acute MI	10% (5)	16% (8)
Diabetes	43% (21)	57% (28)
Heart failure	0%*	8%* (4)
Lower extremity PAD	6% (3)	2% (1)

* Denotes significant differences noted between the usual care and intervention groups

Table 2. Adjusted model of patients achieving guideline targets in enhanced vs. usual care groups

		95% CI for Odds Ratio		
	B (SE)	Lower	Odds Ratio	Upper
Included				
Constant	-1.47 (0.37)			
Intervention	1.15*(0.47)	1.24	3.17	8.07

*Note: R^2 = 0.07 (Cox & Snell), 0.10 (Nagelkereke). * p < 0.05*

Figure 1: Study flow diagram

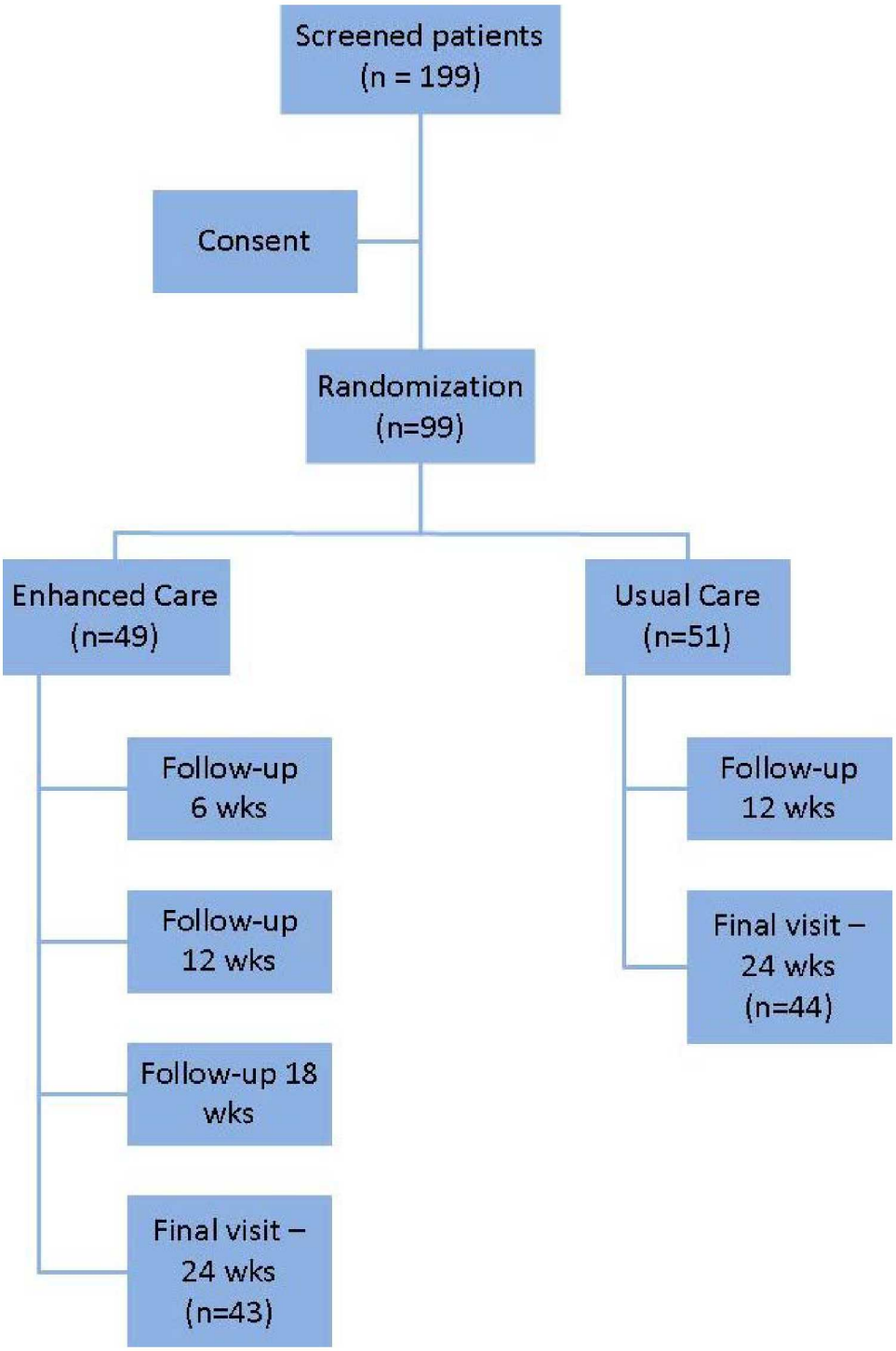

Figure 2: Treatment Algorithm

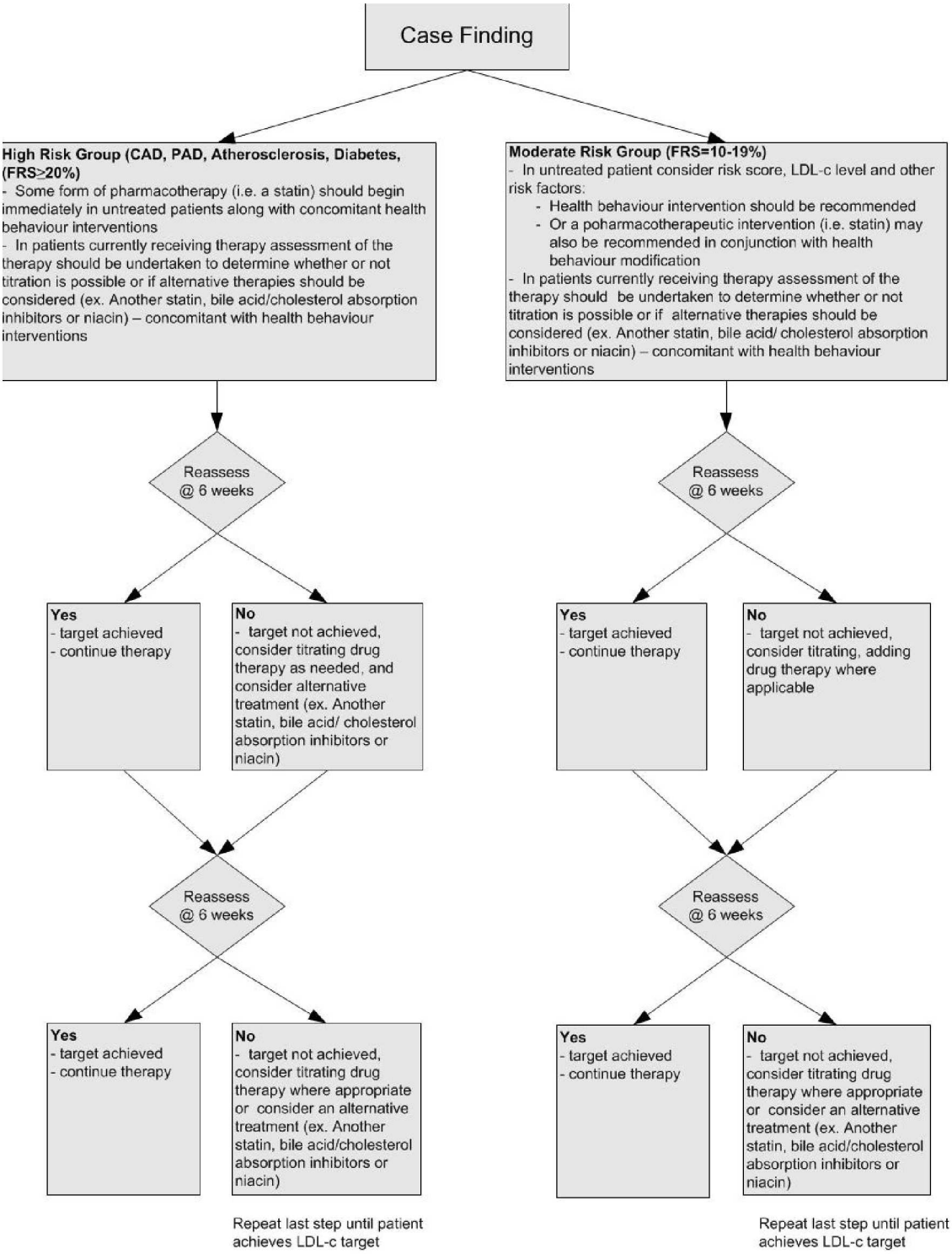

Figure 3. Proportion of patients achieving target LDL-c levels after 6 months, p<0.01

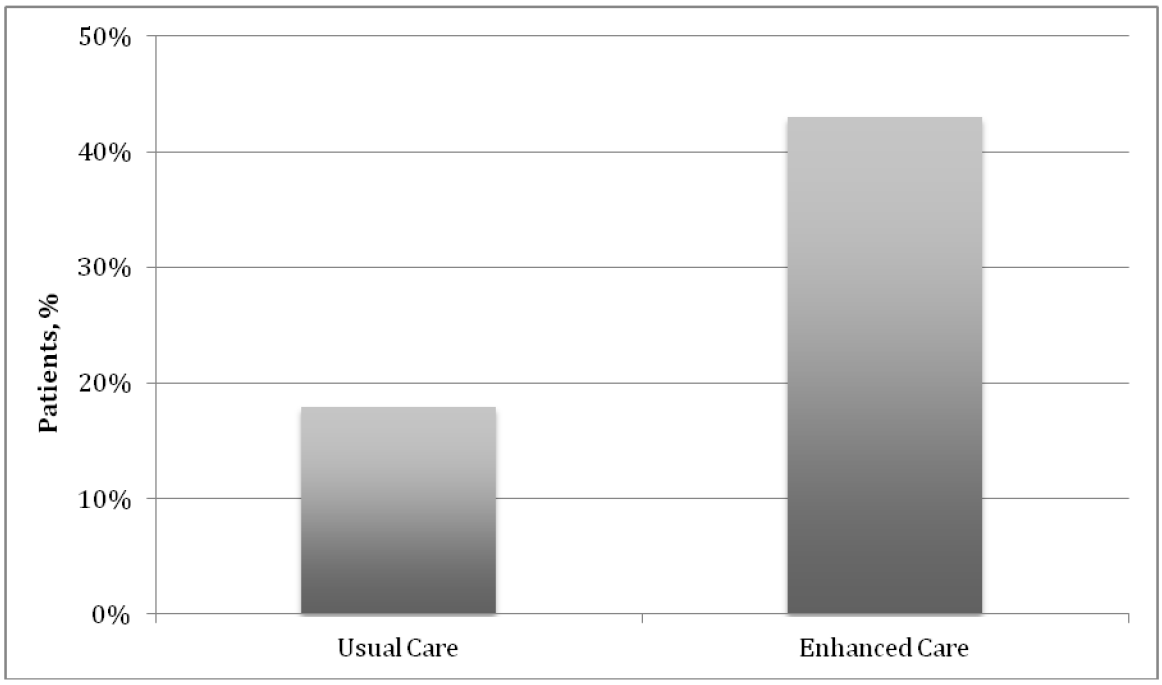

Figure 4. Adjusted mean change in LDL-c level over 6 months, p<0.0001