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Motivation to Learn During Simulation-Based Learning: An Examination of Learner Characteristics in Health Science Students

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Abstract

The purpose of this study was to examine specific learner characteristics (age, gender, and prior completion of baccalaureate degree) as confounders in the self-reporting of perceived self-efficacy, task value, and affective factors in students' motivation to learn in simulation-based learning (SBL). The theoretical foundation used in this research connects the definition of competency (CAMRT, 2014) with Bandura's (1986) concept of self-efficacy and a model for motivation to learn (Pintrich, Smith, García, & McKeachie, 1991). This study was investigated across nursing and allied health programs in a Western Canadian institute of technology. A survey was distributed to full-time students registered in health science programs which are known to use SBL, including nursing and nine allied health programs. Statistical analysis, including independent samples *t*-test and one-way ANOVA, was conducted across the variables of age, gender, and whether or not the participant had completed a prior baccalaureate degree with the self-reported responses to the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich et al., 1991). While no statistically significant differences were found between variables, it is recommended that further study of factors influencing motivational beliefs during SBL continue across different allied health programs such that educators develop an understanding of the challenges that may exist within their own disciplines.

Keywords: simulation, allied health, simulation-based learning, self-efficacy, motivation to learn, motivated strategies, MSLQ.

Dedication

I dedicate this dissertation to my beautiful daughter, whose insight and patience is beyond her years. I could not have been successful if it was not for her support and encouragement.

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Chapter 1: Introduction

Introduction to the Problem

The format for teaching students in almost all nursing and allied health education programs is dependent on clinically based learning (Cardoza & Hood, 2012; Sabus & Macauley, 2016). The implicit expectation is that students learn through real-time teaching in the clinical environment; a task that is delegated to the practioners whose first priority is patient care and safety. The teaching of clinical skills whilst caring for patients is inherently fraught with stress, inconsistencies in teaching and in applications of best practices (Tosterud, Hedelin, & Hall-Lord, 2013). As a result, the student-practitioner relationship can strain clinical resources and cause gaps in knowledge development (Wolfgram & Quinn, 2012). Students require opportunities to connect classroom theory with clinical practice in a safe environment free of issues related to limited clinical placements and inconsistencies in clinical experience. To meet that need, faculty in health science programs develop simulated clinical scenarios that reflect classroom theory and allow for hands-on application while developing critical thinking skills (CASN, 2015; Stroup, 2014). These simulated clinical environments have been met with wide acceptance in medical and health education field (Azzam, Wasi, & Patel, 2016; Hayden, Keegan, Kardong-Edgren, & Smiley, 2014; Yuan, Williams, & Man, 2014).

The use of simulation to teach patient care skills has a long history including the development of the first “Resusci-Anne” mannequin for resuscitation training in the mid-20th century (Chee, 2014). Since then, new and more sophisticated technologies have allowed the increasingly expanding role of simulation in education. High fidelity technology, hospital-like environments, and computerized human patient simulators add a sense of realism to the simulated activity and provide context to the learning activities (Cardoza & Hood, 2012; Hamstra, Brydges, Hatala, Zendejas & Cook, 2014).

Simulation-based learning (SBL) has the advantage of exposing students to realistic clinical scenarios which provide comparable learning experiences across regions, classrooms, and individual students, thereby enabling all learners to meet the course objectives (Lubbers & Rossman, 2017; Reid-Searl, Bowman, McAllister, Cowling, & Spuur, 2014; Skrable & Fitzsimons, 2014). The simulated learning environment helps both students and practitioners prioritize and respond to the often-competing needs of the patient inherent in the clinical environment (Burke & Mancuso, 2012; Reid-Searl et al., 2014).

Furthermore, simulation can also aid in the development of metacognition, support self-regulation, and promote self-efficacy for students when delivered in a student-centered framework (Adamson, 2015; Bambini, Washburn, & Perkins, 2009; Burke & Mancuso, 2012). Curriculums designed to allow students to make small incremental achievements in attaining skills promote and support self-efficacy in a simulated learning environment (Franklin & Lee, 2014; Sitzmann & Yeo, 2013). Through SBL, students develop clinical confidence, increased knowledge and understanding, increased skill performance, and increased satisfaction in the learning process through simulated activities (Adamson, 2015; Astin, 1991; White, 2014).

The advantages for the educator are documented as well (Adamson, 2015; Skrable & Fitzsimons, 2014; Stroup, 2014); faculty are immediately available to identify and correct student misconceptions and support the development of decision-making skills through debriefing sessions (Cheng et al., 2014). Indeed, Stroup (2014) summarized faculty reflections on simulation and concluded that simulation is “effective in pointing out deficits in learning and facilitating the transfer of theoretical knowledge to clinical settings” (p. e161).

Background

The application of knowledge and skill is inarguably important in the successful and safe delivery of health care education, but students also need to develop the necessary motivation to learn and persistence to manage future problem-solving scenarios in real practice (Dolan, Perz, McComb, & Kirkpatrick, 2013; Sedden & Clark, 2016). The successful transfer of learning in a simulated environment to the clinical setting is in part related to an individual's belief in his or her ability, or in other words, one's perception of self-efficacy (Oetker-Black, Kreye, Davis, Underwood, & Naug, 2016). Self-efficacy is a multidimensional construct that places the individual as the agent in determining his or her own success in learning (Bandura, 1977, 1986). Positive self-efficacy and task value beliefs related to learning support self-regulated behavior while promoting metacognitive awareness between self and task (Bodkyn & Stevens, 2015). Furthermore, soft skills such as therapeutic communication, active listening, and awareness of empathy can be developed through deliberate simulated activities (Reid-Searl et al., 2014).

Several studies have shown that simulation supports psychomotor skill development and knowledge acquisition in nursing students (Abe, Kawahara, Yamashina, & Tsuboi, 2013; Adamson, 2015; Skrable & Fitzsimons, 2014). An increasing body of evidence justifies replacing clinical experience with simulation due to its effectiveness in developing clinical competency in students (Azzam et al., 2016; Cant & Cooper, 2017; Larue, Pepin, & Allard, 2015). Research on changing educational practices related to simulation and the learner experience can be found in studies conducted in medical and nursing programs; however, research into SBL and its efficacy is lacking in allied health programs which demonstrate a general paucity of any research related to changing educational practices despite these training programs relying on simulation to prepare students for clinical practice (Emes, 2015; Reid-Searl et al., 2014).

Statement of the Problem

Simulation as a pedagogical method for teaching clinical skills is well understood in the education of pre-licensure nurses and doctors. Best practices in SBL are evident in both nursing and medical programs (CASN, 2015; Jeffries & Rogers, 2007; Paskins & Peile, 2010). Simulation-based curriculum exists beyond these two health professions; however, little empirical evidence can be found outside of them to understand the learner experience in allied health programs. If educators understand the factors that influence learning in a simulated environment they can assist in supporting effective learning (Paskins & Peile, 2010; Reid-Searl et al., 2014). In short, understanding the effect of these factors that may influence motivation to learn in a simulated environment can assist educators to support student learning.

To this end, researchers suggest that more studies are needed to examine the nature of self-efficacy and other motivational and cognitive variables within the self-regulated learner framework including learner characteristics (Honicke & Broadbent, 2016). Learner characteristics such as age, gender, and prior post-secondary education may be factors that influence both self-efficacy and motivation to learn (Balam & Platt, 2014; D’Lima, Winsler, & Kitsantas, 2014; Hamid & Singaram, 2016). This study was conducted to investigate specific learner characteristics and motivational beliefs in the context of SBL in allied health programs.

Purpose of the Study

Bandura’s theory of self-efficacy is the belief held by an individual (or not) that he or she has capabilities to exercise control over events and outcomes that affect his or her life and that personal efforts to do so can be successful. According to Bandura (1986), self-efficacy is formed through four different but connected sources of information with the strongest factor being performance accomplishments or mastery of performance. How an individual interprets his or her efficacy expectations is directly related to the outcome expectations (Bandura, 1989).

Motivational theory lies within the social cognitive model and places the learner as the active processor of information rather than focusing on learning styles or individual differences such as personality profiles (Duncan & McKeachie, 2005). When viewed from the perspective of the individual learner and as agents of their own endeavors, students make intentional decisions to invest in learning and change their behavior. What people believe about their own abilities can influence learning (Artino, 2012; Duncan & McKeachie, 2005). Simulation involves active learning and fits well with Bandura's social cognitive theory (Franklin & Lee, 2014).

The purpose of this study was to examine these learner characteristics (age, gender, and prior completion of a baccalaureate degree) as confounders in the self-reporting of perceived expectancy, value, and affective factors in students' motivation to learn in SBL. This was investigated across nursing and allied health programs in a Western Canadian institute of technology. Based on the self-reporting of responses to demographic and questions related to motivational beliefs, an analysis was conducted to identify whether statistical relationships exist between the characteristics of learners and the self-reporting of motivation to learn in the context of SBL.

Significance of the Study

Development of competency is dependent on the students' ability to apply knowledge and skill to specific clinical procedures but development of confidence to take on future problem-solving scenarios and engage in lifelong learning is dependent on a strong sense of self-efficacy (Baptista, Carlos, Pereira, & Mazzo, 2014). Effective learning in a simulated clinical environment relies on active learning and student engagement (Franklin & Lee, 2014). Success during SBL, therefore, is related to the learner's perceived motivation to learn. Educators generally strive to develop a deep understanding of their students and their individual learning styles, motivational beliefs, and emotional experiences (Franklin & Lee, 2014; Hamid & Singaram, 2016; Henning et al., 2013), but if educators also understand the factors that influence learning in a simulated environment they can assist in supporting effective learning (Paskins & Peile, 2010).

Research Method

The research method selected for this study is considered quantitative with the objective to test three hypotheses. Participants were invited to complete an online questionnaire which included questions to collect demographic data and questions to assess motivational beliefs. A quantitative method seeks to connect relationships between variables and in some cases, examine the strength of these relationships (Creswell, 2012). The goal of a study, such as this one, is to add to the literature and provide for a "comparison of effects against those reported in related prior studies (which) enables researchers to evaluate the consistency of results across studies" (Thompson, Diamond, McWilliam, Snyder, & Snyder, 2005, p. 186).

The research problem focused on identifying specific learner characteristics and motivation to learn during simulated clinical activities. Participants were asked to declare their gender, age, and whether the participant completed a baccalaureate degree prior to his or her current field of study. Motivational beliefs were examined with responses to the Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich, Smith, García, and McKeachie (1991). Responses to these questions were used to identify relationships, if any, between these learner characteristics and motivation to learn.

Nature of Research Design

Creswell (2012) explains that "survey research designs are procedures in quantitative research in which investigators administer a survey to a sample" (p. 376) with an objective to describe the attitudes, opinions, behaviors, or characteristics of a population. The design of this study is considered to be cross-sectional and non-experimental; the selection of the appropriate design allowed for the comparison of groups across the data collected. Some consider survey studies as a sub-type of quantitative, multi-participant research in which the individuals have not been randomly selected to differing treatment conditions (Jalil, 2013; Thompson et al., 2005). Subsequent descriptive and inferential statistical analyses of the data does not provide evidence regarding causal mechanisms; however, objective data from empirical observations and measures, allows the researcher to make meaningful interpretations from the results (Creswell, 2012).

Data collected using the MSLQ instrument allows the researcher to empirically evaluate students' motivation to learn when applied to a specific learning context (Duncan & McKeachie, 2005) and relate motivational beliefs to learner characteristics (D'Lima, Winsler, & Kitsantas, 2014; Hamid & Singaram, 2016; Henning et al., 2013; Nausheen, 2016). The basis of responses to the MSLQ included a Likert scale with a range from 1 (*not very true of me*) to 7 (*very true of me*) (Pintrich et al., 1991). The motivational subscales were amalgamated into three broad components; self-efficacy and control of learning beliefs form the expectancy component; intrinsic goal orientation, extrinsic goal orientation, and task value comprise the value component, and test anxiety measures the affective component (Pintrich et al., 1991

Research Questions

The research questions examined specific learner characteristics and self-reported motivational beliefs in the context of SBL. The first question examined the role of gender on the reporting of motivational beliefs for learning. While Huang (2013) reported gender as a significant factor within specific learning contexts such as math or social sciences for high school students, Balam and Platt (2014) found that the differences in self-efficacy scores according to gender remain an unclear factor in college and university undergraduates. Participants in this study were asked to identify their gender in the demographic portion of the survey.

RQ1: What role does gender play in the self-reporting of motivational beliefs for SBL?

The second question examined the relationship between age and motivational beliefs, which, in the context of a post-secondary environment is limited. Henning et al. (2013) found that few studies of college level student's link age and motivational variations, while also noting educational theorists believe that students possess different motivational constructs at different ages. These authors provided one of the few studies in which age was shown to be an influencing factor on motivational beliefs with older students more likely to score higher on test anxiety and also for intrinsic goal orientations (Henning et al., 2013). Of interest, Franklin and Lee (2014) found that age and gender influenced the reporting on self-efficacy levels in nursing students learning in a simulated environment. Participants in this study were asked to identify their current age in years in the demographic portion of the survey.

RQ2: How does age influence the self-reporting of motivational beliefs for SBL?

The third question explored the relationship between student motivational beliefs and completion of a degree prior to his or her current field of study in health science. The completion of a baccalaureate degree may result in higher expectancy and value scores but has yet to be examined in the context of allied health programs and SBL. In a meta-analysis, Connor (2015) noted that students with low self-efficacy were less likely to complete their academic program as compared to those with high self-efficacy. Specifically, the author found that nurses with lower academic self-efficacy were more likely to withdraw from their field of study. This analysis substantiated Connor's (2015) own findings that nursing retention in a specialized post-graduate program was influenced by previously obtained undergraduate academic outcomes and undergraduate science academic scores. Consequently, participants in this current study were asked whether or not they completed a baccalaureate degree prior to their current health science program.

RQ3: Does completion of a previous baccalaureate degree play a role in the self-reporting of motivational beliefs for SBL?

Hypotheses. The hypotheses are listed below:

$H_0 1$: Gender does not play a role in the self-reporting of motivational beliefs for SBL.

$H_a 1$: Gender does play a role in the self-reporting of motivational beliefs for SBL.

$H_0 2$: Age does not influence the self-reporting of motivational beliefs for SBL.

$H_a 2$: Age does influence the self-reporting of motivational beliefs for SBL.

$H_0 3$: Completion of a previous baccalaureate degree does not play a role in the self-reporting of motivational beliefs for SBL.

$H_a 3$: Completion of a previous baccalaureate degree does play a role in the self-reporting of motivational beliefs for SBL.

Definition of Terms

The list below contains definitions of terms used throughout this document. The definitions are from published literature and provide a common understanding of terminology used in health education programs. A review of the literature indicated that some terminology is used interchangeably. For the purposes of this study, the following definitions apply:

Allied health/allied health professionals. Allied health is defined as a group of professionals that work in health care but are not nurses, physicians, dentists, or pharmacists (HLWIKI International, 2017). Allied health professionals work in multi-disciplinary teams to provide medical services and patient care.

Health science. Health science is also known as health-care science; a term used to represent a broad spectrum of health-care professions that support diagnosis and treatment (Farlex, Inc., 2011).

Simulation. Simulation is defined as "a pedagogy using one or more typologies to promote, improve, and/or validate a participant's progression from novice to expert" (Meakim et al., 2013, p. S6). Simulation is a pedagogical technique that is used to support cognitive and metacognitive processes.

Simulation-based education (SBE). SBE is often used inter-changeably with simulation-based learning; defined as "devices, trained persons, lifelike virtual environments, and contrived social situations that mimic problems, events, or conditions that arise in professional encounters" (McGaghie, Issenberg, Barsuk & Wayne, 2014, p. 48). SBE focuses on instructional design that utilizes clinical variation, distributed practice, mastery in learning, and other instructional design features (Cook et al., 2013).

Simulation-based learning (SBL). SBL is often used inter-changeably with clinical simulation (Jeffries, 2015; Meakim et al., 2013) or simulation-based education. SBL is defined as structured activities that represent actual or potential situations in practice and allows the participant to develop or enhance knowledge, skills, and attitudes in a simulated environment or through an unfolding case study (Pilcher et al., 2012). SBL focuses on a learner-centered approach to curriculum design that includes skill development, problem solving, debriefing, formative assessment, and self-reporting of performance (Adamson, 2015; Pilcher et al., 2012).

Skill development. Skill development refers to the "progress along a continuum of growth in knowledge, skills, and attitudes as a result of educational or other experiences" (Meakim et al., 2013, p. S6).

Self-efficacy. The definition of self-efficacy comes from Bandura's work on Social Cognitive Theory in which the author defined self-efficacy as "a judgment of capability to execute given types of performances" (Bandura, 2006, p. 309). Outcome expectations are judgments about the outcomes that are likely to flow from such performances and are developed from external experiences, motivation, and self-perception (Bandura, 1989).

Limitations and Delimitations

The limitations associated with this study included the self-reporting of responses to the questionnaire. For the purposes of this study, it was assumed that respondents provided honest, self-aware answers. Another limitation was attempting to make inferences about the population based on the sample of respondents. Convenience sampling of students registered in health science programs provided easy access to the student population but may also have introduced bias into the results (Fowler, 2014). In order to make generalized inferences regarding the data collected, the researcher assumed that the sample is representative of the characteristics of the broader population (Statistics Canada, 2010).

The use of a Likert scale is a popular format in survey design and provides a simple response construct that measures one's attitudes from positive to negative (Johns, 2010). The disadvantages to the use of a Likert scale include ambiguity in interpretation of qualitative responses contained in the scale and a generalization to the responses through numerical summation (Johns, 2010). Respondents to the MSLQ were asked to self-report based on a response scale that indicates "very true of me" to "not at all true of me" (Pintrich et al., 1991); this required respondents to have a truthful awareness of their feelings in response to the questions. For the purposes of this study, the researcher relied on prior research that validated the questionnaire as valid and reliable in eliciting accurate assessments across multi-dimensional components (Duncan & McKeachie, 2005).

A cross-sectional design captures the current attitudes, beliefs, opinions, or practices at the time of the study (Creswell, 2012). The timing for the distribution of the questionnaire may impact participation, depending on how busy students are in their respective programs and whether the study is considered important to the participant. Participation may be influenced by whether or not the participant had experience in a simulated environment and was interested in the topic. Participants were asked questions related to their programs use of simulation; the researcher assumed that some respondents may not know or could not accurately evaluate the different approaches to simulation in their respective programs.

Delimitations imposed in this research include factors related to race and culture. Cultural background and race have been shown to influence self-efficacy beliefs, motivation to learn, and the importance placed on academic achievement, but it remains under-investigated and therefore, difficult to draw strong conclusions from the evidence that does exist (D'Lima, Winsler, & Kitsantas, 2014; Honicke & Broadbent, 2016). In medical and nursing education, authors originating in countries outside of North America found similar self-efficacy scores as those within Canada or the United States (Akhu-Zaheya, Gharaibeh, & Alostaz, 2013; Cheraghi et al., 2009; Hassankhani, Aghdam, Rahmani, & Mohammadpoorfard, 2015). For the purposes of this study, it was assumed that race and culture did not influence the self-reporting of motivational beliefs.

Another delimitation in the current study was the decision to use one post-secondary institution. The institute of technology selected for this research was based in part on convenience, in that the institution has many health science programs and a robust population of full-time students. Simulation-based learning is a common pedagogical approach used in all of the health science programs targeted in this study.

Summary

Effective learning in a simulated environment relies on active learning and student engagement (Franklin & Lee, 2014). Educators generally strive to develop a deep understanding of their students and their individual learning styles, motivational beliefs, and emotional experiences (Franklin & Lee, 2014; Hamid & Singaram, 2016; Henning et al., 2013). Just as anxiety can interfere with successful learning so can a lack of motivation and a low sense of self-efficacy (Balam & Platt, 2014; Bandura, 1986; Pintrich et al., 1991; Pintrich, Smith, García, & McKeachie, 1993). Early detection of these barriers to learning can provide the educator with opportunities to encourage student learning through different teaching strategies (Beischel, 2013; Bodkyn & Stevens, 2015). The goal of this study was to examine the specific learner characteristics that may influence motivation to learn in a simulated environment.

This study incorporated the experience of other researchers to develop a research method and design that was used to gather data across several health science programs for quantitative analysis. Results from the questionnaire provided insight into student characteristics with respects to learning in a simulated environment and may provide educators with an understanding of factors that influence motivation to learn in this context. The next chapter reviews the literature examining the role of self-efficacy and motivational beliefs in education, and more specifically post-secondary health science education. The literature review identified many publications originating in the nursing and medical professions, but, while allied health professions are vastly under-represented, inferences were made to inform this research.

Chapter 2: Literature Review

Introduction to Literature Review

Bandura's theory of self-efficacy is the degree of belief held by each individual that he or she has the capability to exercise control over events which affect one's life. According to Bandura (1986), self-efficacy is formed through four different but connected sources of information with the strongest factor being performance accomplishments or mastery of performance. Bandura (1992) identified performance mastery as dependent upon one's perception of self-efficacy and that poor performance may be result of a lack of ability, or because one has the ability but lacks confidence in his or her self-efficacy to make optimal use of their skills (i.e., situational circumstances perceived as outside of the individual's control acting as barriers to success. The other three influencing factors include vicarious experience, verbal persuasion, and physiological state (Bandura, 1986). Each of these sources of information contributes to an individual's perception of self-efficacy and can influence future behavior.

In the theory of self-efficacy, the influence of past performance, or mastery of performance, is the strongest component in building one's belief in his or her ability to perform (Bandura, 1989). The results from studies have shown a strong relationship between an individual's self-efficacy and motivation to learn in an academic context (Artino, 2012; Zimmerman, Bandura, & Martinez-Pons, 1992). Kavanagh (1992) also found that students with a strong sense of self-efficacy were more likely to show increased effort and persistence even when faced with difficult or challenging tasks and manifests as an ability to control emotions when faced with challenges, insofar that students exhibit a lower degree of stress, anxiety, and depression (Artino, 2012; Kavanagh, 1992).

Motivational theory lies within the social cognitive model and places the learner as the active processor of information rather than focusing on learning styles or individual differences such as with personality profiles (Duncan & McKeachie, 2005). When viewed from the perspective of the individual learner and as agents of our own endeavors, students make intentional decisions to invest in learning and change their behavior; what people believe about their own abilities can influence learning (Artino, 2012; Duncan & McKeachie, 2005). Furthermore, students who are intrinsically motivated, have a high sense of self-efficacy, and value the learning experience are more likely to be successful in both a simulated learning environment and clinical environment (Dolan, Perz, McComb, & Kirkpatrick, 2013; Hassankhani, Aghdam, Rahmani, & Mohammadpoorfard, 2015). This conclusion substantiates Pintrich's claim that a higher perceived self-efficacy is associated with an intrinsic goal orientation in students and higher achievement outcomes in students (Pintrich, Smith, García, & McKeachie, 1993).

The overlap between self-efficacy and motivation comes from the social cognitive theory (SCT) which identifies motivation as key to persistence in the face of obstacles, contributes to intentionality and long-term planning, and promotes self-regulation and self-correcting actions (Bandura, 1986, 2001). Research using meta-analyses of the data have shown self-efficacy as a strong predictor of motivation and performance across time, across a variety of environments and different populations (Komarraju & Nadler, 2013). What people believe about their own abilities can influence learning. A strong sense of self-efficacy manifests as an ability to control emotions when faced with challenges in that students exhibit a lower degree of stress, anxiety, and depression (Bandura, 1992, 1997; Kavanagh, 1992).

Applications of self-efficacy theory in the attainment of clinical competency can be found in nursing, medical, and increasingly in allied health (albeit less so) research as educators and practitioners attempt to understand the relationships between perceived self-efficacy, motivation to learn, and attainment of competency in clinical practice (Akhu-Zaheya, Gharaibeh, & Alostaz, 2013; Burke & Mancuso, 2012; Rice, 2015; Rowbotham & Owen, 2015). Understanding the effect of perceived self-efficacy and the impact on motivation to learn can assist educators to support students during simulation-based learning (SBL). Yet almost no data exists to describe optimal teaching and learning practices in the simulated environments linked to development of competency, self-efficacy, and increased confidence in clinical practice for student programs beyond nursing and medicine (Emes, 2015; Reid-Searl et al., 2014; Sedden & Clark, 2016). Development of competency is dependent on students' abilities to apply knowledge and skill to specific clinical procedures but development of confidence to tackle future problem-solving scenarios and engage in lifelong learning can be attributed to a strong sense of self-efficacy (Baptista, Carlos, Pereira, & Mazzo, 2014). According to Rice (2015), "efficacy expectations [in students] not only influence initiating behaviors but also influence the degree of persistence applied to overcoming difficulties to complete a task" (p. 208); these attributes are critical to competency and continual professional development after graduation. Using the theory of self-efficacy can assist educators in developing structured strategies that promote and support student learning.

Understanding learner characteristics such as age, gender, and prior post-secondary education may be factors that influence self-efficacy and motivation to learn (Balam & Platt, 2014; D'Lima, Winsler, & Kitsantas, 2014; Hamid & Singaram, 2016). Gender as an influencing factor in self-reported efficacy levels has been studied in post-secondary students. However, in a study of medical students, Balam and Platt (2014) found no statistically significant difference in their motivation or learning strategies related to gender. Conversely, Hamid and Singaram (2016) reported statistically significant differences between genders with the composite score for motivation higher for females. D'Lima, Winsler, and Kitsantas (2014) found that male college students reported higher self-efficacy at the beginning of the semester compared to their female counterparts. Over the course of the semester, self-efficacy increased for both males and females but the male respondents continued to report higher self-efficacious beliefs (D'Lima et al., 2014).

Similarly, many studies have been reported with age data but fail to examine the correlation between age and motivational beliefs in the context of a post-secondary environment, which is limited in the literature. Henning et al. (2013) found that few studies of college level students link age and motivational variations, while also noting that educational theorists believe that students at different ages possess different motivational constructs. The authors provided one of the few studies in which age was shown to be an influencing factor on motivational beliefs, noting that older students were more likely to score higher on both test-anxiety and also for intrinsic goal orientations (Henning et al., 2013).

The completion of a baccalaureate degree prior to entering an allied health program may result in higher self-efficacy and task value scores but has yet to be examined in the context of SBL. In Bandura's (1997) concept of self-efficacy, one strong factor influencing a positive self-belief is that of performance mastery. Students who have achieved a major milestone in post-secondary education prior to their current field of study may demonstrate stronger self-efficacy and motivational beliefs.

Conceptual Framework

In the 1940s, Neal E. Miller and John Dollard expanded on the earlier works of Edwin B. Holt about human learning through observation, therefore providing the field of psychology with a conceptual framework of learning called *Social Learning and Imitation* (Miller & Dollard, 1941). The authors theorized that humans learn through drives, cues, responses, and rewards (Miller & Dollard, 1941). Furthermore, an important drive in learning comes through social motivation in which the observer imitates the actions of another in order to gain knowledge or experience. In the 1960s, Albert Bandura experimented with these principles of social learning. In these experiments, Bandura let children observe adults punching a Bobo doll without a negative consequence. When left alone, the behavior the children had observed was repeated and performed with the same level of aggression towards the Bobo doll (Bandura, Ross, & Ross, 1963).

In 1977, Bandura identified the importance that social learning had on one's perceived self-efficacy and behavioral change. Bandura's theory of learning, renamed as social cognitive theory (Bandura, 1986), led to a myriad of identified applications in psychology, education, and health. In a compilation of Bandura's work and related studies, Schwarzer (1992) explained that "outcome expectancies refer to the perception of the possible consequences on one's action, self-efficacy expectancies refer to personal action control or agency" (p. xi). Self-efficacy, then, is the belief in one's ability to achieve and overcome obstacles by increasing intentionality and long-term planning. Self-efficacy also influences behavioral coping ability and cognitive-control coping ability (Bandura, 1986; McCarthy & Newcomb, 1992).

Social cognitive theory is defined as learning formed through personal, behavioral, and environmental factors that exert simultaneous and reciprocal influence over each other and the individual (Bandura, 1986). Within the personal factors, Bandura (1991) identified motivating beliefs, perceptions, values, emotions, and meaning as components related to self-efficacy. The personal determinant includes whether an individual has a high or low feeling of self-efficacy towards the behavior being observed whereas the behavioral determinant includes the response the individual receives after they perform a particular behavior (Bandura, 1991). The third determinant in learning is environment, including provision of a setting that allows for the individual to be successful (Bandura, 1986; 1991).

Self-efficacy is grounded in Social Cognitive Theory and can be developed through enactive mastery experience, social modeling, self-evaluation of physiological state, and verbal persuasion (Bandura, 1989). How an individual interprets his or her efficacy expectations is directly related to the outcome expectations (Bandura, 1989). Self-efficacy is related to the perception of one’s own competency and is considered the most important predictor of performance of all motivational constructs (Bandura, 1989; 2004).

The connection between motivation and cognition in the social-cognitive model of learning is related to the context in which the individual is learning (Pintrich & DeGroot, 1990). Furthermore, Pintrich demonstrated how motivation for learning was closely connected to several internal and external factors, including self-efficacy, intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, and test anxiety (Pintrich, Smith, García, & McKeachie, 1991). Other studies examining the relationship between self-efficacy and academic motivation have shown that academic achievement is strongly connected to self-efficacy (Artino, 2012; Zimmerman et al., 1992), and, as has been noted, Kavanagh (1992) found that students with a strong sense of self-efficacy were more likely to show increased effort and persistence even when faced with difficult or challenging tasks. A strong sense of self-efficacy manifests as an ability to control emotions when faced with challenges with students exhibiting a lower degree of stress, anxiety, and depression (Artino, 2012; Kavanagh, 1992).

Competence in practice is described as having the knowledge, skills, and personal motives to enable someone to perform effectively in a job or situation (CAMRT, 2014). Clinical competency is defined as a “combination of skills, knowledge, attitudes, values, and abilities that underpin effective and/or superior performance in a professional/occupational area” (Cant, McKenna, & Cooper, 2013, p. 163). Knowledge and skill development in the attainment of competency has been shown to be important to patients. Calman (2006) reported through her grounded theory study that patients believed competence was evident through technical skill but also that healthcare providers also need to demonstrate effective personal attributes and characteristics in order to be viewed as competent.

The theoretical framework used in this study connects the development of competency with skill and knowledge attainment (CAMRT, 2014) with an emphasis on the personal motives described as factors of self-efficacy (Bandura, 1986) and motivational beliefs (Pintrich et al., 1991). Self-efficacy is supported through performance mastery, vicarious experiences, and verbal persuasion, but can be negatively affected by overwhelming physiological feedback such as anxiety (Bandura, 1986). Motivation to learn is demonstrated by a strong sense of self-efficacy, control of learning beliefs, high task value, and an intrinsic orientation, whereas test anxiety and an extrinsic motivation orientation can interfere with cognitive and metacognitive processes (Pintrich et al., 1991).

Review of Research Literature

This chapter presents a review of evidence related to the constructs of self-efficacy, motivational beliefs, and achievement. It focuses on studies conducted in an academic context but, more importantly, in the development of clinical competency through SBL, primarily in nursing and medical educational programming. The literature review is organized under the following headings: Self-Efficacy and Education; Self-Efficacy and Simulation-Based Learning; Self-Efficacy and Motivation to Learn; Learner Characteristics, Self-Efficacy, and Motivation to Learn. Also included are references to current publications guiding allied health education which reviewed for the variance of SBL definitions and applications in different professions.

Search strategy. The literature search was conducted using electronic databases including ProQuest Central and CINHAL Complete which houses over 1300 full text journals from the fields of nursing and allied health. Further searches included Google Scholar with and without 'published after' restrictions. Search words or phrases used included self-efficacy, nursing OR allied health, clinical simulation, and clinical competency. Further searches were conducted using related keywords such as "self-regulated learning AND motivation to learn" and "self-efficacy AND adult education". These searches generated not only many older publications related to self-efficacy and academic achievement, but also more recent articles examining the relationships between the learner, motivation to learn, and competency. "Simulation-based learning" was used as a key phrase when searching for articles specific to clinical simulation and competency in nursing and other allied health education programs.

A refined search of the literature restricted results to a number of articles published between January 1, 2012 and the current day. For example, a CINHAL Complete search using the keywords "self-efficacy AND clinical competency published after 2012" produced 86 full text articles. The same search in ProQuest resulted in a total of 117 results, with almost half (54) published in 2015-2016. A CINHAL Complete search using the keywords self-efficacy AND simulation produced 43 full text articles published after 2012; with *nursing* added as a keyword, the result was reduced to 21 articles. Replacing the keyword *nursing* with *allied health* did not produce any articles published in the last five years. In a similar ProQuest search," self-efficacy AND simulation OR nursing" produced 612 articles after 2012; "self-efficacy AND allied health" produced 63 full text results. The results of these searches provided an abundance of literature related specifically to the nursing profession and pre-licensure nursing education programs. Very little research exists for other allied health education programs (Emes, 2015; Sedden & Clark, 2016) leaving the researcher to wonder if the nursing experience can be translated accurately and completely to other health education programming.

Self-efficacy and education. Social cognitive theory posits that self-efficacy is one's belief in his or her own capability and ability to overcome obstacles (Bandura, 1977). When faced with academic challenges, students with a higher perceived self-efficacy persevere and achieve better academic outcomes (Lee, Lee, & Bong, 2014). Put another way, according to Bandura (1992), "people make causal contributions to their own psychosocial functioning through mechanisms of personal agency" (p. 3). This includes beliefs about their ability to exercise control over events that affect their lives (Bandura, 1989, 1992).

Gore (2006) identified experiences with success or failure as predictive of performance for college students and linked this to the students' sense of perceived self-efficacy. Gore's findings are substantiated by later work in which researchers examined the influence of students' self-efficacy on motivation and learning (van Dinther, Dochy, & Segers, 2011). The research identified the significant influence self-efficacy has on students' task interest, task persistence, establishment or setting of goals, choices made, motivation, and use of cognitive, metacognitive, and self-regulatory strategies (van Dinther et al., 2011). Indeed, self-efficacy, performance, and academic achievement have been linked in several studies (Komarraju & Nadler, 2013;

Zimmerman, 2000; Zimmerman et al., 1992). According to Bandura (1997), the relationship between self-efficacy and achievement is due to the influence of the courses of action people choose to pursue. People with strong perceived self-efficacy are more likely to demonstrate increased effort and persistence than their peers with a weaker sense of the same (Bandura, 1989; 1992). Furthermore, for students with a strong self-efficacy belief, difficulties are viewed as challenges rather than obstacles (Zimmerman & Schunk, 2008).

Further research in an educational context has shown that students with a high level of perceived self-efficacy are more likely to take on difficult tasks, persist through obstacles, demonstrate a willingness to learn (motivation), and achieve a higher GPA than students who report a lower sense of self-efficacy (Britner & Pajares, 2006; Komarraju & Nadler, 2013; van Dinther et al., 2011). Although students enter the classroom with an established perception of their own self-efficacy instructional design and teaching methodologies can be used to promote and support its development (Britner & Pajares, 2006; Komarraju & Nadler, 2013; Pajares, 2003).

Self-efficacy and simulation-based learning. Simulation is growing in all allied health education programs as faculty and administrators recognize the need to provide students with a safe learning environment allowing for the practice of clinical skills without risk of injury to patients or clients. SBL is also recognized as an educational method that can promote and support student self-efficacy by utilizing the four sources of it (Akhu-Zaheya et al., 2013; Bambini, Washburn, & Perkins, 2009) including the previously mentioned mastery of performance (performance outcomes), vicarious experiences (observation of others), verbal or social persuasion (formative feedback), and physiological feedback (signals one's own body is sending) (Bandura, 1977).

In health education, simulation is used to supplement traditional teaching methods, such as lectures and knowledge testing. Cardoza and Hood (2012) demonstrated that baccalaureate nursing students reported an improvement in general self-efficacy after clinical simulation instruction compared to their prior perceived level of self-efficacy prior to simulation for specific patient care procedures. In a meta-analysis of research related to the outcomes of SBL in nursing, Adamson (2015) reported that some researchers found that learners who set personal goals for simulation activities demonstrated better performance in procedural skills. This is evidence of the fact that the setting of goals and motivation to learn are key characteristics of self-efficacy.

Bambini et al. (2009) used mixed-methods research to demonstrate that nursing students learning through simulation were able to increase their confidence in learning what to expect and how to conduct themselves effectively in the clinical setting. Furthermore, the students demonstrated an overall increase in self-efficacy related to performance of clinical skills (Bambini et al., 2009). The intersection of social cognitive theory and simulation was further explored by Burke and Mancuso (2012), who stated that "using SCT as a framework for planning and implementing simulation learning activities not only optimizes task and content mastery but also supports student analysis of one's own learning or thinking process" (p. 543). The reinforcement of SCT with development of self-efficacy was achieved by providing students with an opportunity to identify personal barriers to successful mastery in terms of knowledge or skills acquisition (Burke & Mancuso, 2012).

The development of a simulation framework by the National League of Nursing (NLN) based on the work of Jeffries and Rogers (2007) provided educators with a model for best practices in simulation-based teaching and learning. This NLN/Jeffries Simulation Framework identified five individual components that influence the effectiveness of learning in a simulated environment, as follows: facilitator, participant, educational practices, outcomes, and simulation design characteristics (Jeffries & Rogers, 2007). Since its inception, the Framework has generated many studies focused on one or more of the five components. In Adamson’s (2015) review, studies that focused on the complexities of the participant identified several characteristics that influence learning; these include age, gender, readiness to learn, personal goals, preparedness, tolerance for ambiguity, self-confidence, learning style, cognitive load, and level of anxiety.

The use of simulation exists in other allied health programs but with limited research examining the effectiveness of SBL. One recent meta-analysis of the literature focused on teaching and learning methodologies in medical radiography (Holmström & Ahonen, 2016). The review included literature with publication dates between 2000 – 2014, full-text availability, a focus on radiography students’ learning in a bachelor’s degree program, and which was inclusive of student perspective in the research questions and results. The authors found a total of 35 articles that fit their parameters and were included in the analysis (Holmström & Ahonen, 2016).

The two methods of learning that fit the definition of SBL are OSCE and SOLAR. Each of these methods rely on a form of clinical simulation whether it requires working with simulated patients in a test environment, such as the OSCE model, or computer-based case studies using problem-based learning for clinical decision making. Students assessed both the OSCE and SOLAR methods as valuable in the development of clinical skills but learning in the clinical environment with graduate radiographers acting as role models continues to be preferred among students (Holmström & Ahonen, 2016).

SBL allows students to build confidence in ability, self-reflect on their practice, and develop behavioral coping ability (Burke & Mancuso, 2012). The development and support of self-efficacy in SBL is an important factor in the development of competency and the pursuit of lifelong learning (Burke & Mancuso, 2012). A student-centered approach in SBL focuses on the instructor-student interaction to meet learner needs, foster collaboration, and promote learner engagement (Adamson, 2015). Consequently, Hamstra et al. (2014) encouraged educators to refocus the goal of simulation away from functional fidelity (life-like technology) and towards a more student-centered approach to include cognitive engagement and suspension-of belief.

Self-efficacy and motivation to learn. Pintrich (1988) used the connection between motivation and cognition to formulate a model of learning that was based on a contextualized, social-cognitive model that built on Bandura's concept of self-efficacy (1977). Pintrich believed that academic achievement was due to cognitive and metacognitive strategies but was also dependent upon the student's motivation to apply these strategies in learning (Pintrich & DeGroot, 1990). The theoretical model that supports student motivation to learn includes an expectancy component, a value component, and an affective component (Pintrich & DeGroot, 1990). The authors examined how these factors supported the self-regulated learner with an early version of the Motivated Strategies for Learning Questionnaire (MSLQ) which included questions related to self-efficacy, intrinsic value, and test anxiety. The results reported by Pintrich and DeGroot (1990) identified that "student involvement in self-regulated learning is closely tied to students' efficacy beliefs about their capability to perform classroom tasks and to their beliefs that these classroom tasks are interesting and worth learning" (p. 38).

Redevelopment of the MSLQ arose out of a need to include students' measure of motivation to learn when linked to internal and external factors and learning strategies (Pintrich et al., 1991), and has subsequently been used to study many different student groups, ages, and program choice (Duncan & McKeachie, 2005). The survey is designed in such a manner that it can be used in its entirety (81 questions) or with selected motivational or learning strategies subscales. Several studies have used the MSLQ to study college-level students enrolled in health science programs (Bodkyn & Stevens, 2015; Cook, 2011; Hamid & Singaram, 2016; Henning et al., 2013).

In a meta-analysis of research on motivation and learning for clinical competency, Sedden and Clark (2016) included the keywords *clinical learning environment*, *mentors in clinical setting*, and *clinical learning motivation* to capture research done with post-secondary students enrolled in allied health programs. The authors concluded that, “the motivation to learn should be intrinsic; students should want to learn the material, not just memorize it to pass the course” (Sedden & Clark, 2016, p. 611). Furthermore, the authors found that positive, constructive feedback increased students’ self-efficacy along with self-motivation which aligns with Bandura’s assertion that development of self-efficacy can be accomplished through verbal or social persuasion (Sedden & Clark, 2016).

The relationship between self-efficacy, clinical skills development in a lab setting, and the transfer of skills to a clinical environment was studied by Oetker-Black, Kreye, Davis, Underwood, and Naug (2016). These researchers utilized the Clinical Skills Self-Efficacy Scale (CSES) survey to collect data on nursing students’ perceived self-efficacy related to specific clinical tasks (Oetker-Black et al., 2016). The authors hypothesized that self-efficacy theory may explain the knowledge reorganization that is needed for students to effectively transfer learning from a simulated environment to clinical practice. In conclusion, they stated that increased self-efficacy may be a mediating variable that effects whether students successfully transfer skills learned in a simulated lab (Oetker-Black et al., 2016).

Applications of self-efficacy theory in the attainment of clinical competency can be found in nursing, medical, and allied health research as educators and practitioners attempt to understand the relationships between perceived self-efficacy, motivation to learn, and attainment of competency in clinical practice (Akhu-Zaheya, et al., 2013; Burke & Mancuso, 2012; Rice, 2015; Rowbotham & Owen, 2015). These studies have shown the link between perceived self-efficacy, motivation, and performance in context-specific environments.

Learner characteristics, self-efficacy, and motivation to learn. Learner characteristics in the study of self-efficacy and motivation to learn are often an important variable in determining the factors that affect learning; demographic information such as age and gender are common data points in research related to educational practices. Some studies include ethnicity, socio-economic level, and current or prior education as factors that may affect learning (Bodkyn & Stevens, 2015; D'Lima, Winsler, & Kitsantas, 2014; Hilpert, Stempien, van der Hoeven Kraft, & Husman, 2013). The differences in self-efficacy scores according to gender have been analyzed by several authors but still remain an unclear factor (Balam & Platt, 2014). Some authors report gender as a significant factor within specific learning contexts such as math or social sciences for high school students (Huang, 2013), while others do not find gender to be a factor in motivational beliefs in college or university level students (Balam & Platt, 2014; Hamid & Singaram, 2016).

Balam and Platt (2014) found no statistically significant difference in medical students' motivation or learning strategies related to gender. Hamid and Singaram (2016) also found no significant associations in learning strategies between female and male respondents but did report statistically significant differences between genders with the composite score for motivation higher for females. D'Lima et al. (2014) found that male college students reported higher self-efficacy at the beginning of the semester as compared to their female counterparts. Over the course of the semester however, self-efficacy increased for both males and females but the male respondents continued to report higher self-efficacious beliefs overall (D'Lima et al., 2014).

While many studies report collecting age data, an examination of the correlation between age, self-efficacy, and motivational beliefs in the context of a post-secondary environment is limited. Henning et al. (2013) found that few studies of college level students link age and motivational variations, while also noting that educational theorists believe that students possess different motivational constructs at different ages. The authors provided one of the few studies in which age was shown to be an influencing factor on motivational beliefs, concluding that older students were more likely to score higher on test anxiety and intrinsic goal orientations (Henning et al., 2013).

The completion of a baccalaureate degree prior to entering an allied health program may result in higher self-efficacy and task value scores, but has yet to be examined in the context of SBL. In Bandura's (1997) concept of self-efficacy, one strong factor that influences a positive self-belief is that of performance mastery; students who have achieved a major milestone in post-secondary education prior to their current field of study in allied health may demonstrate stronger self-efficacy and motivational beliefs as a result. Connor (2015) noted that students with low self-efficacy were less likely to complete their academic program as compared to those with high self-efficacy. Likewise, an examination of nursing retention in a specialized post-graduate program identified undergraduate GPA and undergraduate science GPA scores as influencing factors on student success; those with lower academic self-efficacy were more likely to withdraw from their field of study (Connor, 2015).

Simulation in health science education. Documents that guide health science education programs, called competency profiles, originate from the disciplines' respective professional associations, which develop them to guide curriculum. For example, the competency profile for the medical radiation technologists (CAMRT, 2014) describes competency as requiring the application of learning encompassing the cognitive domain (knowledge and thinking skills), the affective domain (attitudes and values) and the psychomotor domain (manual skills). In Canada, accreditation of allied health and nursing programs is a requirement for graduates to access certification or board exams (CAMRT, 2014; CASN, 2015).

The evaluation of student competency in performing clinical skills is determined by individual education programs. A recent revision to the competency profile for medical radiation technologists (CAMRT, 2014) provided education programs with the option of evaluating specific competencies in a simulated environment. The CAMRT defines simulation as a learning activity that "involves cognitive, affective and psychomotor learning in a setting that simulates a practice activity. It may include learning through role-play, or through uses of technology or equipment where a mannequin, model, or other object replaces a human patient" (CAMRT, 2014, p. 8). In addition to competencies assessed in a simulated environment, some competencies deemed of high importance for entry to practice competency require assessment in the clinical environment (CAMRT, 2014).

The Canadian Association of Schools of Nursing (CASN) is the accrediting body for nursing programs in Canada. In a 2015 CASN report, the organization provided a framework for nursing education in which the key characteristics of simulation experiences were identified as:

- Planned, predictable, and controlled by the instructor allowing selection based on learning needs;

- Delivered consistently from one student to another within a learning group;
- Situated in a simulated environment of emotions and communication among limited number of members of the interprofessional team;
- Allows students to make errors and learn from them;
- Allows skills to be learned in isolation with components of the skill mastered through repeated practice. (CASN, 2015, p. 9)

This focus on creating a student-centered approach in the simulation lab supports education models proposed by the aforementioned NLN/Jeffries simulation framework (Jeffries & Rogers, 2007), the CAMRT competency profile (2014), and the CASN educational framework for nurses (2015). A student-centered approach requires educators to better understand their students' individual learning needs (Robb, 2016). Furthermore, a student-centered approach to curriculum design, teaching strategies, and learning activities can promote cognition, self-efficacy, and self-regulation for success in learning (Robb, 2016).

Analysis of Methodological Issues

In this section, a review of instruments related to general self-efficacy, task-specific efficacy, and motivation to learn is examined. Self-efficacy crosses many domains of human functioning related to self-regulation and mastery performance. Sitzmann and Yeo (2013) found in their meta-analysis of self-efficacy interventions, that providing individuals with opportunities to demonstrate successful performance is one method to enhance self-efficacy by showing that a cumulative positive effect of small, incremental achievements which support self-efficacy and improve goal setting, satisfaction, and other outcomes related to individual and collective performance.

Pintrich and colleagues demonstrated that motivation for learning was closely connected to several factors including self-efficacy, both intrinsic and extrinsic goal orientation, task value, control of learning beliefs, and test anxiety (Pintrich et al., 1991). The MSLQ questions therefore relate closely to these factors (Pintrich et al., 1993). MSLQ's motivational scales however are based on three general motivational constructs: expectancy, value, and effect. The development of the MSLQ arose out of a need to empirically evaluate students' measure of motivation as it is linked to internal and external factors, and learning strategies (Duncan & McKeachie, 2005). Subsequently, Duncan and McKeachie (2005), summarized the findings in a meta-analysis of numerous studies using the MSLQ and determined the survey to be a valid instrument in which researchers could efficiently measure students' motivation across different educational contexts.

In a study conducted by Komarraju and Nadler (2013), college students (N = 407) completed the entire 81-item MSLQ (Pintrich et al., 1991) to identify perceived self-efficacy as it relates to motivational orientation, cognitive and metacognitive learning strategies, and resource-management strategies. The methodology also included the 8-item Implicit Theories of Intelligence Scale and 18-item Achievement Goal Inventory survey (Grant & Dweck, 2003, as cited by Komarraju & Nadler, 2013). To test for the relationship between self-efficacy and academic achievement, the authors used a multivariate analysis of covariance (MANCOVA) to determine whether students in high and low self-efficacy groups differed significantly in their perception of their own intelligence and academic goals (Komarraju & Nadler, 2013). The data analysis did indeed demonstrate a strong connection between high self-efficacy (M=2.48, SD=1.09) and the incremental theory of intelligence, whereas those with low self-efficacy (M=2.71, SD=1.09) demonstrated a strong affiliation to the entity theory of intelligence (a belief that intelligence cannot be changed; Komarraju & Nadler, 2013). Furthermore, the high self-efficacy group also had higher scores for academic outcome goals. The overall results of the data analysis support previous research that concludes students with high self-efficacy and confidence in their academic performance are also more likely to believe that intelligence is changeable (incremental theory) and outcomes are related to effort (Komarraju & Nadler, 2013).

With the link between self-efficacy, motivation to learn, and academic achievement firmly established, other authors have applied self-efficacy to different performance contexts including undergraduate and graduate education, and aspects of employment (Duncan & McKeachie, 2005). Specific to health care, researchers have related self-efficacy to competency attainment in pre-licensure students (Oetker-Black et al., 2016; White, 2014), employment retention of nurses (Conner, 2015), and both as a predictor of success in graduate nurses (Rice, 2015), and confidence in research skills (Swenson-Britt & Berndt, 2013) in graduate nurses. In allied health education, researchers have used self-efficacy measures to evaluate the effectiveness of different teaching and learning methods (Beischel, 2013; Cardoza & Hood, 2012; Thomas & Mackey, 2012), instructor influence on self-efficacy in students (Rowbotham & Owen, 2015), and learner motivation related to nurse education (Hassankhani et al., 2015).

The general self-efficacy scale (GSE), developed by Schwarzer and Jerusalem (1995), has been adapted for many different and specific contexts and can be used with other surveys to determine relationships between different variables (Rowbotham & Schmitz, 2013). Responses are made using a 4-point Likert scale and the mean self-efficacy of the general adult population is a core of 2.9 (Schwarzer & Jerusalem, 1995). Bandura (2006) recommended that any questions used to assess self-efficacy begin with the words *can do* rather than *will do* because *can* is a judgment of capability whereas *will* is a statement of intention. Bandura (2006) explained that self-efficacy is "a major determinant of intention, but the two constructs are conceptually and empirically separable" (p. 309).

The Student Self-Efficacy Scale (SSE) is an adaptation of the GSE (Rowbotham & Schmitz, 2013) and addresses four areas of student self-efficacy: academic performance, skill and knowledge development, social interaction with faculty, and coping with academic stress. In a subsequent study, Rowbotham and Owen (2015) collected 236 responses to the SSE and Nursing Clinical Teacher Effectiveness Inventory (NCTEI). Data were analyzed using the program Statistical Package for the Social Sciences (SPSS) as well as descriptive and multivariate statistics to identify the relationship between perceived clinical educator behavior and student self-efficacy. Cronbach's alpha (internal consistency reliabilities) was calculated as .99 for the NCTEI and .808 for the SSE survey (Rowbotham & Owen, 2015). A MANCOVA test identified specific educator behaviors that influence students' self-efficacy, with *evaluation* concluding as having the most significant impact on students' perception of self-efficacy in learning. Other educator factors measured that did not have a strong influence on student self-efficacy included *teaching ability*, *nursing competence*, *interpersonal relationships*, and *teacher personality* (Rowbotham & Owen, 2015).

In another study, Oetker-Black et al. (2016) used the construct of self-efficacy to develop the Clinical Skills Self-Efficacy Scale (CSES) for pre-licensure nursing students. The motive behind the development of this survey was due to a lack of a valid and reliable external instrument to evaluate the level of clinical skills competency in relation to self-efficacy in nursing students (Oetker-Black et al., 2016). In order to study this relationship, the CSES required psychometric evaluation, and the development CSES questions reflect Bandura's (1986) theory in that self-efficacy assessment is task and situation specific, with predictiveness increasing as a function of specificity linked to a skill (Oetker-Black et al., 2016). When measuring perceived self-efficacy, accuracy in responses is achieved when the participant responds to questions related to a specific task rather than in a general context. Bandura (2006) noted that scales of perceived self-efficacy must be tailored to the particular domain of functioning that is the object of interest thereby providing a context to the questions.

The CSES was completed by 214 students at various levels in a baccalaureate nursing program. The survey was evaluated for internal consistency reliability (Cronbach's alpha = .96) and data were analyzed for means, standard deviations, and ranges for the nine different clinical skills items. Further analysis established dimensionality and construct validity. From the results and data analysis, the authors (Oetker-Black et al., 2016) demonstrated a link between increased self-efficacy and transfer of skills learned in a simulated environment of the clinical setting. The CSES instrument was deemed both valid and reliable as a method.

In the study, *Predictors of Successful Clinical Performance in Associate Degree Nursing Students*, Rice (2015) examined the relationship between self-efficacy and emotional intelligence (EI) as predictors for success in the attainment of clinical competence in nursing students. To measure emotional intelligence, the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) was used and the questions addressed the four facets of EI: perceiving emotion, integrating emotion to facilitate thought, understanding emotion, and regulating emotions (Rice, 2015). To measure self-efficacy, the author employed Schwarzer's and Jerusalem's (1995) General Self-Efficacy Scale and the Self-efficacy in Clinical Performance Scale (SCPS) developed by Cheraghi, Hassani, Yaghmaei, and Alavi-Majed (2009). The GSE and SCPS both utilized a four-point Likert scale for responses; the MSCEIT provided a total score with a standard score mean of 100 points. A fourth survey, the Short Nursing Competence

Questionnaire (SNCQ), consisted of 18 items which participants responded to regarding perceived nursing competence during their current clinical rotation, was used to obtain data on nurse competency.

A total of 56 nursing student participants completed the surveys and data were analyzed using SPSS 18.0 (Rice, 2015). The data showed that student self-perception of their clinical competence on the SNCQ had a broad range of scores (2.3 – 4.0) and that general self-efficacy and clinical self-efficacy were significantly correlated with student-rated clinical performance. A higher EI score as determined by the MSCEIT showed significant correlation to greater clinical self-efficacy (Rice, 2015). The results of this study are supported by previous research by Lauder et al. (2008) in which the authors demonstrated how self-efficacy beliefs play a role in the successful attainment of clinical competency in nursing programs (Rice, 2015).

Self-efficacy has also been measured in relation to new or innovative educational interventions. As previously discussed, SBL is becoming more important as a pedagogical method in health science programs as it has the advantage of exposing students to clinical scenarios which provide comparable learning experiences across students and enable all learners to meet the course objectives. Creating a simulated environment offers a safe and realistic settings for learners and protects opportunities for clinical decision-making. When done deliberately, simulation can also aid students in the development of their metacognition and self-regulation, and promote their self-efficacy (Burke & Mancuso, 2012).

Cardoza and Hood (2012) reported that although SBL offers many benefits for the student, including fostering engagement and psychomotor skill development which both build self-confidence, the research lacks clear evidence of the effectiveness of simulation on learning outcomes and whether this knowledge transfers to the clinical environment. In the study, *Comparative Study of Baccalaureate Nursing Student Self-Efficacy Before and After Simulation* (Cardoza & Hood, 2012), the authors employed Schwarzer's and Jerusalem's (1995) General Self-Efficacy Scale across different data points in time. The study spanned two years in order to collect data from separate nursing groups and included both pre-simulation and post-simulation self-efficacy data. While the authors claim that, "high-fidelity human simulation as an effective method for student nurses and faculty to identify nursing knowledge, critical analysis, and technical skill deficits" (Cardoza & Hood, 2012, p. 147), it remained unclear if the authors adapted the GSE to make the questions more specific to the simulation experience as recommended by Bandura (2006). In their final discussion, Cardoza and Hood (2012) rightfully support the implementation of new educational practices based on outcome data and evidence of effectiveness, confirming the use of self-efficacy theory can assist educators in developing structured learning strategies that promote and support student learning.

Similarly, Thomas and Mackey (2012) conducted a pre- and post-simulation study on baccalaureate nursing students to assess confidence in clinical performance. In this study, 14 students enrolled in an elective course in clinical simulation for nursing were considered the experimental group (Thomas & Mackey, 2012). The control group consisted of ten student participants who attended the program-standard clinical rotation. At the beginning and the end of the simulation course, the students completed the Clinical Decision-Making Self-Confidence Scale (NCSBN, 2009) which consisted of 12 items and 5-point Likert scale. This data was then compared to the completed surveys of the control group. The survey assessed students' perception of clinical confidence in four dimensions: accurately recognizing a change in patient's condition, performing basic physical assessments for conditions, identifying basic nursing interventions for conditions, and evaluating the effectiveness of interventions for patients' conditions. Demographic information from all students was analyzed and showed no statistically significant differences for age, level of student, gender, or number of completed clinical rotations in a hospital (Thomas & Mackey, 2012). Independent samples *t*-tests were used on the data at the beginning and end of the semester across the four dimensions.

Simple mean scores of confidence for the control group at the beginning of the semester produced a range of 8.7 to 10.1, and at the end of the semester a range of 8.9 to 10.8. The authors noted that the experimental group mean score for confidence at the beginning of the semester was 5.8 to 8.3 but at the end of the semester the range was 12.4 to 12.8; a significant increase over the control group. The data from the experimental group at the end of the semester showed a more positive perceived confidence as compared to the control group in all four dimensions (Thomas & Mackey, 2012). The authors attribute the significant change in confidence for the experimental group to the debriefing of student performance that followed the simulated clinical scenario. This harkens back to the other factors which may contribute to improved confidence in clinical skill; teacher-student interaction, peer interaction, and skill-teaching projects (Thomas & Mackey, 2012).

Beischel (2013) used a quantitative and qualitative explanatory mixed-methods approach (with the core component being quantitative) to examine the effectiveness of SBL. The study used pre- and post-test scores, learner and lifestyle characteristic questions, and the S-Anxiety Scale to mediate the effect of anxiety related to a simulation activity. The data consisted of many quantitative variables, including auditory-verbal learning style, hands-on learning style, readiness to learn, preparation for simulation, anxiety, and cognitive learning outcomes (differences between the pre- and post-test scores). The data were compiled using descriptive statistical analysis and correlation methods to produce a matrix of the variables with mean and standard variation data.

The study indicated that being ready to learn, being prepared for simulation, and having an auditory-verbal learning style lessened student anxiety, whereas a strong auditory-verbal and hands-on learning style influenced cognitive learning outcomes (Beischel, 2013). The data also reflect a low effect of anxiety on cognitive learning outcomes. Students with lowered perceived self-efficacy were influenced more by the physiological changes that occur during challenging experiences and exhibited lower overall performance and cognitive processing (Beischel, 2013).

Artino et al. (2012b) examined the relationship between achievement goal structures, learning behaviors, and performance assessment in medical students. The authors indicated that, at the time of the study, the research lacked an empirical analysis of how students' perceptions and behaviors correlate with performance throughout a four-year medical program (Artino et al., 2012b). The authors further hypothesized that student perceptions of mastery goal structures positively correlate with adaptive learning behaviors (metacognition), and negatively correlate with maladaptive behaviors such as procrastination and refusal to seek assistance when struggling. The authors also hypothesized that academic performance would be positively correlated with metacognitive control strategies (Artino et al., 2012b). The quantitative study included several different subscales adapted from previously validated instruments and including the MSLQ survey, extracting three components: the subscale related to *metacognition,* four-item subscale to measure *procrastination*, and five-item subscale to measure *avoidance-of-help-seeking* behavior (Artino et al., 2012b). The amalgamation of these three subscales was used to measure learning behaviors. Achievement goal structures was measured using a mastery goal structures subscale, performance-approach goal structures, and a performance avoidance goal structures subscale to measure student perceptions during the clinical portion (clerkship) of their training. Both achievement goal structures and learning behavior surveys used a 5-point Likert scale and the performance assessment portion of the study incorporated a weighted GPA grade based on each course grade and the number of contact hours (Artino et al., 2012b).

The surveys were validated for internal consistency reliability and mean scores for each item associated with a particular subscale. The descriptive analysis for the total sample (N = 304) was calculated and a correlation analysis was conducted to explore the associations between the survey variables and cumulative medical school GPA. Final analysis included a one-way multivariate (MANCOVA) to investigate whether class year was related to the survey variables and SPSS 20.0 for the descriptive analyses. The results of the analyses largely proved the initial hypotheses statements; that is, students who perceived the learning environment as one in which the focus was on improvement and understanding were more likely to have better metacognition and less procrastination. Students who exhibited poor learning behaviors such as procrastination and failure to seek help were more likely to do less well on clinical performance assessment.

The authors (Artino et al., 2012b) noted that differences in responses across junior, intermediate, and senior students may be related to how the students perform during their clerkship and the feedback they receive from supervising clinicians. Furthermore, the authors suggest that, due to the strong influence that mastery of performance has in student success, instructional practices be designed to support mastery goal structures and subvert maladaptive learning behaviors. In particular, the authors suggest implementing instructional practices that promote mastery ideals such as effort, risk taking, and creativity as well as constructive formative assessments for the evaluation of progress (Artino et al., 2012b). These suggestions for improved learning environments are in line with SBL in which students are provided with a safe environment in which errors can be made and skills can be developed without negative consequence and/or risk to patient safety.

Some authors have taken a qualitative approach to examining the influence of SBL and learner characteristics in the attainment of clinical competency (Bambini et al., 2009; Baptista, Pereira, & Martins, 2016). For instance, Baptista et al. (2016) provided a phenomenological approach to understanding students' feelings toward and conceptualization of high-fidelity simulation (HFS). The authors were interested in investigating problems students experienced during the simulation learning activities. Through the use of semi-structured interviews, 13 students were asked questions related to their simulation experience and the meaning they developed through the use of high-fidelity manikins (Baptista et al., 2016). The students expressed an overall high level of general satisfaction with HFS and in particular, identified an increased sense of self-confidence related to performing clinical tasks and a greater sense of autonomy in problem-solving through the simulated scenarios (Baptista et al., 2016). The HFS activities also allowed students to work through their anxiety and stress in an acceptable manner, thereby providing exposure to a real-life scenario risk-free. The authors noted that "in simulated practice, there should be pressure to stimulate the student to live with it and develop strategies to overcome it in the real context" (Baptista et al., 2016, p. 13).

Bambini et al. (2009) used a mixed-methods approach which included a quasi-experimental, quantitative survey to calculate self-efficacy scores and a qualitative analysis of nursing students' responses to open ended questions related to the simulated learning experience; a total of 112 participants completed both the pre-test and post-test. The researchers collated the data to understand the influence of simulated experiences on self-efficacy, perceptions of the simulated clinical experience, and if previous work experience with patients influenced the students’ perceived level of confidence in their clinical skills (Bambini et al., 2009). The resulting qualitative analysis brought forth three general themes: communication (verbal and non-verbal, with patients), confidence (self-confidence in patient interactions and psychomotor skills), and clinical judgment (ability to prioritize and identify abnormalities). The results of this study encouraged the authors to include more simulation in the nursing education setting (Bambini et al., 2009).

Beischel (2013) used a quantitative and qualitative explanatory mixed-methods approach in her study of the learning variables on anxiety and cognitive learning outcomes related to HFS. In describing the rationale for this approach, the author stated that the primary purpose was to test a hypothesized model, to explain the quantitative results using student perceptions concerning the different qualities of HFS, and the effectiveness of learning in a simulated environment (Beischel, 2013). Using both self-reported anxiety scores prior to the simulation activity and comments made after the activity provided the author with a contextual explanation of the data. In conclusion, Beischel (2013) reported that measuring anxiety during the simulation experience alongside the qualitative reports from students may have provided a more accurate representation of student anxiety.

The mixed-method approach encompasses components of both qualitative and quantitative methods for the purpose of producing more usable, practical information. Johnson and Onwuegbuzie (2004) advocate the mixed-methods approach and claim that researchers should utilize methods that produce the most thorough and informative answer to their research questions. The decision to use mixed-methods, whether one paradigm is more predominant than another, and whether the time-order of different methodologies is relevant to a researcher’s study will depend on the overall objective of the research. Many times, quantitative data can be limited in developing hypotheses or meaning, but qualitative research can be time consuming and suffer from confirmation bias (Johnson & Onwuegbuzie, 2004). The decision to use a quantitative approach is often based in the need to obtain as large a sample size as necessary to make statistically meaningful statements, whereas a qualitative approach typically requires fewer subjects and focuses on understanding human behavior from the informant's perspective (Minichiello, 2008).

Synthesis of Research Findings

Pintrich (1988) used the connection between motivation and cognition to form a model of learning that was based in a contextualized, social-cognitive model building on Bandura's concept of self-efficacy (1977). Pintrich et al. (1991) demonstrated how motivation for learning was closely connected to several factors including self-efficacy, intrinsic and extrinsic goal orientation, task value, control of learning beliefs, and test anxiety. The purpose of the MSLQ was to provide an instrument that could empirically evaluate students' measure of motivation as it is linked to both internal and external factors and learning strategies (Duncan & McKeachie, 2005).

In a meta-analysis of the research, Duncan and McKeachie (2005) found that the MSLQ has been used either in its entirety or by way of subscale extraction across many different domains, content areas, and target populations, and that the results from the MSLQ have well-established the empirical links among motivation, learning strategies, and performance. Examples of studies using the MSLQ include the evaluation of learning motivation and self-regulation in learning in nursing students (Robb, 2016), preparedness for medical school (Musick & Ray, 2015), evaluation of medical students' perception of task performance and anxiety in the attainment of competence (Phillips, Dong, Durning, & Artino, 2015), and assessment of the cognitive complexity and motivation to learn in undergraduate nursing students (Dolan et al., 2013). The literature contains many examples of studies examining motivation to learn throughout the education system.

In the study conducted by Robb (2016), the author used one motivation sub-scale (self-efficacy) and three learning strategies subscales (rehearsal, elaboration, and organization) with a convenience sample of undergraduate nursing students (N = 65). Participants were found to have self-efficacy related to success in their coursework and confidence in their ability to accomplish tasks taught in the course. The results also showed a positive relationship between self-efficacy and GPA averages for those who selected complex, cognitive, self-regulated learning strategies (Robb, 2016).

Similarly, Dolan et al. (2013) excerpted a portion of the MSLQ, namely the motivation subscales which assess intrinsic and extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning, and test anxiety (Pintrich et al., 1991). In this study (Dolan et al., 2013), two different student populations were used for comparison: nursing and engineering students. The analysis of data was completed using Factorial Analysis of Variance (ANOVA) with two between-group factors. The data confirmed the findings of other researchers in relating self-efficacy to motivation to learn, that is, students with a higher sense of self-efficacy exhibit positive motivation to learn and typically have better outcomes than students with low self-efficacy. Interestingly, the results showed a decrease in motivation to learn for the engineering students over time while the nursing students demonstrated a higher motivation to learn related to task value and control beliefs than the engineering students. The authors hypothesized that this difference between the two groups may be as a result of the clinical placements student nurses have thereby bringing greater relevance to the material taught in the classroom (Dolan et al., 2013).

In the study conducted by Musick and Ray (2016), the authors employed the MSLQ instrument to examine the association between students' confidence, reasoning skills and performance measures in pre-matriculation medical students. The authors modified the questions within the motivational subscale to suit their specific needs (Musick & Ray, 2016) and administered the survey in a pre-test, post-test methodology. The students ($N = 32$) were also asked to provide demographic information (gender, ethnicity, socio-economic background) as part of the authors' objective was to relate performance and MSLQ response data with demographic characteristics (Musick & Ray, 2016). The Health Sciences Reasoning Tool (HSRT), which measures reasoning and decision-making processes, was administered separately to evaluate student reasoning skills (Musick & Ray, 2015). A mean total academic score was assessed at the end of the pre-matriculation program based on tests results. The survey items were evaluated for mean differences and inter-item correlations using *t*-test and Pearson procedures, respectively. The authors noted that the results of the averaged exam scores and HSRT could not be computed as the software did not allow for this type of analysis, but as an alternative, the results were analysed with SPSS 22.0 with significance levels for the analysis of all tests set at $p = .05$ (Musick & Ray, 2015).

In the analysis of the MSLQ portion of the study, the authors were surprised to see a drop in student confidence related to academic achievement at the completion of the program as compared to the start of the program. The authors hypothesized that this drop in confidence as an adjustment in students' expectations of achievement related to the academic rigor of becoming a doctor. Another result of interest was a higher measure of confidence in males than females, yet better scores on knowledge based exams by the female participants (Musick & Ray, 2015).

Phillips et al. (2015) chose the MSLQ in their study to evaluate the self-reported task-importance and anxiety levels in the performance of different medical education competencies. In this study, the authors hypothesized that task-importance factors would be positively correlated with two adaptive factors (self-efficacy and metacognition), negatively correlated with two maladaptive factors (procrastination and avoidance of help seeking), and that anxiety factors would be negatively correlated with self-efficacy and metacognition (Phillips et al., 2015). Furthermore, the authors hypothesized that junior medical students would identify more with anxiety factors while senior students would rank task importance as higher. The hypotheses were substantiated by previous research in which it was shown that senior medical students scored higher on patient care self-efficacy and evidence-based medicine self-efficacy (Artino et al., 2012a). The measurement of metacognition was achieved using an 8-item subscale of the MSLQ; the questions assessed the frequency in which students employed metacognitive control strategies such as planning, goal setting, comprehension monitoring, and performance regulation to evaluate their progress as learners (Phillips et al., 2015). Although the MSLQ can be used to evaluate self-efficacy and anxiety as confounding factors in motivation to learn, the authors chose a more elaborate assessment tool developed by Artino et al. (2012a) in which self-efficacy and anxiety were tied to specific competencies.

Data were collected and analyzed for overall means, standard deviations, and correlations among the task-importance and anxiety subscales, the three self-efficacy subscales, and the learning strategies (i.e., metacognition, procrastination, and avoidance of help seeking). The statistical analyses of data supported the authors' initial hypotheses. In light of their findings, the authors encourage further research that uses task importance, anxiety, and self-efficacy as multi-dimensional factors affecting learning and competency outcomes (Phillips et al., 2015). The value in this study lies in the understanding of how students' motivational beliefs and emotional experiences in attaining core competencies may evolve, or regress, as they move through the education program; educators can use this information to support students through challenging times in their learning (Phillips et al., 2015).

Critique of Previous Research

The links between self-efficacy and motivation to learn have been studied extensively and have shown a deep connection to student success across different education contexts (Duncan & McKeachie, 2005). Some authors have shown that students possessing a high perceived self-efficacy demonstrate better academic achievement scores and theorize that these students will continue to achieve success in their graduate careers through lifelong learning (Gore, 2006; Komarraju & Nadler, 2013). The challenge has been to make an empirical connection between self-efficacy as a student and continued success as a graduate. What is evident though, is that SBL in a pre-licensure or entry-to-practice program is filled with complexities and confounding factors. In a meta-analysis of the literature related to SBL in nursing, Adamson (2015) categorized these confounding factors as student related, teacher related, educational practices, and simulation design. While the benefits of SBL are well understood and learning outcomes have been shown to transfer from the simulated experience to the clinical environment, it is still largely unknown if the downstream effects are evident later in graduate practice (Adamson, 2015; Akhu-Zaheya et al., 2013; Beischel, 2013: Burke & Mancuso, 2012).

In the theory of self-efficacy, the influence of past performance, or mastery of performance, is the strongest component in building one's belief in his or her ability to perform (Bandura, 1989). Implementing a curriculum designed to allow students to make small incremental achievements in attaining skills promotes and supports self-efficacy in a simulated learning environment (Sitzmann & Yeo, 2013). Furthermore, students who are intrinsically motivated, have a high sense of self-efficacy, and value the learning experience are more likely to be successful in both a simulated learning environment and clinical environment (Dolan et al., 2013; Hassankhani et al., 2015).

Effective educators strive to develop a deep understanding of our students and their individual learning styles, motivational beliefs and emotional experiences; just as anxiety can interfere with successful learning, so can a lack of motivation and a low sense of self-efficacy (Pintrich et al., 1993; Schnell, Ringeisen, Raufelder, & Rohrmann, 2015). Early detection of these barriers to learning can provide the educator with opportunities to encourage student learning through different teaching strategies (Beischel, 2013; Phillips et al., 2015). Applications of self-efficacy theory in the attainment of clinical competency can be found in nursing and medical education but is under-represented in allied health research. Those who have studied student characteristics that influence learning attempt to understand the relationships between perceived self-efficacy, motivation to learn, and attainment of competency in clinical practice (Akhu-Zaheya et al., 2013; Burke & Mancuso, 2012; Rice, 2015; Rowbotham & Owen, 2015).

Summary

Students with a high perceived self-efficacy are more likely to achieve their academic goals, persist when faced with challenging tasks, and demonstrate control over their emotions during stressful situations. Self-efficacy is also connected to motivation to learn insofar as students with a strong sense of self-efficacy will be more self-regulated, self-reflective, and self-monitoring (Pintrich et al., 1991; Zimmerman et al., 1992). Students registered in allied health programs are required to develop a proficient level of competency in technical skill, exhibit appropriate attitudes and values, and adjust quickly to challenging clinical environments. Simulation-based learning, also referred to as clinical simulation, is utilized in health education programs due to increasing demand from hospital administrators to alleviate pressures on clinical teachers by replacing real-life practice with simulated, experiential learning.

A key factor in the efficacy of SBL is dependent upon the motivation of the student to engage in learning, to suspend belief when faced with simulated scenarios, and to receive formative feedback in a constructive manner as a way to improve performance (Adamson, 2015). Simulation as a teaching and learning methodology is here to stay, with an even greater presence anticipated as a replacement for clinical practice in pre-licensure programs (Hayden, Keegan, Kardong-Edgren, & Smiley, 2014). The aim of this study was to examine the relationships between learner characteristics, including age, gender, and previously attained baccalaureate degree, with perceived self-efficacy and task value factors in learners' motivation to learn in a simulation environment. The MSLQ instrument asked participants to evaluate their perceived motivation to learn based on extrinsic and intrinsic goal orientations, self-efficacy, task value, control of learning beliefs, and test anxiety as it related to simulation-based learning (Pintrich et al., 1993).

Chapter 3: Methodology

Introduction to Methodology

Simulation as a pedagogical method for teaching clinical skills is well understood in the education of pre-licensure nurses and doctors (Adamson, 2015; Phillips, Dong, Durning, & Artino, 2015; Stegmann, Pilz, Siebeck, & Fischer, 2012). Best practices in simulation-based learning (SBL) is evident in both nursing and medical programs (CASN, 2015; Jeffries & Rogers, 2007; Paskins & Peile, 2010). Simulation-based curriculum of course exists beyond these two professions, and yet little empirical evidence can be found to understand the learner experience in other allied health disciplines, such as medical radiography, sonography, and medical lab sciences (Reid-Searl, Bowman, McAllister, Cowling, & Spuur, 2014). If educators understand the factors that influence learning in a simulated environment they can assist in supporting effective learning (Paskins & Peile, 2010). Educators can support student learning by understanding the effect of perceived self-efficacy and the impact on motivation to learn in a simulated environment.

Motivational theory lies within the social cognitive model and places the learner as the active processor of information rather than focusing on learning styles or individual differences such as personality profiling (Duncan & McKeachie, 2005). When viewed from the perspective of the individual learner as agent of his or her own endeavors, the student makes an intentional decision to invest in learning. In short, what people believe about their own abilities can influence learning (Artino, 2012; Duncan & McKeachie, 2005).

The aim of the study was to examine learner characteristics and expectancy for success, task value, and affective factors in motivation to learn in SBL across several health science programs in a Western Canadian institute of technology. Pintrich and colleagues demonstrated how motivation for learning was closely connected to several factors including self-efficacy, intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, and test anxiety (Pintrich, Smith, García, & McKeachie, 1991). The development of the Motivated Strategies for Learning Questionnaire (MSLQ) arose out of a need to empirically evaluate the measure of motivation as it is linked to both internal and external factors and learning strategies (Duncan & McKeachie, 2005; Pintrich et al., 1991).

This chapter outlines the purpose of the study, the research questions and hypotheses, and the methodology implemented to evaluate the research questions. Drawing from previously published literature, a justification for using the MSLQ is provided along with the proposed statistical analyses, limitations and delimitations to the research design, and expected findings. No data was collected until ethics review board approval was secured.

Purpose of the Study

The purpose of this study was to identify learner characteristics that may influence students' motivational beliefs in a simulated clinical environment. At the post-secondary institution wherein this study was conducted, the school of health sciences offers many different programs which allow graduate students to be both clinically and academically prepared to be employed in their chosen field. The use of simulation as a teaching and learning strategy is an important tool that many programs use in some form and fidelity. The level of student success during SBL in nursing and medical programs has been linked to motivation to learn and an inherent belief in one's ability to learn, often referred to as self-efficacy (Adamson, 2015; Akhu-Zaheya, Gharaibeh, & Alostaz, 2013; Cook, Thompson, & Thomas, 2011; Phillips et al., 2015).

The above literature review demonstrated a paucity of research on this topic in health science programs beyond nursing and medical programs.

The aim of this study was to examine the relationships between learner characteristics, including age, gender, and previously completed baccalaureate degree (or not), with motivational beliefs in the context of SBL. Data was compiled from health science students who completed the demographic questions and responded to questions from the motivational beliefs subscale based on the MSLQ (Pintrich et al., 1991; [Appendix B]). Subsequent statistical analysis was conducted on the data wherein the researcher looked for associations between responses.

Research Questions

This study served to collect data for statistical analysis in order to answer three research questions. First, does gender play a role in the self-reporting of motivational beliefs for learning in a simulated environment? The differences in self-efficacy scores according to gender have been analyzed by several authors but it still remains an unclear factor (Balam & Platt, 2014). Some researchers report gender as a significant factor within specific learning contexts (Huang, 2013), while others do not find gender to be a factor in motivational beliefs, particularly in college or university level students (Hamid & Singaram, 2016). Balam and Platt (2014), for example, found no statistically significant difference in medical students' motivation or learning strategies related to gender. D'Lima, Winsler, and Kitsantas (2014) found that male college students reported higher self-efficacy at the beginning of the semester as compared to their female counterparts. Over the course of the semester, self-efficacy increased for both males and females but the male respondents continued to report higher self-efficacious beliefs (D'Lima et al., 2014). Furthermore, Hamid and Singaram (2016) found no significant associations in learning strategies between female and male respondents but reported statistically significant differences between genders with the composite score for motivation higher for females.

The second question sought to understand the relationship between age and motivational beliefs and asked to what extent does age influence the self-reporting of motivational beliefs for learning in a simulated environment. An examination of the relationship between age and motivational beliefs in the context in a post-secondary environment is limited; Henning et al. (2013) found that few studies of college level students link age and motivational variations, while also noting that educational theorists believe students at different ages possess different motivational constructs. The researchers provided one of the few empirical studies in which age was shown to be an influencing factor on motivational beliefs finding that older students were more likely to score higher on test anxiety and also for intrinsic goal orientations (Henning et al., 2013).

The third question sought to understand if students with a previously completed baccalaureate degree scored differently in the self-reporting of motivational beliefs for learning than those without a degree. The attainment of a baccalaureate degree may result in higher self-efficacy and task value scores but has yet to be examined in the context of SBL. In Bandura's (1997) concept of self-efficacy, an important factor that influences a positive self-belief is performance mastery. Students who have achieved a major milestone in post-secondary education prior to their current field of study may demonstrate stronger self-efficacy and motivational beliefs as a result. A review of the literature found that students with low self-efficacy were less likely to complete their academic program as compared to those with high self-efficacy and an examination of nursing retention in a specialized post-graduate program identified undergraduate GPA scores as influencing factors on student success (Connor, 2015).

Gray, McGuiness, Owende, and Carthy (2014) provided a psychometric review of studies that examined the relationships between cognitive ability, personality traits, self-efficacy, and motivation to learn against academic performance and concluded that, "prior academic performance is a good predictor of academic performance for standard students, but it does not perform as well for mature learners or learner groups with ethnic diversity…self-efficacy is the best motivation-based predictor of academic performance" (pp. 95-96).

Hypotheses

The following hypotheses were related to the research questions after review of the preceding literature on the subject of motivation to learn and self-efficacy in post-secondary students, specifically in nursing, medicine, and allied health. Previous results in the literature have failed to provide consistent conclusions related to which learner characteristics, if any, strongly influence motivation to learn in simulated clinical environments. The null hypotheses assumes there is no relationship between the variables being tested, or in other words, that the mean scores across the MSLQ are statistically equal between the learner characteristic being examined.

RQ1: Does gender play a role in the self-reporting of motivational beliefs for SBL?

Null hypothesis one (H_01): Gender does not play a role in the self-reporting of motivational beliefs for SBL.

RQ2: To what extent does age influence the self-reporting of motivational beliefs for SBL?

Null hypothesis two (H_02): Age does not influence the self-reporting of motivational beliefs for SBL.

RQ3: Does completion of a previous baccalaureate degree play a role in the self-reporting of motivational beliefs for SBL?

Null hypothesis three (H_03): Completion of a previous baccalaureate degree does not play a role in the self-reporting of motivational beliefs for SBL.

Research Method and Methodology

A quantitative method was selected to test the three hypotheses stated above. Participants were invited to complete an online questionnaire which included questions related to demographics and questions to assess motivational beliefs. The learner characteristics included gender, age, and whether the participant completed a baccalaureate degree prior to his or her current field of study. The responses to the questions assessing motivational beliefs were collected using a Likert scale. Responses to these questions were used to identify relationships, if any, between these learner characteristics and motivational beliefs in the context of simulation-based learning. A quantitative method seeks to connect relationships between variables and in some cases, examine the strength of these relationships, if any (Creswell, 2012).

This study is considered non-intervention research wherein intervention research, also known as experimental design, requires the researcher to compare a new or experimental activity against a current standard activity to assess differing outcomes or impact (Creswell, 2012). The methodology in this study aimed to analyze learner responses across several different allied health programs rather than assess an intervention among participants. This study did not use experimental design due to the complexities of implementing this approach in an ethical and practical manner across several health science programs. The decision to use a quantitative method is often based in the need to obtain as large a sample size as is necessary to make statistically meaningful statements about a social phenomenon (Minichiello, 2008). Furthermore, the research questions and hypotheses have been matched with a suitable research approach such that the research is best addressed by a non-experimental design (Creswell, 2012).

Research Design

Creswell (2012) explains that "survey research designs are procedures in quantitative research in which investigators administer a survey to a sample" (p. 376) with a research objective to describe the attitudes, opinions, behaviors, or characteristics of a population. The design of this study is considered to be cross-sectional and non-experimental; the selection of the appropriate design allowed for the comparison of groups across the data collected. Some consider survey studies as a sub-type of multi-participant research in which the individuals have not been randomly selected to differing treatment conditions (Jalil, 2013; Thompson et al., 2005). It can be said that descriptive studies, such as this, do not provide the best evidence regarding causal mechanisms; however, objective data result from empirical observations and measures, allowing the researcher to make meaningful interpretations from the results (Creswell, 2012). Due to the large pool of potential participants, this researcher chose a survey approach to collect as much data as possible for analyses with the objective of examining associations between variables.

Prospective participants in this study included all registered full-time enrolled in nursing or one of the other nine allied health programs and represent a cross-sectional sample from one Canadian institute of technology. The nine allied health programs were selected based on full-time registration, use of simulated clinical practice in the curriculum, and active on campus at the institute used in this study. Data collected in the questionnaire consisted of demographic items and motivation to learn items using a previously validated questionnaire developed by Pintrich et al. (1991).

Target Population, Sampling Method, and Related Procedures

The target population included full-time registered health science students in a Western Canadian institute of technology. The participants who responded to the survey were considered a convenience sample (Creswell, 2012; Robb, 2016). Convenience sampling is also known as non-probability sampling (Creswell, 2012; Kothari, 2004) and while this form of sampling has its disadvantages, it offers objective insight into the current student population with respect to learner characteristics across many different fields of study. This researcher was reliant on those who chose to complete the questions due to the volunteer aspect of survey methodology.

The survey was distributed electronically using an acceptable vendor product. In Canada, FluidSurveys™ (Fluidware Inc., 2014) is a licensed software platform that is FIPPA (Freedom of Information and Protection of Privacy Act, 1996) compliant. All registered allied health students are provided with a college-domain email account and prospective participants' email information was compiled by an objective non-researcher to ensure confidentiality. The online survey tool was set for anonymized responses. Participants received an email message with the introductory letter stating the purpose of the study and contact information of the principle investigator (Appendix A) and provided a link to redirect the student to the questionnaire. Two weeks after the first invitation message, a reminder email was sent out with the close date. Access to the questionnaire remained open for a period of three weeks. Participation was entirely voluntary and there was no consequence for non-participation.

Registration lists of full-time students in the school of health sciences at the time of the distribution of the questionnaire identified 1062 students; 544 (51%) of these were in the Bachelor of Science in Nursing (BSN) program and the remaining 518 (49%) students were distributed across nine other allied health programs (registration data collected September 13, 2017). Through data analysis, the researcher looked for evidence of sample error or error due to inferences made to the whole population based on the sample size. A non-response error, or bias, can arise due to some members of the sample who fail to respond to the survey (Statistics Canada, 2010).

Researchers should be aware of the statistical power required to accurately accept or reject the null hypotheses when determining sample size. A small sample size may lead the researcher to falsely reject a null hypothesis (type I error) or to wrongly accept a null hypothesis, known as a type II error (Bannon, 2013). Researchers should apply a rigorous, systematic approach when identifying the appropriate sample size for group comparisons (Creswell, 2012). Statistical significance is a measure of the likelihood that positive results reflect a real effect, and that the findings can be used to make conclusions about differences which really exist.

A sample size calculation was done based on G*Power analysis with power set at 0.80 and a significance level $p = .05$, and a medium effect size (0.15), the minimum sample size required to provide a detectable relationship resulted in 77 participants (Faul, Erdfelder, Lang, & Buchner, 2007). When calculated with a large effect size (0.35), the sample size is reduced to 36 (Faul et al., 2007).

Instrumentation

The survey instrument was based on the MSLQ, which has been used in a variety of studies across many different student groups, ages, and program areas (Duncan & McKeachie, 2005; Pintrich et al., 1991). The original MSLQ was designed such that it can be used in its entirety (81 questions) or with selected motivational or learning strategies subscales. This study used only the motivation subscale, which consists of 31 questions. Responses are in the form of a 1-7 Likert scale in which the low end indicates “not at all true of me” and the high end indicates “very true of me” (Pintrich et al., 1991, p. 41). The questions related to the expectancy component included self-efficacy (one’s expectancy for success specific to task performance) and control of learning beliefs (confidence in one’s skills to perform a task). The value component was assessed with questions related to task value, intrinsic goal orientation, and extrinsic goal orientation, and the affective component was assessed with questions related to test anxiety (Pintrich et al., 1991).

The MSLQ instrument has been investigated by several authors for reliability and validity in its design (Table 1) and application to different fields of study across different student populations (Bodkyn & Stevens, 2015; Hilpert et al., 2013; Smith & Chen, 2015). The literature provides current examples of the application of the MSLQ and several meta-analyses of results in different educational contexts (Duncan & McKeachie, 2005; Hilpert et al., 2013; Smith & Chen, 2015). While the results of this study cannot determine cause and effect, the data may provide insight into learner characteristics for further study as educators implement SBL into allied health programs across Canada.

Internal and external validity. The MSLQ has undergone several analyses since its inception to assess the internal reliability and validity of the subscales (Duncan & McKeachie, 2005; Hilpert, Stempien, van der Hoeven Kraft, & Husman, 2013; Smith & Chen, 2015). In an early review, Duncan and McKeachie (2005) concluded that “the empirical links among motivation, learning strategies, and performance are well established; indeed, a recent meta-analysis showed that self-efficacy and achievement motivation had the strongest effects on college grade point average” (p. 120). Smith and Chen’s (2015) analysis concluded that the questions related to expectancy (self-efficacy and control of learning beliefs), value (intrinsic motivation and task value), and self-regulation (metacognitive self-regulation and effort regulation) have the best latent structure across the questions. Liu et al., (2012) provided an extensive summary of previously published analyses of the MSLQ in which authors examined the psychometric properties of the full version. Recently, authors such as Hilpert et al. (2013), Bodkyn and Stevens (2015), and Hamid and Singaram (2016) published statements supporting the MSLQ as a reliable and valid instrument.

Internal consistency reliability. Internal consistency, or Cronbach's alpha, is used to assess the congruence of responses across several survey questions of the same type. The internal consistency aspect of reliability is an issue with self-reported measures such as those found in the MSLQ (Duncan & McKeachie, 2005), as it was calculated as high across the motivation subscales specific to self-efficacy and task-value (Cronbach's α of .88 and .80, respectively), and lowest for control of learning beliefs (Cronbach's α of .51; [Hamid & Singaram, 2016]). Bodkyn and Stevens (2015) furthermore calculated a total Cronbach's α for the MSLQ motivation subscale as .91 and Smith and Chen (2015) found that the motivational subscales met the desirable internal consistency threshold of .7 with self-efficacy (.971), test anxiety (.781), and task value (.817) alpha calculations. A summary of published motivational subscales' Cronbach's alpha is provided in Table 1.

Table 1

Summary of Cronbach's Alpha for MSLQ Motivational Subscale

	n =	Intrinsic goal	Extrin-sic goal	Task value	Control of LB	Self-efficacy	Test anxiety
Bodkyn & Stevens, (2015)	485	.50	.57	NR	NR	NR	NR
Cook et al. (2011)	210	.79	.78	.88	.67	.92	.83
Duncan & McKeachie, (2005)	NR	.74	.62	.90	.68	.93	.80
Hamid & Singaram, (2016)	165	.60	.62	.80	.51	.88	.68
Hilpert et al. (2013)	3140	.80	.72	.91	.79	.94	.83
Nausheen, (2016)	368	NR	.57	.80	NR	.66	.60
Smith & Chen, (2015)	459	NR	NR	.817	NR	.971	.781

Note: NR = Not reported, LB = Learning beliefs

Internal (content) validity. Validity refers to the degree of adequacy and appropriateness of the interpretations and actions based on the observed scores (Smith & Chen, 2015). In a review of the literature, several authors have examined the internal validity of the MSLQ by applying Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) (Hilpert et al., 2013; Liu et al., 2012; Smith & Chen, 2015). In their analysis, Smith and Chen (2015) found that convergent validity existed across items in the same motivation scale.

Hilpert et al. (2013), were more critical of the internal validity of the MSLQ and through extensive statistical analysis concluded that "the hypothesized latent factor structure of the

MSLQ model is systemically flawed. Our traditional approach to CFA provides good evidence that this is the case" (p. 9). This conclusion was made with the analysis of 3,140 responses to the MSLQ and demonstrated that some of the questions should be removed to improve the reliability and validity of the instrument. The subscales which evaluated expectancy, value, and self-regulation were more accurate than items related to extrinsic goal orientation due to lack of support for extrinsic goals as a measure of value and suggested questions related to test anxiety be removed due its affective rather than a motivational nature (Hilpert et al., 2013). Smith and Chen (2015) offered a different analysis and recommended the removal of some questions such that the motivation subscale had 24 items grouped into three scales of expectancy, test anxiety, and task value.

Duncan, Pintrich, Smith and McKeachie (2015) performed Confirmatory Factor Analysis across the motivational subscale items and concluded that, while the goodness of fit indices were not the strongest, they were, in their estimation, "quite reasonable values" (p. 70). Specifically, Duncan et al. (2015) estimated the chi-squared to degree of freedom ratio of the MSLQ (X^2/df = 3.49), the goodness of fit index (GFI = .77), root mean residual (RMR = .07), and Hoelter's critical number (CN = 122). A chi-squared to degree of freedom ratio of less than 5 is considered to be a good fit between the observed and reproduced correlation matrices (Duncan et al., 2015). Furthermore, strong Lambda-ksi (LX) estimates for values equal to or over .80 proved best for task value (questions 17, 23, 26, and 27), control of learning beliefs (question 18), self-efficacy (questions 5, 20, 21, and 31), and test anxiety (question 19). Poor LX estimates were calculated for questions 13 and 30 (extrinsic goal orientation; .48 and .44 respectively); question 25 (control of learning beliefs; .47), and question 8 (test anxiety; .42). Although the goodness of fit indices are not the best, the authors note that they are reasonable given that motivational beliefs have been assessed across a broad range of courses and subject domains (Duncan et al., 2015).

External validity. External validity is the extent to which the results of a study can be generalized from a sample to the broader population (Krupnikov & Levine, 2014). Many researchers have calculated the external validation factor of the MSLQ when studying student populations outside of the United States although with some conflicting results (D'Lima et al., 2014; Nausheen, 2016). In a recent study of Pakistani postgraduate students, Nausheen (2016) found that the questions used to assess self-efficacy in performance for testing and grading cross loaded with questions used to assess test anxiety, although questions which assessed extrinsic goal orientation functioned well in that sample population. This current study did not collect data related to culture or race due to the inconclusive results in the literature.

Data Collection

After ethics board approval, the questionnaire was distributed electronically using an acceptable vendor product. Electronic survey services offer many advantages including ease of access and return for participants, low cost for survey administration and collection, and the automation of data input and sorting (Schobel, Schickler, Pryss, Maier, & Reichert, 2014). The return rate for electronic surveys has been shown to be higher than for paper-based surveys and respondents are more motivated to be truthful – a fact which is attributed to the current widespread acceptance and anonymity of electronic platforms (Schobel et al., 2014). The disadvantage attributed to commercial survey services is a potential for privacy breaches associated with the collection of personal data. To limit this potential risk, participants were not required to provide any personal information that could potentially be used to identify the individual respondents (i.e., all responses will be anonymous and will not be associated with an email address or other identifier). Data will not be used for any other purpose than the one associated with this study and identified in the cover letter.

Participants received an email message with the cover letter of introduction stating the purpose of the study and contact information of the principle investigator. After two weeks, a reminder email was sent out which included a specified close date. The survey was open for a total of three weeks. All electronic and hard copy data will be retained in a secured account for the required time limit as prescribed by the Institutional Review Board (IRB) and Research Ethics Board (REB).

Part A of the questionnaire (Appendix B) included close-ended, demographic questions such as current program registration, current level in program, completion of a baccalaureate degree prior to current field of study, age, gender, and expected credential type at graduation from current program. Part B asked respondents to evaluate the frequency of use for each form of simulation activity they had participated in within their respective program. The responses to these questions were dependent on the respondent's interpretation of the questions. Part C was a modified version of the MSLQ as published by Pintrich et al. (1991) to contextualize the learning environment. Modification of the questions is accepted practice and is done to add context to the educational environment. Other researchers using the MSLQ have modified the questions to provide context to their studies (Kim, Park, Cozart, & Lee, 2015; Liu, Wang, Koh, Chye, Chua, & Lim, 2012; Smith & Chen, 2015).

Operationalization of Variables

Demographic data is commonly collected as part of descriptive research and provides the researcher with information about the population in the study (Walker, 2005). Participants for this study were asked to self-declare their age, gender, and whether they entered the program with a previously completed baccalaureate degree, or not. The other demographic data included current program of study and their level in the program. It was assumed respondents answered truthfully and accurately to the demographic questions.

Participants were provided with a definition of simulation. The definition of simulation, also called clinical simulation, is considered to be structured activities that represent situations in practice and allow the participant to develop or enhance knowledge, skills, and attitudes in a simulated environment (Pilcher et al., 2012). The researcher assumed that participants would recognize simulation as the lab component in their respective programs and relate the simulated educational experience to their own learning experience.

Motivation for learning focuses on why students choose to learn and includes two important components (Pintrich, 1999). The first component in motivation for learning includes beliefs about one's personal ability, or efficacy, and the other component is that of task value. Students who report a high sense of self-efficacy and recognize the value in learning are more likely to overcome obstacles. The MSLQ contains four questions related to each value statement for intrinsic and extrinsic goal orientation. A strong extrinsic goal orientation indicates the value the student places on learning related to grades, competition, or evaluation by others, whereas a strong intrinsic goal orientation indicates the student values the learning opportunity for the achievement of a personal goal, or for its own sake (Hilpert, Stempien, van der Hoeven Kraft, & Husman, 2013). Pintrich (1999) concluded that an intrinsic goal orientation promotes self-regulated learning and supports academic success whereas an extrinsic goal orientation hinders learning and is associated with lower educational outcomes. Test anxiety, an affective factor in motivation, can interfere with learning and deter motivation (Pintrich et al., 1991). Test anxiety is considered to have two components; one that is related to worry and cognitive processing, and an emotional component. The questions that assess text anxiety in the MSLQ attempt to measure both components (Pintrich et al., 1991).

Data Analysis Procedures

This study aimed to examine relationships between learner characteristics and motivational beliefs, rather than cause-and-effect results. A quantitative research method follows the philosophy of positivism in human inquiry thereby providing an objective, systematic, and methodological process to understanding social phenomenon (Walker, 2005). The descriptive research approach aims to answer the questions of “what” rather than causal or “why” questions (Fowler, 2014). Data collected from a survey can identify the prevalence, distribution, and interrelationships between variables (Burns & Grove, 2005; Fowler, 2014; Walker, 2015). Inferential analysis provides the researcher with results that may be used to infer or make predictions about the larger population based on the sample collected (Creswell, 2012).

The first step included descriptive analysis aimed to provide the researcher with data to identify base characteristics of a group in order to observe, describe, and document specific attributes of the identified group (Burns & Grove, 2005). Descriptive statistical analysis may include calculation of central tendency, variability, and relative standing, and allows researchers to analyze mean scores across different student characteristics such as gender, field of study, or other independent variables (Balam & Platt, 2014; Creswell, 2012; Dolan, Perz, McComb, & Kirkpatrick, 2013). Data demonstrating age distribution (figure 1), gender distribution, and respondents with and without a baccalaureate degree are identified in absolute and relative frequency tables (Table 2).

Identification of variables. Variables in quantitative research are typically categorized as dependent, independent, and or control variables (Creswell, 2012). Independent variables are considered attributes or characteristics that influence an outcome or dependent variable and, in this study include age, gender, and completion of baccalaureate degree (or not). The independent variables are stable, whereas dependent variables are characteristics or attributes that are influenced or dependent on the independent variables (Creswell, 2012). Responses to the MSLQ section of the questionnaire are considered dependent variables in this study. A descriptive study, such as this one, examined the relationships between learner characteristics and responses to the questions which evaluated motivational beliefs.

Measurement of variables. The measurement of variables is classified as either categorical or continuous. The categorical measurement of variables aims to allocate responses into categories; for example, groups of students were recoded and categorized into male (0), female (1), or other/choose not to respond (2). Completion of a degree prior to current program of study was categorized into no (0) or yes (1) responses and considered a dichotomous variable. A variable measured along a continuum or scale is considered a continuous measurement, or interval scoring (Creswell, 2012). Data collected for age was considered an interval variable because responses were stated in years of age. The participants were subsequently recoded and categorized into one of three groups; group 1 for ages 18–22 years, group 2 for ages 23– 6, and group 3 for 27 years of age or older. Responses to the questions regarding motivational beliefs were based on a Likert scale and are therefore considered continuous measures.

Statistical Analysis Procedures

The data is presented as univariate results; data reflecting gender, age, and prior degree responses are provided as frequency and percent distributions. Appendix C provides a complete set of data of mean scores from the MSLQ portion of the survey. The next analytical approach included statistical applications to examine the relationships between learner characteristics and responses to the questionnaire for motivational beliefs. The statistical approach or technique depends on whether the variables being compared are based on categorical or continuous measurement (Creswell, 2012). Further analysis was considered inferential; inferential statistics considers the relationships between variables. When examining the relationships between variables, there are three possible results: neither variable may influence the other; both variables may influence each other, nor one of the variables may influence the other (Rosenberg, Nelson, & Vivekananthan, 1968).

Calculations were conducted to evaluate the internal consistency of each motivational subscale. Internal consistency, or Cronbach's alpha, is used to assess the congruence of responses across several survey questions that ask the same type of question (Creswell, 2012). Strong internal consistency is achieved the closer Cronbach's alpha approaches 1 indicating shared covariance (Creswell, 2012). The MSLQ contains eight questions to measure self-efficacy, four questions to evaluate control of learning beliefs, four questions to measure both intrinsic and extrinsic goal orientation, six questions to evaluate task value, and five questions to measure test anxiety. The results of Cronbach's alpha calculations can be found in Table 5.

Comparison for gender responses to the MSLQ questions related to the three amalgamated components (expectancy, value, and affective) were completed in descriptive and inferential analyses. The questionnaire offered participants three gender responses, namely male, female, or other/not declared. Typically, a one-way ANOVA analysis is used when there are three or more categorical independent groups, an independence of observations between the groups, and if there is a reasonably even distribution between categories (Bannon, 2013). Due to extreme low response rate to gender "other/not declared" ($n = 1$), this category was removed from analysis and an independent samples *t*-test applied. The independent samples *t*-test procedure also assumes there is no relationship between the study participants in each group (independence of observations) and that there are no significant outliers (Bannon, 2013). Similarly, the independent samples *t*-test analysis is an appropriate statistical procedure to use when examining a continuous variable (MSLQ responses) with a categorical predictor with two response categories, including degree/no degree responses to examine the third research question. Age in years was recoded and categorized into three distinct age groups. The one-way ANOVA test is suitable to determine whether there are any statistically significant differences between the means of three or more independent (unrelated) groups and the dependent variable is normally distributed in each group that is being compared (Bannon, 2013).

This research identified three hypotheses to evaluate the relationships between learner characteristics and the self-reporting of motivational beliefs. Hypothesis testing requires setting a significance level (alpha level) that reflects the probability of whether the null hypothesis is true or not true. The typical alpha level for educational research is set at .05 (Creswell, 2012).

Limitations and Delimitations of the Research Design

The limitations associated with this study included the self-reporting of responses to the questions; according to Fowler (2014), there is no objective way to verify answers to subjective questions, but rather the researcher may understand that some responses can include error due to misunderstanding the question, lack of information to answer accurately, or over/under-estimating in self-awareness. It will be assumed for the purposes of this study that respondents answered honestly and were self-aware to answer accurately. Convenience sampling of students registered in nursing and allied health programs provided easy access to this student population but may have also introduced bias into the results. Fowler (2014), reminds researchers that people who respond to surveys are intrinsically motivated by their interest in the topic being investigated and may skew the results.

Another limitation is attempting to make inferences about the population based on the sample of respondents. In order to make generalized inferences regarding the data collected, the researcher assumes that the sample is representative of the characteristics of the broader population, and that these characteristics follow some model or are evenly distributed over the population (Statistics Canada, 2010). Non-probability sampling does not provide for computation of sampling error (Statistics Canada, 2010). Factors which may affect the precision of results include the variability of the population, the size of the population, survey design, and the response rate (Statistics Canada, 2010). Inferences can introduce error when reporting results from the sample and inferring to the population. Also, when responses consistently under- or over-estimate personal characteristics, it can create invalid data (Fowler, 2014). However, the design of the MSLQ is such that the participant answers similar questions for the same trait so as to reduce answer bias (Pintrich et al., 1991). According to Artino and Stevens (2006), "social desirability bias is considered a significant threat to the construct validity of any self-report instrument" (p. 7) including the MSLQ.

The current study represents a snap-shot review dependent upon the time of year that the survey is distributed. Most allied health programs commence in September of each year, with exams in December and May annually. The timing of the survey may have influenced student participation related to how busy they are in their respective programs and whether or not they have had any exposure to learning in a simulated environment. The survey was distributed in late October at approximately mid-term to avoid over-lap with final exams.

This study aimed to gather data in a similar manner to other studies using the MSLQ in order to compare local results with those of other authors (Cook, Thompson, & Thomas, 2011; D'Lima et al., 2014; Hamid & Singaram, 2016). A learner characteristic that was not included in the data set is ethnicity. Ethnicity has been shown to influence self-efficacy beliefs and the importance placed on academic achievement, but remains under-investigated and difficult to draw strong conclusions from the evidence that does exist (D'Lima et al., 2014; Honicke & Broadbent, 2016). Authors originating in countries outside of North America found similar self-efficacy scores as those within Canada or the United States (Akhu-Zaheya et al., 2013; Cheraghi, Hassani, Yaghmaei, and Alavi-Majed, 2009; Hassankhani et al., 2015), and therefore, for the purposes of this study, it was assumed that ethnicity does not influence the self-reporting of motivational beliefs.

The use of a Likert scale is a popular format in survey design and provides a simple response construct that measures one's attitudes from positive to negative (Johns, 2010). The disadvantages to the use of a Likert scale include ambiguity in interpretation of qualitative responses contained in the scale and a generalization to the responses through numerical summation (Johns, 2010). Respondents to the MSLQ were asked to self-report based on a response scale that indicates "very true of me" to "not at all true of me" (Pintrich et al., 1991); this required respondents to have a truthful awareness of their feelings in response to the questions. For the purposes of this study, the researcher relied on prior research which validated the questionnaire as valid and reliable in eliciting accurate assessments across multi-dimensional components (Duncan & McKeachie, 2005).

Delimitations imposed in this research include factors related to race and culture. Cultural background and race have been shown to influence self-efficacy beliefs, motivation to learn, and the importance placed on academic achievement, but it remains under-investigated and therefore, difficult to draw strong conclusions from the evidence that does exist (D'Lima, Winsler, & Kitsantas, 2014; Honicke & Broadbent, 2016). In medical and nursing education, authors originating in countries outside of North America found similar self-efficacy scores as those within Canada or the United States (Akhu-Zaheya, Gharaibeh, & Alostaz, 2013; Cheraghi et al., 2009; Hassankhani, Aghdam, Rahmani, & Mohammadpoorfard, 2015). For the purposes of this study, it was assumed that race and culture did not influence the self-reporting of motivational beliefs.

Another delimitation in the current study was the decision to use one post-secondary institution. The institute of technology selected for this research was based in part on convenience, in that the institution has many health science programs and a robust population of full-time students. Simulation-based learning is a common pedagogical approach used in all of the health science programs targeted in this study.

Expected Findings

Age, gender, and motivational beliefs. The relationship of age and gender to motivational beliefs has been studied, but with inconclusive results (Balam & Platt, 2014; D'Lima et al., 2014; Hamid & Singaram, 2016). Hamid and Singaram (2016) found a significant difference in composite scores for motivation between male and female first-year medical students with females demonstrating higher scores. In contrast, Balam and Platt (2014) did not find a statistically significant difference in gender scores for motivation for undergraduate students. Studies that examined self-efficacy across differing academic contexts found self-efficacy scores were significantly different for males and females depending on the content domain (Huang, 2013). For example, females demonstrated higher scores language arts self-efficacy but males had higher science and math self-efficacy scores (Huang, 2013). Based on the literature, it is expected that this study will not demonstrate a statistically significant difference in motivational beliefs based on age and gender.

Completion of baccalaureate degree and motivational beliefs. The relationship between the prior completion of a baccalaureate degree to motivational beliefs is supported by two key concepts within self-efficacy and motivation to learn constructs (D'Lima et al., 2014; Gray et al., 2014). Within Bandura's (1989; 1992) social cognitive theory, self-efficacy is supported by mastery of performance and impacts one's ability to confront, as opposed to avoid, obstacles encountered along the path to goal attainment. In an academic context, students with a high self-efficacy are better at effort regulation and demonstrate a stronger engagement and motivation to learn (D'Lima et al., 2014; Gray et al., 2014). Students learning in a simulated clinical environment offers a unique learning context, one that may be very different compared to traditional learning experiences. It is, nevertheless, expected that students with a previously completed baccalaureate degree will report higher scores for motivated strategies for learning in the expectancy and value components but with lower affective (test anxiety) scores than those without a degree.

Ethical Issues in the Proposed Study

The ethical issues in this study included informed consent from participants and protection of privacy for respondents. All registered, full-time health students in the specified programs received an introductory email explaining the nature of the study and contact information of the researcher (Appendix A). Once the student clicked on the survey link, he or she was welcomed to participate in the study with a cover letter detailing the purpose of the study, confidentiality and anonymity requirements, and data storage. The primary investigator is responsible for ensuring that the collection and archiving of data complies with relevant laws and regulations such as the Freedom of Information and Protection of Privacy Act (1996) and Canada's Anti-Spam Legislation (CASL, 2014).

Approval from the IRB at Concordia University was obtained in parallel with the REB application through the Canadian institution included in this study. The purpose of the IRB (United States) and the REB (Canada) is to ensure that appropriate steps are taken to protect the rights and welfare of all humans participating in research studies. In their review of research proposals, the IRB/REB members evaluate the researcher's adherence to three main ethical principles; specifically, respect for persons, beneficence, and justice. A survey such as this one, is typically seen as low risk for participants so long as security of data remains paramount. The author of this study declared no conflict of interest; students registered in the researcher's health science program were excluded from participation.

Summary

The link between motivational beliefs and performance has been the subject of many studies (Balam & Platt, 2014; Duncan & McKeachie, 2005; Gray et al., 2014; Komarraju & Nadler, 2013). The variability in determining the strength of the relationship and predictive nature of outcomes can be related back to the way in which respondents answer questions related to what they believe to be true about themselves and the context of the learning environment. Applications of motivation theory in the attainment of clinical competency can be found in nursing and medical education but is under-represented in allied health research. Those who have studied student characteristics that influence learning attempt to understand the relationships between perceived self-efficacy, motivation to learn, and attainment of competency in clinical practice (Akhu-Zaheya et al., 2013; Burke & Mancuso, 2012; Rice, 2015; Rowbotham & Owen, 2015). Understanding the effect of perceived self-efficacy and the impact on motivation to learn can assist educators to support students during SBL.

The lack of consensus across the literature suggests that researchers need to examine the nature of self-efficacy and other motivational and cognitive variables within the self-regulated learner framework including learner characteristics (Honicke & Broadbent, 2016). This study employed a quantitative method and descriptive survey design to better understand learner characteristics and motivational beliefs in the context of learning in a simulated environment in health science programs for a cross-sectional population in a Western Canadian institute of technology. Statistical analysis was completed to examine the relationships between variables to assist in rejecting the null hypotheses, or not.

Chapter 4: Data Analysis and Results

Introduction

The purpose of this study was to examine the learner characteristics of age, gender, and the completion of a baccalaureate degree as potential influencing factors in the self-reporting of motivational beliefs for simulation-based learning (SBL) within nursing and allied health programs in a Western Canadian institute of technology. Development of competency is dependent upon the students' ability to apply knowledge and skill to specific clinical procedures. Furthermore, competency is further enhanced by effective learning in a simulated clinical environment which relies on active learning and student engagement (CAMRT, 2014; Franklin & Lee, 2014). Success during SBL is related to one's perceived self-efficacy and motivation to learn; wherein Bandura's (1986) theory of self-efficacy is an individuals belief that he or she can be successful in his or her efforts and has capabilities to exercise control over events which affect his or her life, and motivation to learn is based in one's expectancy for success, task value, and anxiety (Pintrich, Smith, García, & McKeachie, 1991).

This study strived to answer three research questions by examining the relationships between gender, age, prior completion of a baccalaureate degree, and motivational beliefs in individuals enrolled in a full-time nursing or allied health program. The context for the study was specific to simulation-based learning, also known as clinical simulation, frequently used in the health science programs identified in this research. Statistical analyses were conducted across the learner characteristics of age, gender, prior completion of a baccalaureate degree, and mean scores from the motivational beliefs questionnaire.

The survey implemented in this study was comprised of three sections: the first section focused on demographic information such as current field of study, age, gender, and prior completion, or not, of a baccalaureate degree (Appendix B); the second section asked respondents to identify different approaches to simulation and frequency of use they have experienced in their current program; and the third section contained 31 questions from the Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich et al. (1991), and modified for context specific to SBL. The results of the data collected and accompanying statistical analyses is presented in this chapter, along with a description of the sample and a summary of the results examining the relationships between variables.

Description of the Sample

The target population included full-time registered allied health students in a Western Canadian institute of technology. Students enrolled in full-time programs were invited to participate in the survey. The participants who responded to the questionnaire are considered a convenience sample (Creswell, 2012; Robb, 2016). While this form of sampling has its disadvantages, including rendering the researcher reliant upon those who chose to complete the questions, potentially introducing response bias (Fowler, 2014). Although the timing of the study hoped to maximize response rate, a large proportion of the population chose not to respond to the survey.

Non-response may have been a result of the survey not reaching the intended participants, participants who received the questionnaire but choose not to respond (refusal), or participants who received the survey but were unable to perform the task due to personal limitations or barriers (Fowler, 2014). Not all respondents who started the questionnaire completed all questions, leading to a 69.5% completion rate. The lack of response and partial completion rate may also have been the result of survey fatigue, as students in higher education are often surveyed across multiple institutional initiatives (Porter & Whitcomb, 2005). Registration included 544 students in the full-time nursing program and 518 students in the remaining nine allied health programs (medical radiography, nuclear medicine, medical lab science, biomedical engineering, prosthetics and orthotics, medical sonography, biotechnology, electroneurophysiology, environmental health). All responses were anonymous and the data provided has been used for this analysis.

Summary of the Results

Respondents were asked to identify their age, gender, current field of study, level in their program, and whether or not they had completed a baccalaureate degree prior to entering their respective health science program (Appendix B). The MSLQ portion of the questionnaire contained 31 questions specific to motivational beliefs. A total of 73 participants started the survey but only 56 completed the survey in its entirety (69.5% completion rate). Response data included mean age calculated as 25.42 years and median age of 24 years. Two respondents were significant outliers from the mean age, stating 42 and 51 years. The Statistical Package for Social Sciences (SPSS; IBM, 2017) software allows the researcher to transform outlier data but for the purposes of this research, the age responses were not manipulated. Furthermore, by grouping participants according to age (18–22 years, 23–26 years, and 27+ years) the effect of the two outliers was diminished. Figure 1 shows the distribution of age by frequency.

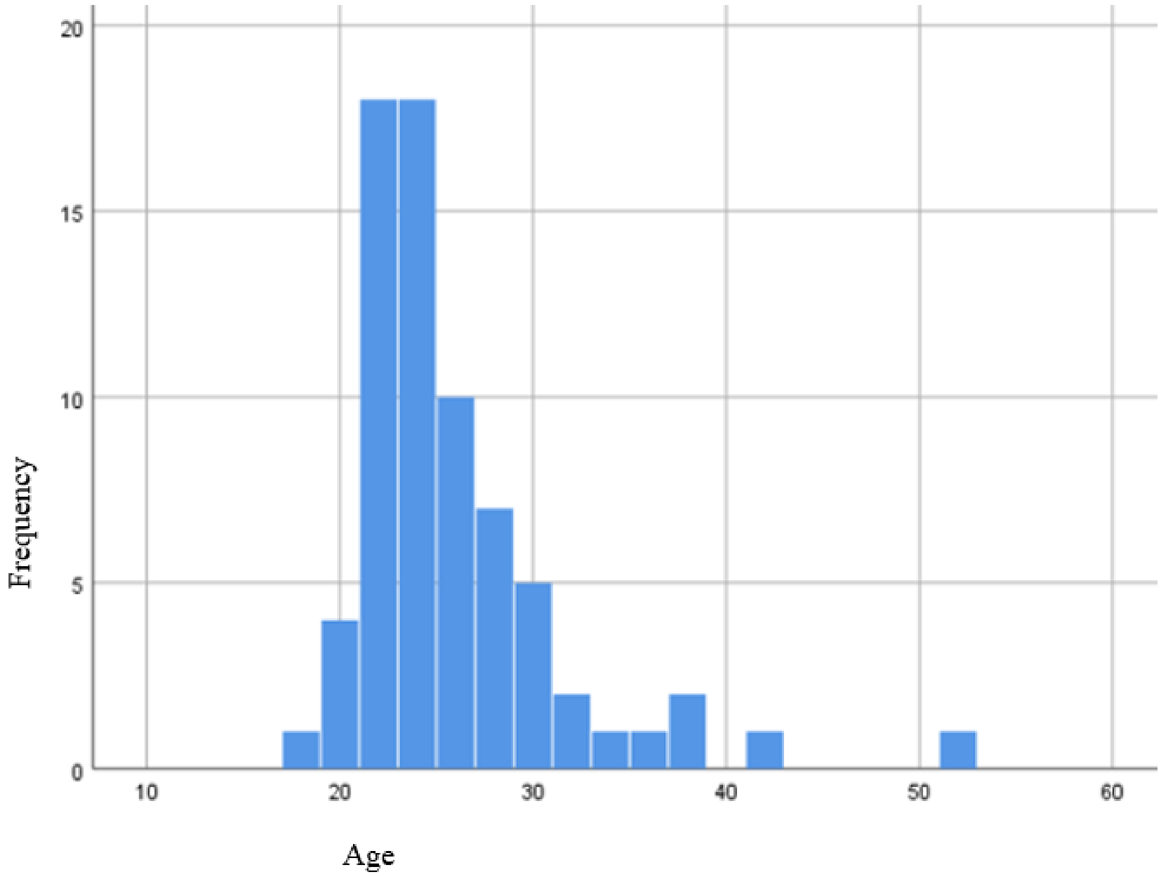

Figure 1. Age histogram

Seventy-three participants answered the question related to current field of study; of those responses 29 (39.7%) were allied health students and 44 (60.3%) were enrolled in the nursing program. The year of study question yielded 28 (38.4%) first year students responses, 22 (30.1%) second year, and 23 (31.5%) third or final year students. Table 2 summarizes the responses to current field of study and level in the program.

Table 2

Program and Year of Study

Program	Level in program (by year)			Response by program (*n*)
	First	Second	Final	
Biomedical engineering	1	0	0	1
Biotechnology	1	0	1	2
Electroneurophysiology	0	1	0	1
Environment health	0	0	2	2
Medical lab science	2	4	0	6
Medical radiography	7	4	0	11
Medical sonography	2	0	2	4
Nuclear medicine	1	0	0	1
Nursing (BSN)	14	12	18	44
Prosthetics and orthotics	0	1	0	1
Total by level *n* (%)	28 (38.4%)	22 (30.1%)	23 (31.5%)	73 (100%)

The sample population included 58 female (79.5%) and 13 male respondents (17.8%), and two respondents who chose “other” or did not declare gender. Female participants outnumbered male participants at a rate reflective of typical gender enrolment statistics in nursing and allied health programs (UBC, 2016). Prior completion of a degree yielded 33 (45.2%) respondents who had and 40 (54.8%) who had not completed a degree prior to their current program. The data identified one participant in the 18–22 age group with a prior baccalaureate degree. The largest proportion of degree completion was seen in respondents aged 23–30 years (26 out of 40 respondents; 65%). Completion of a prior degree included biomedical engineering, prosthetics and orthotics, nuclear medicine (*n* = 1 each), environmental health (*n* = 2), medical radiography, sonography (*n* = 3, each), and BSN nursing (*n* = 18; 41% of responses in this program). Furthermore, 9 out of 13 male respondents (69%) and 23 out of 58 female respondents (41%) completed a degree prior to their current field of study. Table 3 summarizes the demographic data related to gender and prior completion of a degree.

Table 3

Gender and Prior Completion of Degree

Gender	*n*	%	Prior degree *n* (%)
Female	58	79.5%	23 (40%)
Male	13	17.8%	9 (69%)
Other/no response	2	2.7%	1 (50%)
Total (N)	73	100%	
Prior degree	*n*	%	
Yes	33	45.2%	
No	40	54.8%	
Total (N)	73	100%	

The second section of the survey asked participants to identify the type and frequency of simulation approaches used in their respective programs; the definition of simulation was provided to participants in the introduction to Section B (Appendix B). According to Pilcher et al. (2012), simulation is defined as structured activities that represent situations in practice and allows the participant to develop or enhance knowledge, skills, and attitudes in a simulated environment (Pilcher et al., 2012). Only 63 participants completed all questions in this section from the 73 that started the questionnaire representing an 86% completion rate. Participants who skipped this section may be a reflection of the respondent not knowing or understanding the questions asked or how to respond accurately to these questions; unfortunately, it is impossible to know exactly why participants did not complete these questions but continued with the questionnaire.

Table 4

Frequency and Type of Simulation by Year in Program

	None/Not sure	Some, not frequent	Frequent	Very frequent	Level in program
Low-technology simulators	0	2	8	11	1
	0	8	8	5	2
	0	2	15	5	3
Total	0	12	31	21	*n* = 64
Simulated/ standardized patients	3	4	4	10	1
	1	8	8	4	2
	1	10	11	0	3
Total	5	22	23	14	*n* = 64
Screen based computer simulations	10	5	3	3	1
	10	6	5	0	2
	11	7	3	0	3
Total	31	18	11	3	*n* = 63
Complex task trainers	13	4	2	2	1
	11	6	2	1	2
	11	6	3	2	3
Total	35	16	7	5	*n* = 63
Case study/clinical scenarios	0	5	7	9	1
	1	6	10	4	2
	3	2	10	6	3
Total	5	13	27	19	*n* = 63
Unfolding case simulations	7	9	3	2	1
	8	9	4	0	2
	6	11	3	2	3
Total	21	29	10	4	*n* = 64

The third section of the survey was based on the MSLQ (Pintrich et al., 1991) and has been used in a variety of studies across many different student groups, ages, and programs (Duncan & McKeachie, 2005). This study used only the motivational subscale portion of the MSLQ, which consisted of 31 questions. Specifically, these subscales included questions to assess intrinsic goal orientation, extrinsic goal orientation, self-efficacy, control of learning beliefs, task value and test anxiety in the context of learning in a simulated environment. Responses were in the form of a 1–7 Likert scale in which the low end represents "not at all true of me" and the high end represents "very true of me" (Pintrich et al., 1991, p. 41). In general, higher scores that range between four and seven are considered better than lower scores across all subcomponents except test anxiety. A higher score within the test anxiety responses reflects student worry about testing (Fang, bin Daud, Al Haddad, & Mohd-Yusof, 2017). The questions were designed to ask participants to rate their responses across six different categories (Appendix C).

Further grouping of each individual category creates three main motivational components: the expectancy component consisted of questions related to self-efficacy and control of learning beliefs relating to a student's belief that his or her efforts will result in positive outcomes. The value component was assessed with questions related to task value as well as intrinsic and extrinsic goal orientation. The affective component was assessed with questions related to test anxiety (Pintrich et al., 1991).

Detailed Analysis

All data was tabulated on a spreadsheet and coded for uploading to SPSS 25 software platform (IBM, 2017). Once the data was entered, it was reviewed for missing data and item nonresponse (Fowler, 2014). Questions in the MSLQ were recoded to identify the specific subscale of assessment (i.e., intrinsic goal orientation, extrinsic goal orientation, self-efficacy, task value, control of learning beliefs, and test anxiety). This allowed the researcher to cluster specific sub-scale items for component analysis. The value component included responses for questions identified as intrinsic goal orientation, task value, and extrinsic goal orientation. Goal orientation refers to the student's perception of the reasons why one is engaging in the learning task and the motivating reward as a result of learning. Task value assesses how interesting or useful the learning task is perceived by the student–a high task value should reflect more involvement in learning by the student (Pintrich et al., 1991). The expectancy component includes responses to questions assessing self-efficacy and control of learning beliefs, and the third component is considered affective and included questions which assess test anxiety.

Calculations were conducted to evaluate the internal consistency of each motivational subscale. Internal consistency, or Cronbach's alpha, is used to assess the congruence of responses across several survey questions that ask the same type of question (Creswell, 2012). Strong internal consistency is achieved the closer Cronbach's alpha approaches 1 indicating shared covariance (Creswell, 2012). While the internal consistency aspect of reliability can be an issue with self-reported measures such as those found in the MSLQ (Duncan & McKeachie, 2005), according to the alpha coefficients tabulated, questions assessing self-efficacy, task value, and test anxiety provided the best consistency across responses respectively, whereas internal and external goal orientation reflected the lowest alpha coefficient results for internal consistency (Table 5). The alpha coefficient based on standardized items is alpha computed on the correlation matrix of items (Falk, & Savalei, 2011). In this study, the items were scored using the same metric and left in raw form so the covariance matrix (Cronbach's alpha) could be used to determine the internal consistency (Falk, & Savalei, 2011). Table 5 provides a summary of Cronbach's alpha and alpha coefficients based on standardized items:

Table 5

Calculation of Cronbach's Alpha

Category of motivation strategies	Number of items	Cronbach's alpha	Alpha coefficient based on standardized items
Intrinsic goal orientation	4	.519	.526
Extrinsic goal orientation	4	.596	.592
Self-efficacy	8	.877	.884
Task value	6	.840	.849
Control of learning beliefs	4	.682	.692
Test anxiety	5	.767	.754

Research question 1. The first research question examined the role of gender on the self-reporting of motivational beliefs for learning in a simulated environment. Previous studies have sought to define the relationship between gender and motivational beliefs but with inconclusive results (Balam & Platt, 2014; D'Lima, Winsler, & Kitsantas, 2014; Hamid & Singaram, 2016; Musick & Ray, 2016). The null hypothesis in this study stated that gender does not play a role in the self-reporting of motivational beliefs for learning during SBL.

The following tables (6–11) provide a summary of responses from male and from female respondents to the MSLQ instrument for each of the three constructs, namely value, expectancy, and affective components, respectively. Comparison for gender responses to the MSLQ questions related to the value component (intrinsic goal and extrinsic goal orientation, and task value), expectancy component (self-efficacy and control of learning beliefs), and affective component (test anxiety) were completed in descriptive and independent samples *t*-test analyses.

Due to the low response rate for gender "other/not declared" (*n* = 1), this category was removed and a subsequent independent samples *t*-test was conducted based on the male and female responses. The independent samples *t*-test procedure assumes there is no relationship between the study participants in each group (independence of observations) and that there are no significant outliers (Bannon, 2013). The Levene's test assumes equal variances between groups if the significance value (sig) is small (<.05); in each calculation of gender, the Levene's value was large (>.05) therefore, equal variances was assumed across all components (Appendix D).

Descriptive results show that female respondents were more likely to feel anxious to testing (*M* = 4.49, *SD* = 0.74) as compared to male respondents (*M* = 3.83, *SD* = 1.16) but further analysis across all responses to the affective component did not find statistically significant results for gender (Table 11). Slight mean differences between female and male responses were demonstrated in the value component and expectancy component but further analysis did not prove these to be statistically significant (Tables 7 and 9, respectively). The results of the independent samples *t*-test compared mean scores for motivational beliefs from the three different components and gender (two categories) which revealed the following summative results for each motivation component; there was not a statistically significant difference for male participants (*M* = 5.47, *SD* = 0.64) compared to female participants (*M* = 5.22, *SD* = 0.49), t(22) = 1.05, *p* = .30 (two-tailed) for the expectancy component. Similarly, comparing mean scores for the affective component and the gender question yielded no significant difference for male respondents (*M* = 3.83, *SD* = 1.16) and female respondents (*M* = 4.49, *SD* = 0.74), t(8) = 1.08, *p* = .31 (two-tailed); the value component scores were also deemed not statistically significant for males (*M* = 5.09, *SD* = 0.57) and females (*M* = 5.32, *SD* = 0.59), t(26) = 1.01, *p* = 0.32.

Table 6

Gender Mean Scores for Motivated Strategies: Value Component

Gender	Male	Female
Intrinsic goal	Mean Scores (SD)	
Q1.	5.36 (1.50)	5.35 (1.11)
Q16.	5.64 (1.20)	5.63 (1.38)
Q22.	5.18 (1.08)	5.63 (1.20)
Q24.	4.27 (1.42)	5.02 (1.62)
Gender Mean (SD)	5.11 (0.59)	5.41 (0.29)
Extrinsic goal		
Q7.	4.09 (1.92)	4.21 (1.53)
Q11.	4.64 (1.70)	4.14 (1.64)
Q13.	5.27 (1.79)	4.95 (1.62)
Q30.	4.91 (1.97)	5.16 (1.64)
Gender Mean (SD)	4.72 (0.49)	4.61 (.516)
Task Value		
Q4.	4.45 (1.13)	5.28 (1.30)
Q10.	6.00 (1.09)	5.77 (1.46)
Q17.	5.18 (1.60)	5.47 (1.28)
Q23.	5.73 (1.27)	6.09 (1.02)
Q26.	5.09 (1.22)	5.70 (.939)
Q27.	5.55 (.820)	6.07 (.961)
Gender Mean (SD)	5.33 (0.55)	5.73 (0.32)

Table 7

Independent Samples t-test: Gender and Value Component

	Levene's test for equality of variances		t-test for equality of means				
Equal variances assumed for all	F	Sig.	t	df	Sig. (2-tailed)	Mean diff	Std error diff
Q1. intrin_1	1.050	.310	.037	52	.971	.015	.404
Q16. intrin_2	.000	.991	.019	52	.985	.008	.456
Q22. intrin_3	.061	.806	-1.124	52	.266	-.446	.397
Q24. intrin_4	.404	.528	-1.399	52	.168	-.751	.537
Q4. tv_1	.204	.653	-1.927	52	.059	-.825	.428
Q10. tv_2	.267	.608	.492	52	.625	.233	.472
Q17. tv_3	.823	.369	-.623	52	.536	-.283	.455
Q23. tv_4	1.469	.231	-1.009	52	.317	-.366	.362
Q26. tv_5	.087	.769	-1.796	52	.078	-.607	.338
Q27. tv_6	.089	.767	-1.659	52	.103	-.524	.316
Q7. extr_1	.457	.502	-.217	52	.829	-.118	.546
Q11. extr_2	.133	.717	.891	52	.377	.497	.558
Q13. extr_3	.465	.498	.572	52	.570	.319	.559
Q30. extr_4	.508	.479	-.438	52	.663	-.254	.579

Note: intrin = intrinsic goal orientation; tv = task value; extr = extrinsic goal orientation

Table 8

Gender Mean Scores for Motivated Strategies: Expectancy Component

Gender	Male	Female		Male	Female
Self-efficacy	Mean (SD)		Control of LB	Mean (SD)	
Q5.	4.90 (1.59)	4.77 (1.40)	Q2.	5.20 (1.23)	5.57 (1.26)
Q6.	5.00 (1.56)	4.57 (1.50)	Q9.	4.90 (1.91)	4.91 (1.62)
Q12.	6.60 (.51)	6.09 (1.07)	Q18.	6.20 (.789)	5.80 (1.25)
Q15.	5.60 (.70)	5.02 (1.48)	Q25.	4.30 (1.57)	4.66 (1.55)
Q20.	5.50 (1.08)	4.86 (1.23)	Gender Mean (SD)	5.15 (0.79)	5.23 (0.54)
Q21.	5.90 (.738)	5.43 (1.17)			
Q29.	5.80 (.919)	5.48 (1.17)			
Q31.	5.70 (.823)	5.52 (1.30)			
Gender Mean (SD)	5.62 (0.53)	5.22 (0.50)			

Note: Control of LB = Control of Learning Beliefs

Table 9

Independent Samples t-test: Gender and Expectancy Component

	Levene's test for equality of variances		t-test for equality of means				
Equal variances assumed for all	F	Sig.	t	df	Sig. (2-tailed)	Mean Diff	Std. Error Diff
Q2. clb_1	.135	.715	-.835	52	.408	-.368	.441
Q9. clb_2	.425	.517	-.015	52	.988	-.009	.588
Q18. clb_3	1.425	.238	.976	52	.333	.405	.414
Q25. clb_4	.013	.909	-.659	52	.513	-.359	.545
Q5. se_1	.179	.674	.254	52	.801	.127	.502
Q6. se_2	.011	.918	.816	52	.418	.432	.530
Q12. se_3	1.745	.192	1.453	52	.152	.509	.350
Q15. se_4	2.766	.102	1.192	52	.239	.577	.484
Q20. se_5	.081	.776	1.506	52	.138	.636	.423
Q21. se_6	3.618	.063	1.208	52	.233	.468	.388
Q29. se_7	.880	.353	.814	52	.419	.323	.396
Q31. se_8	.953	.334	.410	52	.683	.177	.432

Note. clb = control of learning beliefs; se = self-efficacy

Table 10

Gender Mean Scores for Motivated Strategies: Affective Component

Gender	Male	Female
Test Anxiety	Mean (SD)	
Q3.	2.42 (1.67)	3.62 (2.108)
Q8.	3.92 (1.97)	4.06 (1.878)
Q14.	3.58 (2.02)	4.55 (2.24)
Q19.	3.58 (1.16)	4.64 (1.83)
Q28.	5.64 (1.20)	5.59 (1.54)
Gender Mean (SD)	3.83 (1.16)	4.49 (0.738)

Table 11

Independent Samples t-test: Gender and Affective Component

	Levene's test for equal variances		t-test for equality of means				
Equal variances assumed for all	F	Sig.	*t*	df	Sig. (2 tailed)	Mean difference	Std error difference
Q3. tanx_1	2.388	.128	-1.487	52	.071	-1.203	.654
Q8. tanx_2	.570	.454	.145	52	.815	-.143	.610
Q14. tanx_3	1.939	.170	-.894	52	.179	-.970	.712
Q19. tanx_4	2.443	.124	-2.081	52	.065	-1.053	.559
Q28. tanx_5	.988	.325	.156	52	.928	.045	.501

Note. tanx = test anxiety

Research question 2. The second research question sought to understand the relationship between age and motivational beliefs by examining age data to the self-reporting of motivational beliefs for learning for SBL. An examination of the difference between age and motivational beliefs in the context of a post-secondary environment is limited. For the purposes of this study, participants were asked to provide their current age in years; this data was subsequently recoded to create three age groups with participants who completed the remaining questions in the survey (N = 65). The first group, aged 18–22 years, consisted of 21 students. The second group, aged 23–26 years, consisted of 25 students and the third group had a total of 19 students aged 27 years or older. One-way ANOVA analysis and post-hoc Tukey Honest Significance (HSD) tests were done on the data (Appendix E). ANOVA analysis did not demonstrate a statistically significant difference ($p > 0.05$) across the age groups in all three motivational components (value, expectancy, and affective). Furthermore, comparisons between groups did not identify statistically significant differences (Table 12); because the ANOVA analysis did not demonstrate a difference, the Tukey HSD was not required.

Table 12

One-way ANOVA for Age and Motivational Beliefs

One-way ANOVA for age		df	Mean Square	F	Sig
Value Component	Between Groups	2	0.7630	0.596	.554
	Within Groups	57	36.4667		
	Total	59			
Expectancy Component	Between Groups	2	0.1124	0.099	.906
	Within Groups	69	39.136		
	Total	71			
Affective Component	Between Groups	2	6.9663	1.016	.367
	Within Groups	69	236.4829		
	Total	71			

Research question 3. The third question examined whether completing a prior baccalaureate degree influenced the self-reporting of motivational beliefs for learning in a simulated environment. The null hypothesis stated that the completion of a previous baccalaureate degree does not influence the self-reporting of motivational beliefs for learning during SBL. Independent samples *t*-test analysis is an appropriate statistical procedure to use when examining a continuous variable (MSLQ responses) with a categorical predictor with two response categories (prior degree/no prior degree) as the independent variable (Appendix F). The number of participants in each of the categories was balanced across all 31-motivational beliefs responses; a balanced group of respondents supports the validity of the independent samples t-test (Bannon, 2013).

The results of the independent samples *t*-test compared mean scores for motivational beliefs from the expectancy component to whether the student had a prior degree or not; there was not a statistically significant difference for "no degree" (M = 5.36, SD = 0.58) compared to participants with a degree (M = 5.07, SD = 0.37), t(22) = 1.49, p = .15 (two-tailed). Similarly, comparing mean scores for the affective component and the degree question yielded no significant difference for "no degree" (M = 4.60, SD = 0.69) and "degree" (M = 4.13, SD = 0.96), t(8) = 0.89, p = .40 (two-tailed); the value component scores were also deemed not statistically significant for "no degree" (M = 5.32, SD = 0.17) and "degree" (M = 5.19, SD = 0.16), t(26) = 0.51, p = .61.

In order to have enough statistical power it is important to have a minimum of 30 participants per cell to detect a medium to large effect size (Bannon, 2013) which this study achieved with 33 out of 73 indicating completing a degree prior to their field of study. The independent samples *t*-test did not demonstrate a significant relationship between respondents with or without a degree prior to their current field of study (Appendix F); significance values were above .05 and therefore the researcher cannot reject the null hypothesis.

The decision to reject or not reject the null hypothesis can potentially introduce error based on the interpretation of the data analysis. The first type of error, type I, is the incorrect rejection of the null hypothesis due to the acceptance of a relationship that does not exist. The probability of this error rate is alpha (Creswell, 2012). Type II error is due to the researcher failing to reject the null hypothesis when an affect or relationship does occur in the relationship; the probability of this error rate is called beta (Creswell, 2012). According to Creswell (2012), the researcher can reject the null hypothesis when it should be rejected because an effect exists due to the strength of the relationship.

Summary

The purpose of this study was to examine learner characteristics including age, gender, and the prior completion of baccalaureate degree as influencing factors in the self-reporting of motivational beliefs during SBL. Participants in this study included full-time students in nursing and allied health programs across one post-secondary institution who voluntarily completed the survey. Data was collected, coded, and analysed in a statistical software program, SPSS 25 (IBM, 2017).

Statistical analyses were conducted across the learner characteristics of age, gender, prior completion of a baccalaureate degree, and the mean scores from the motivational strategies questionnaire. Results of the analyses did not provide statistical evidence to reject any of the null hypotheses. No strong associations between variables were noted for age and the motivational components of expectancy for success (self-efficacy, control of learning beliefs), value components (task value, intrinsic and extrinsic goal orientation), and the affective component of test anxiety.

This chapter provided the results from the questionnaire and explained the data analysis performed in this study. Descriptive tables provided the data according to the scores collected from participants while inferential analysis in the form of one-way ANOVA and independent samples *t*-test did not provide statistically significant results. The next chapter, Chapter 5, addresses the challenges and limitations in this study, results in relation to the literature, and possible solutions and recommendations for future research on these topics.

Chapter 5: Discussion and Conclusions

Introduction

Chapter 5 commences with a restatement of the study and the research questions. A connection of the results to the current literature is made to further understand the characteristics of learners to motivational beliefs. The link between motivational beliefs and performance has been the subject of many studies (Balam & Platt, 2014; Duncan & McKeachie, 2005; Gray, McGuiness, Owende, & Carthy, 2014; Komarraju & Nadler, 2013). The variability in determining the strength of the relationship and predictive nature of outcomes can be related back to the way in which respondents answer questions reflecting what they believe to be true about themselves and the context of the learning environment.

Applications of self-efficacy theory in the attainment of clinical competency can be found in nursing and medical education but is under-represented in allied health programs. Those who have studied student characteristics influencing learning in health education attempt to understand the relationships between perceived self-efficacy, motivation to learn, and attainment of competency in clinical practice (Akhu-Zaheya, Gharaibeh, & Alostaz, 2013; Burke & Mancuso, 2012; Rice, 2015; Rowbotham & Owen, 2015), as doing so can assist educators to support students during simulation-based learning (SBL).

The lack of consensus across the literature suggests that researchers need to examine the nature of self-efficacy and other motivational and cognitive variables within the self-regulated learner framework including learner characteristics (Honicke & Broadbent, 2016). This study employed a survey to better understand the relationships between specific learner characteristics and motivational beliefs in the context of learning in a simulated environment in health science programs within a cross-sectional population of a Western Canadian institute of technology.

Statistical analysis included descriptive calculations of mean, standard deviation, and range of data. Inferential analysis assisted in testing the three hypotheses related to the research questions.

Summary of Results

The purpose of this study was to examine age, gender, and prior completion of baccalaureate degree as learner characteristics influencing factors in the self-reporting of motivational beliefs during SBL. Participants included full-time students in nursing and nine allied health programs across one post-secondary institution. Data was collected, coded, and analysed in a statistical software program called SPSS 25 (IBM, 2017). Descriptive and inferential analyses were conducted across variables associated with the participant (age, gender, prior completion of a baccalaureate degree) and responses to questions assessing motivational beliefs in the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, García, & McKeachie, 1991). Statistical analysis included independent sample t-tests and one-way ANOVA tests based on categorical and continuous variables.

This study served to answer three research questions: First, what role does gender have in the self-reporting of motivational beliefs for learning in a simulated environment? The results of this survey provided 73 responses to the gender question; two participants choose not to indicate male or female, but only one of these respondents continued with the questionnaire. Subsequently, the data associated with the one participant who indicated gender as *other/not declared* was removed from the analysis. Of the remaining 71 responses, 13 (17.8%) were male and 58 (79.5%) were female participants. Mean scores within each of the subcomponents were fairly uniform with perhaps one exception when responding to questions related to test anxiety. Female respondents were more likely to score high for test anxiety (mean score = 4.48, SD = 0.74) as compared to male respondents (mean score = 3.95, SD = 1.12) where 7 represents the high end of the Likert scale and is associated with the response "*very true of me*". Further analysis using independent samples *t*-test did not reveal a statistically significant difference in the affective component nor did expectancy and value components for gender responses and therefore, the null hypothesis cannot be reject (Appendix D).

The second research question sought to understand the relationship between age and motivational beliefs and asked if age influences the self-reporting of motivational beliefs for SBL. A total of 65 participants provided their current age and continued with this section of the questionnaire. The range in age was recorded as 18–51, with a median age of 25.46 (SD = 5.33); this data was subsequently used to create three age groups. The first group, aged 18–22 years, consisted of 21 students. The second group, aged 23–26 years, consisted of 25 students and the third group had a total of 19 students aged 27 years or older. One-way ANOVA analysis and post-hoc Tukey Honest Significance (HSD) tests were done on the data (Appendix E). One-way ANOVA analysis did not demonstrate a statistically significant difference across the age group in all three motivational components (value, expectancy, and affective). A post-hoc Tukey HSD is relevant only when the data results in a statistically significant outcome.

The third question posed to what extent does the completion of a previous baccalaureate degree play a role in the self-reporting of motivational beliefs for learning in a simulated environment. This question sought to understand the relationship between the successful completion of an undergraduate degree and the student's motivational beliefs in his or her current field of study. The null hypothesis stated that completion of a previous baccalaureate degree does not play a role in the self-reporting of motivational beliefs for learning during SBL. The results of this question revealed that 45.2% (n = 33) had completed a degree prior to their current field of study, and 54.8% (n = 40) had not completed a degree. The largest proportion of prior degree completion prior to their current field of study was evident in respondents aged 23-30 years (26 out of 40 respondents; 65%). Furthermore, 9 out of 13 male (69%) and 24 out of 58 female respondents (41%) completed a degree prior to their current field of study. Similar to the analysis of two gender categories and responses to the MSLQ, the question related to a prior degree had two categorical responses (no or yes) and so statistical analysis was performed using an independent samples t-test (Appendix F). Analysis of the data did not demonstrate a statistical significance between degree completion and the self-reporting of motivational beliefs, and therefore, the null hypothesis cannot be rejected.

In short, results from the analysis of variables did not provide statistical evidence to reject any of the null hypotheses; there was no association noted for gender, age, or completion of a prior degree as compared to motivational components of expectancy for success (self-efficacy, control of learning beliefs), value components (task value, intrinsic and extrinsic goal orientation), and the affective component of test anxiety. As a result, statistical analyses does not confirm a relationship between variables.

Discussion of Results

Students require opportunities to connect classroom theory with clinical practice in a safe environment. The development of simulated clinical environments has been met with wide acceptance in medical and health education (Azzam, Wasi, & Patel, 2016) for this purpose. High fidelity technology, hospital-like environments, and computerized human-patient simulators add a sense of realism to the simulated activity and provide context to the learning activities (Cardoza & Hood, 2012; Hamstra, Brydges, Hatala, Zendejas & Cook, 2014). Simulation-based learning has the advantage of exposing students to realistic clinical scenarios which provide comparable learning experiences across student populations, enabling all learners to meet the course objectives (Lubbers & Rossman, 2017; Reid-Searl, Bowman, McAllister, Cowling, & Spuur, 2014; Skrable & Fitzsimons, 2014).

Understanding the effect of perceived self-efficacy and the impact on motivation to learn in a simulated environment can assist educators to support student learning. The literature suggests that researchers need to examine the nature of self-efficacy and other motivational and cognitive variables within the self-regulated learner framework including learner characteristics (Honicke & Broadbent, 2016). Learner characteristics such as age, gender, and prior post-secondary education were examined as factors that may influence motivation to learn, including an assessment of self-efficacy, task value, control of learning beliefs, and goal orientations.

Inferential analysis of the data did not provide significant results to reject the null hypotheses for gender, age, or degree completion prior to current field of study. The first question examined the role of gender on the reporting of motivational beliefs for learning. Huang (2013) reported gender as a significant factor within specific learning contexts such as math or social sciences for high school students while Balam and Platt (2014) found that the differences in self-efficacy scores according to gender remain an unclear factor in college and university undergraduates. The results of this study demonstrated no difference in motivational beliefs between male and female respondents.

The second question examined the relationship between age and motivational beliefs. An examination of the correlation between age and motivational beliefs in the context of a post-secondary environment is limited. Henning et al. (2013) found that few studies of college level students link age and motivational variations, while also noting educational theorists believe that students at different ages possess different motivational constructs. One-way ANOVA analysis of the data collected in this study failed to identify differences across ages and responses to motivational beliefs subscales (Appendix E).

The third question explored the relationship between student motivational beliefs and their completion of an undergraduate degree prior to the current field of study in health science. Connor (2015) noted that nursing students with low self-efficacy were less likely to complete their academic program as compared to those with high self-efficacy and that retention in a specialized post-graduate program was influenced by previously obtained undergraduate GPA scores. It was hypothesized that completion of a baccalaureate degree would result in higher scores across the MSLQ but statistical analysis did not demonstrate a significant relationship between these variables.

Discussion of Results in Relation to the Literature

Motivational theory lies within the social cognitive model and places the learner as the active processor of information rather than focusing on learning styles or individual differences such as personality profiles (Duncan & McKeachie, 2005). When viewed from the perspective of the individual learner and as agents of their own endeavors, students make intentional decisions to invest in learning and change their behavior. Put another way, what people believe about their own abilities can influence learning (Artino, 2012; Duncan & McKeachie, 2005); students who are intrinsically motivated, have a high sense of self-efficacy, and value the learning experience are more likely to be successful in both a simulated learning and clinical environments (Dolan et al., 2013; Hassankhani et al., 2015). This conclusion substantiates Pintrich's claim that a higher perceived self-efficacy is associated with an intrinsic goal orientation and higher achievement outcomes (Pintrich, Smith, García, & McKeachie, 1993).

Researchers have provided evidence that self-efficacy is a strong predictor of motivation and performance across time, across a variety of environments, and different populations (Akhu-Zaheya, Gharaibeh, & Alostaz, 2013; Burke & Mancuso, 2012; Komarraju & Nadler, 2013; Rice, 2015; Rowbotham & Owen, 2015). When Zimmerman, Bandura, and Martinez-Pons (1992) examined the relationship between self-efficacy and academic motivation, they determined that academic achievement was strongly connected to self-efficacy. Students with a strong sense of self-efficacy were more likely to show increased effort and persistence even when faced with difficult or challenging tasks (Bandura, 1991; Kavanagh, 1992). A strong sense of self-efficacy manifests as an ability to control emotions when faced with challenges in that students exhibit a lower degree of stress, anxiety, and depression (Bandura, 1992, 1997; Kavanagh, 1992).

Using the theory of self-efficacy can assist educators in developing structured learning strategies that promote and support student learning. In health education, simulation is used to supplement traditional teaching methods, such as lectures and testing of knowledge. Cardoza and Hood (2012) demonstrated that baccalaureate nursing students reported an improvement in general self-efficacy after clinical simulation instruction compared to their perceived level of self-efficacy prior to simulation for specific patient care procedures. In a meta-analysis of research related to the outcomes of SBL in nursing, Adamson (2015) reported that some researchers found that learners who set personal goals for simulation activities demonstrated better performance in procedural skills. The setting of goals and motivation to learn are key characteristics of self-efficacy. Indeed, according to Rice (2015), “efficacy expectations [in students] not only influence initiating behaviors but also influence the degree of persistence applied to overcoming difficulties to complete a task" (p. 208) – attributes that are critical to competency and continual professional development after graduation.

Gender and motivational beliefs. The differences in self-efficacy scores according to gender have been analyzed by several authors but still remain an unclear factor (Balam & Platt, 2014). Some authors report gender as a significant factor within specific learning contexts – such as math or social sciences for high school students (Huang, 2013) – while others do not find gender to be a factor in motivational beliefs in college or university level students (Balam & Platt, 2014; Hamid & Singaram, 2016). Balam and Platt (2014) found no statistically significant difference in medical students' motivation or learning strategies related to gender. Hamid and Singaram (2016) similarly found no significant associations in learning strategies between female and male respondents, but did report statistically significant differences between genders with the composite score for motivation higher for females. D'Lima, Winsler, and Kitsantas (2014) found that male college students reported higher self-efficacy at the beginning of the semester as compared to their female counterparts. Over the course of the semester, self-efficacy increased for both males and females but the male respondents continued to report higher overall self-efficacious beliefs (D'Lima et al., 2014).

Age and motivational beliefs. While many studies report collecting age data, an examination of the correlation between age, self-efficacy, and motivational beliefs in the context of a post-secondary environment is limited. Henning et al. (2013) found that few studies of college level students link age and motivational variations, yet also noted that educational theorists do believe that students at different ages possess different motivational constructs. The authors provided one of the few studies in which age was shown to be an influencing factor on motivational beliefs and found that older students were more likely to score higher on test anxiety and for intrinsic goal orientations (Henning et al., 2013). Interestingly, Henning et al. reported female respondents provided a higher mean score for test anxiety than their male counterparts but a statistically weak correlation between age and test anxiety. The results of the current study adds to the ambiguity of age as a factor in motivational theory in the context of simulation-based learning.

Prior degree and motivational beliefs. The completion of a baccalaureate degree prior to entering an allied health program may result in higher self-efficacy and task value scores but had yet to be examined in the context of SBL. In Bandura's (1997) concept of self-efficacy, one strong factor strongly influencing a positive self-belief is that of performance mastery; students who have achieved a major milestone in post-secondary education prior to their current field of study in allied health may demonstrate stronger self-efficacy and motivational beliefs as a result. The results of this study did not find a statistically significant relationship between students with a prior baccalaureate degree and those without across all components of the MSLQ.

Limitations

The main limitation in this study was the small sample size. Nonresponse and incomplete responses to the survey limited the statistical power associated with the analysis and results. Porter and Whitcomb (2005) identified the challenges of dealing with non-response rates to surveys in higher education. Furthermore, the authors noted that student characteristics may influence who completes surveys and those who perennially choose not to participate in surveys. In their analysis of the literature, the authors (Porter & Whitcomb, 2005) found evidence that student affluence and a higher level of academic achievement were characteristics identifying students most to complete surveys. Gender also plays a role in that women are more likely to participate in surveys than men. Race is another demographic factor that can influence response rates where white students are more likely to complete a survey than their non-white counterparts (Porter & Whitcomb, 2005). Relevance or interest in the topic of the survey can also unsurprisingly influence response rates (Fowler, 2014; Porter & Whitcomb, 2005).

While 73 students started the survey, only 56 completed it in its entirety resulting in a 69.5% completion rate. Survey fatigue may be the result of an audience receiving too many requests to respond to surveys or the participant losing interest when answering the survey and submitting an incomplete response (Porter, Whitcomb, & Weitzer, 2004). The time and effort to complete a lengthy survey may also explain the number of incomplete responses. Survey fatigue can be alleviated by the number of surveys distributed to the prospective audience being limited, lessening the necessary time spent participating in a survey (i.e., shortening the number of questions), or increasing the timing for distribution of the survey (Porter et al., 2004).

Incomplete survey responses resulted in missing data. While many researchers conducting quantitative research can accept the reality of missing data, it can lead to bias in the results and should be examined (Cox, McIntosh, Reason, & Terenzini, 2014). Cox et al. (2014) suggest there are approaches to dealing with missing data that limit bias of results, as they go beyond traditional methods of mean insertion or listwise deletion and provide a legitimate strategy for managing incomplete responses. The effect of missing data can be found in calculations of standard error associated with mean values and Pearson correlations, among other outcomes. If missing data is not accounted for, the standard error will be under-estimated, thereby providing a downward bias and increasing the likelihood of making a type I error in which the researcher incorrectly finds an estimate statistically significant (Cox et al., 2014).

In this study, missing data was not manipulated, nor were mean substitutions used to fill in the gaps. Mean substitution does not alter the calculation of variable means but this approach can reduce estimates of population variance, thereby reducing the effect of variance and covariance estimates (Cox et al., 2014). In descriptive analysis, pairwise deletion was selected so that means and standard deviations would be calculated in all cases with a value for a particular variable. Although the data does not support rejecting any of the three hypotheses, the small sample size and limited statistical power in the analysis may provide misleading results. This study was descriptive with analyses to examine relationships and does not attempt to find causal relationships.

Implication of Results for Practice, Policy, and Theory

Simulation-based learning is firmly integrated in almost all nursing programs and most allied health programs, simply due to the advantages of exposing students to realistic clinical scenarios which provide comparable learning experiences across regions, classrooms, and individual students (Lubbers & Rossman, 2017; Reid-Searl et al., 2014; Skrable & Fitzsimons, 2014). The simulated learning environment helps both students and practitioners prioritize and respond to the often-competing needs of the patient inherent in the clinical environment (Burke & Mancuso, 2012; Reid-Searl et al., 2014). The advantages for the educator are documented as well (Adamson, 2015; Skrable & Fitzsimons, 2014; Stroup, 2014) in that faculty are immediately available to identify and correct student misconceptions and support the development of decision-making skills through debriefing sessions (Cheng et al., 2014). What is less understood is the successful transfer of learning in a simulated environment to the clinical setting which is in part related to an individual's belief in his or her ability or, in other words, one's perception of self-efficacy (Oetker-Black, Kreye, Davis, Underwood, & Naug, 2016). Research into SBL and its effect on educational practices is lacking in allied health programs, although it is well represented in nursing and medical education. Self-efficacy is supported by successfully learning important clinical skills during simulated, experiential activities and SBL is therefore an important strategy for the development of competency. This study aimed to further understand the learner characteristics that may influence motivation to learn during simulated clinical activities. Throughout the literature, examples of learner characteristics that influence motivation to learn have centered, in part, on age, gender, and previous completion of a degree (Balam & Platt, 2014; Connor, 2015; Henning et al., 2013; Huang, 2013), however there remains a lack of consensus of the overall effect of these characteristics.

Effective learning in a simulated environment relies on active learning and student engagement which are closely tied to perceived self-efficacy and motivation to learn (Franklin & Lee, 2014). Just as anxiety can interfere with successful learning so can a lack of motivation and a low sense of self-efficacy (Pintrich et al., 1993; Schnell, Ringeisen, Raufelder, & Rohrmann, 2015). Early detection of these barriers to learning can provide the educator with opportunities to encourage student learning through different teaching strategies (Beischel, 2013; Phillips, Dong, Durning, & Artino, 2015) and, naturally, educators generally strive to develop a deep understanding of their students and their individual learning styles, motivational beliefs, and emotional experiences (Franklin & Lee, 2014; Hamid & Singaram, 2016; Henning et al., 2013). Simulated-based medical education with deliberate practice has been shown to be superior to the more traditional model of clinical teaching and learning (Chee, 2014; McGaghie, Issenberg, Barsuk, & Wayne, 2014). Simulation as a teaching and learning methodology is here to stay, with an even greater presence anticipated as a replacement for clinical practice in pre-licensure programs (Hayden, Keegan, Kardong-Edgren, & Smiley, 2014).

Recommendations for Further Research

Educators must remain diligent in their quest to better understand how students learn and what barriers may exist that interfere with motivation to learn. As noted by Connor (2015), nursing students with a higher sense of self-efficacy were more likely to persist through obstacles, engage in learning, and achieve higher academic scores. Furthermore, medical students who indicated higher levels of motivation to learn as evaluated by the MSLQ were more likely to achieve better academic results (Cook, Thompson, & Thomas, 2011). It is recommended that further study of factors influencing self-efficacy and motivation to learn in a simulated environment continue in the different allied health programs such that educators develop an understanding of the challenges that may exist within their own disciplines. Due to the variety of methods and technologies used to simulate clinical practice, assessment of motivation to learn for students may also vary depending on the fidelity of the simulation and the perceived realism (Hamstra et al., 2014). While gender and age have shown to be inconclusive factors in the self-reporting of self-efficacy and motivation to learn, environmental context or fidelity (realism) in simulation may be influencing factors as reported by Adamson (2015), Beischel (2013), Chee (2014), and Hamstra et al. (2014). A qualitative method, or mixed-methods approach, may provide deeper insight into the barriers for learning in a simulated clinical environment.

The MSLQ is dependent on the self-reporting of responses by participants. Further research may benefit by an objective assessment tool along with pre- and post-simulation assessments. The goal of simulation activities for clinical preparedness is to develop competence in procedure which can be assessed using cognitive testing. Evaluation of students' affective construct is more challenging and requires opportunities for reflection. More research is required to fully understand and anticipate the effects of learner characteristics on the efficacy of simulation-based learning.

Conclusion

The purpose of this study was to examine factors of age, gender, and prior completion of baccalaureate degree as learner characteristics influencing factors in the self-reporting of motivational beliefs during SBL. Participants in this study included full-time students in nursing and allied health programs across one post-secondary institution who voluntarily completed the survey. Through a literature review, development of a conceptual model, and critical analysis of the work of other authors related to education, this study strived to answer three research questions examining the association between gender, age, prior completion of a baccalaureate degree and motivational beliefs in students while enrolled in a full-time nursing or allied health program. The context for the study was specific to the SBL frequently used in health science programs identified in this research.

Descriptive and inferential analyses were conducted across learner characteristics of age, gender, prior completion of a baccalaureate degree and self-reported responses to the motivational beliefs questionnaire. Results of the analyses did not provide statistical evidence to reject any of the null hypotheses in that no statistically significant relationships were noted. No association was noted for gender, age, nor completion of a prior degree as compared to motivational components of expectancy for success (self-efficacy, control of learning beliefs), value components (task value, intrinsic and extrinsic goal orientation), and the affective component of test anxiety.

Further study focusing on individual allied health disciplines is recommended to better understand the personal and collective challenges students have in the development of clinical competency. Deliberate practice can assist students to develop greater self-efficacy and motivation to learn which may lead to success as a graduate, and in the pursuit of a career in health care (Burke & Mancuso, 2012; Gore & Thompson, 2016; Komarraju & Nadler, 2013). Simulated clinical experience continues to be an increasing component within nursing and allied health education programs with an evolving body of evidence-based literature to support best practices in teaching.

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APPENDICES

Appendix A: Student Invitation to Participate

Dear Participant,

I invite you to participate in a research study entitled *The Relationship between Self-efficacy and Motivation to Learn in Simulation Based Learning across Allied Health Students*. I am currently enrolled in the Transformational Leadership, Doctorate of Education program at Concordia University, Portland, OR. This study is research to be included in my thesis. The purpose of this study is to determine students' motivational beliefs as they relate to learning in a simulation environment in allied health.

This questionnaire has been designed to collect information on your current program of study, demographic information (non-identifiable), and self-reporting to questions regarding motivational beliefs. Your participation in this research project is completely voluntary. You may decline altogether, or leave blank any questions you don't wish to answer. There are no known risks to participation beyond those encountered in everyday life. The data you provide is and will remain entirely anonymous (there is no data to connect responses to specific individuals).

Data from this research will be kept in a secured account for three years and reported only as a collective combined total. No one other than the researcher will know your individual answers to this questionnaire and the responses are entirely anonymous (there is no data to connect responses to specific individuals). Completion of the survey implies that you have provided consent to use your responses in my research. If you agree to participate in this project, please answer the questions on the questionnaire as best you can. Completion of the survey is estimated at 15 minutes. By clicking on the survey link, you have provided your informed consent to use your responses in my study. FluidSurveys™ is a free and open source online survey application.

If you have any questions about this project, feel free to contact Lorraine Clarke Roe, principal investigator, School of Health Science at [research email redacted] / [researcher phone number redacted].

Information on the Research Ethics Board (REB) can be accessed through http://www.bcit.ca/appliedresearch/ethics/ or by contacting the REB Chair, Allison Kirschenmann, Faculty, Basic Health Sciences [Chair's phone number redacted].

Thank you for your assistance in this important endeavor.

Sincerely yours,

Lorraine Clarke Roe, A.C. (T), M.Ed.

If you have any questions or concerns about this survey, please don't hesitate to contact me.

Please click on the LINK to start the SURVEY

Appendix B: Survey Questions

Part A: Demographic information

1. Which health science program are you currently registered in? *(full time programs only)*
    - Medical radiography
    - Nuclear medicine
    - Medical sonography
    - Medical lab science
    - Biomedical engineering
    - Electroneurophysiology
    - Environmental health
    - Nursing (BSN)
    - Prosthetics and Orthotics
    - Biotechnology
2. What is your current level in your program?
    - First year
    - Second year
    - Third year and/or final year
3. Before entering this program, did you complete a baccalaureate (Bachelor's) degree?
    - No
    - Yes
4. What is your current age?
    - *Fill in box/drop menu*

5. Gender:
    - Male
    - Female
    - Other
    - Choose not to respond
6. What credential will you receive upon graduation from your program?
    - Diploma
    - Advanced diploma
    - Degree

Part B: Approaches to Simulation

Simulation based learning (SBL), also called clinical simulation, can be defined as structured activities that represent situations in practice and allows the participant to develop or enhance knowledge, skills, and attitudes in a simulated environment (Pilcher et al., 2012).

For each of the different simulation methods listed, please identify the level of experience you have had with each in your current program:

1 (none/unsure) 2 (some but not frequent) 3 (frequent) 4 (very frequent)

7. Low-tech simulators (includes models or mannequins used to practice simple physical maneuvers or procedures; lab environments with limited equipment)
8. Simulated/standardized patients (includes actors trained to role-play patients; role play with instructors and/or students)

9. Screen-based computer simulators (includes programs to train and assess clinical knowledge and decision making)
10. Complex task trainers (includes high fidelity technological tools; immersive technology such as virtual reality devices and simulators that replicate a clinical setting).
11. Case study/clinical scenarios (includes role-playing using partial task trainers or static mannequins)
12. Unfolding case simulations (includes video representation of clinical scenarios in which discussion and debriefing can occur throughout scenario).

Part C: Motivated Strategies for Learning Questionnaire.

The following questions ask about your motivation for and attitudes about **simulation**. Remember there are no right or wrong answers; just answer as accurately as possible. Use the scale below to answer the questions. If you think the statement is very true of you, circle 7; if a statement is not at all true of you, circle 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you (Pintrich, Smith, García, & McKeachie, 1991).

1	2	3	4	5	6	7
Not at all true of me						very true of me

1. I prefer course material that really challenges me so I can learn new things.
2. If I study in appropriate ways, then I will be able to learn the material in a simulation course.
3. When I take a test, I think about how poorly I am doing compared with other students.
4. I think I will be able to use what I learn in a simulation course in other courses.

5. I believe I will receive an excellent grade in a simulation class.
6. I am certain I can understand the most difficult material presented in the readings for this course.
7. Getting a good grade in a simulation class is the most satisfying thing for me right now.
8. When I take a test, I think about items on other parts of the test I can't answer.
9. It is my own fault if I don't learn the material in a simulation course.
10. It is important for me to learn the course material in a simulation class.
11. The most important thing for me right now is improving my overall grade point average, so my main concern in a simulation class is getting a good grade.
12. I am confident I can learn the basic concepts taught in a simulation course.
13. If I can, I want to get better grades in this class than most of the other students.
14. When I take tests, I think of the consequences of failing.
15. I am confident I can understand the most complex material presented by the instructor in a simulation course.
16. In a simulation class, I prefer course material that arouses my curiosity, even if it is difficult to learn.
17. I am very interested in the content area in a simulation course.
18. If I try hard enough, then I will understand the simulation course material.
19. I have an uneasy, upset feeling when I take an exam in a simulation course.
20. I am confident I can do an excellent job on the assignments and tests in a simulation course.
21. I expect to do well in a simulation class.

22. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.
23. I think the course material in a simulation class is useful for me to learn.
24. When I have the opportunity in a simulation class, I choose course assignments that I can learn from even if they don't guarantee a good grade.
25. If I don't understand the course material, it is because I didn't try hard enough.
26. I like the subject matter of a simulation course.
27. Understanding the subject matter of a simulation course is very important to me.
28. I feel my heart beating fast when I am being examined.
29. I am certain I can master the skills being taught in a simulation class.
30. I want to do well in a simulation class because it is important to show my ability to my family, friends, employer or others.
31. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in a simulation class.

SURVEY COMPLETED – THANK YOU

Appendix C: Descriptive Response Means across All Participants

Expectancy Component (Self-efficacy and Control of Learning Beliefs)	Mean	SD	N
Q5. I believe I will receive an excellent grade in a simulation class.	4.87	1.44	63
Q6. I am certain I can understand the most difficult material presented in the readings for this course.	4.64	1.53	64
Q12. I am confident I can learn the basic concepts taught in a simulation course.	6.02	1.24	60
Q15. I am confident I can understand the most complex material presented by the instructor in a simulation course.	5.07	1.39	60
Q20. I am confident I can do an excellent job on the assignments and tests in a simulation course.	4.98	1.19	58
Q21. I expect to do well in a simulation class.	5.50	1.11	58
Q29. I am certain I can master the skills being taught in a simulation class.	5.46	1.17	56
Q31. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in a simulation class.	5.52	1.22	56
Q2. If I study in appropriate ways, then I will be able to learn the material in a simulation course.	5.53	1.26	64
Q9. It is my own fault if I don’t learn the material in a simulation course.	4.88	1.65	60
Q18. If I try hard enough, then I will understand the simulation course material.	5.81	1.18	58
Q25. If I don’t understand the course material, it is because I didn’t try hard enough.	4.55	1.54	56

Value Component (Intrinsic and Extrinsic Goal Orientation, Task Value)	Mean	SD	N
Q1. I prefer course material that really challenges me so I can learn new things.	5.45	1.15	64
Q16. In a simulation class, I prefer course material that arouses my curiosity, even if it is difficult to learn.	5.60	1.34	60
Q22. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.	5.53	1.17	58
Q24. When I have the opportunity in a simulation class, I choose course assignments that I can learn from even if they don't guarantee a good grade.	4.89	1.59	57
Q7. Getting a good grade in a simulation class is the most satisfying thing for me right now.	4.13	1.73	63
Q11. The most important thing for me right now is improving my overall grade point average, so my main concern in a simulation class is getting a good grade.	4.05	1.75	60
Q13. If I can, I want to get better grades in this class than most of the other students.	4.93	1.69	60
Q30. I want to do well in a simulation class because it is important to show my ability to my family, friends, employer or others.	5.05	1.72	56
Q4. I think I will be able to use what I learn in a simulation course in other courses.	5.20	1.34	64
Q10. It is important for me to learn the course material in a simulation class.	5.82	1.38	60
Q17. I am very interested in the content area in a simulation course.	5.43	1.31	58
Q23. I think the course material in a simulation class is useful for me to learn.	6.07	1.07	57
Q26. I like the subject matter of a simulation course.	5.61	1.02	56
Q27. Understanding the subject matter of a simulation course is very important to me.	5.98	0.94	56

Affective Component (Test Anxiety)	Mean	SD	N
Q3. When I take a test, I think about how poorly I am doing compared with other students.	3.47	2.10	64
Q8. When I take a test, I think about items on other parts of the test I can’t answer.	4.09	1.89	64
Q14. When I take tests, I think of the consequences of failing.	4.38	2.21	60
Q19. I have an uneasy, upset feeling when I take an exam in a simulation course.	4.44	1.75	57
Q28. I feel my heart beating fast when I am being examined.	5.61	1.46	56

Appendix D: Gender and Motivational Beliefs

Gender and Value Component

	Gender	N	Mean	Std. Deviation	Std. Error Mean
C1.intrin_1	0 (male)	11	5.36	1.502	.453
	1 (female)	43	5.35	1.110	.169
C16.intrin_2	0	11	5.64	1.206	.364
	1	43	5.63	1.381	.211
C22.intrin_3	0	11	5.18	1.079	.325
	1	43	5.63	1.196	.182
C24.intrin_4	0	11	4.27	1.421	.428
	1	43	5.02	1.626	.248
C4.tv_1	0	11	4.45	1.128	.340
	1	43	5.28	1.297	.198
C10.tv_2	0	11	6.00	1.095	.330
	1	43	5.77	1.461	.223
C17.tv_3	0	11	5.18	1.601	.483
	1	43	5.47	1.279	.195
C23.tv_4	0	11	5.73	1.272	.384
	1	43	6.09	1.019	.155
C26.tv_5	0	11	5.09	1.221	.368
	1	43	5.70	.939	.143
C27.tv_6	0	11	5.55	.820	.247
	1	43	6.07	.961	.147
C7.extr_1	0	11	4.09	1.921	.579
	1	43	4.21	1.536	.234
C11.extr_2	0	11	4.64	1.690	.509
	1	43	4.14	1.641	.250
C13.extr_3	0	11	5.27	1.794	.541
	1	43	4.95	1.618	.247
C30.extr_4	0	11	4.91	1.973	.595
	1	43	5.16	1.647	.251

Gender and Value Component

Independent Samples Test		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	f	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower
C1.intrin_1	Equal variances assumed	1.050	.310	.037	52	.971	.015	.404	-.796
	Equal variances not assumed			.031	12.932	.976	.015	.483	-1.030
C16.intrin_2	Equal variances assumed	.000	.991	.019	52	.985	.008	.456	-.906
	Equal variances not assumed			.020	17.363	.984	.008	.420	-.877
C22.intrin_3	Equal variances assumed	.061	.806	-1.124	52	.266	-.446	.397	-1.242
	Equal variances not assumed			-1.196	16.877	.248	-.446	.373	-1.233
C24.intrin_4	Equal variances assumed	.404	.528	-1.399	52	.168	-.751	.537	-1.827
	Equal variances not assumed			-1.517	17.357	.147	-.751	.495	-1.793
C4.tv_1	Equal variances assumed	.204	.653	-1.927	52	.059	-.825	.428	-1.683

	Equal variances not assumed			-2.095	17.431	.051	-.825	.393	-1.653
C10.tv_2	Equal variances assumed	.267	.608	.492	52	.625	.233	.472	-.716
	Equal variances not assumed			.584	20.179	.566	.233	.398	-.598
C17.tv_3	Equal variances assumed	.823	.369	-.623	52	.536	-.283	.455	-1.197
	Equal variances not assumed			-.544	13.445	.595	-.283	.521	-1.404
C23.tv_4	Equal variances assumed	1.469	.231	-1.009	52	.317	-.366	.362	-1.093
	Equal variances not assumed			-.884	13.467	.392	-.366	.414	-1.257
C26.tv_5	Equal variances assumed	.087	.769	-1.796	52	.078	-.607	.338	-1.285
	Equal variances not assumed			-1.536	13.186	.148	-.607	.395	-1.459
C27.tv_6	Equal variances assumed	.089	.767	-1.659	52	.103	-.524	.316	-1.159
	Equal variances not assumed			-1.824	17.737	.085	-.524	.287	-1.129
C7.extr_1	Equal variances assumed	.457	.502	-.217	52	.829	-.118	.546	-1.215
	Equal variances not assumed			-.189	13.453	.853	-.118	.625	-1.464

C11.extr_2	Equal variances assumed	.133	.717	.891	52	.377	.497	.558	-.622
	Equal variances not assumed			.875	15.201	.395	.497	.568	-.712
C13.extr_3	Equal variances assumed	.465	.498	.572	52	.570	.319	.559	-.802
	Equal variances not assumed			.537	14.444	.599	.319	.594	-.952
C30.extr_4	Equal variances assumed	.508	.479	-.438	52	.663	-.254	.579	1.416
	Equal variances not assumed			-.393	13.778	.700	-.254	.646	-1.640

Gender and Expectancy Component

Independent Samples Test		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
C2.clb_1	Equal variances assumed	.135	.715	-.835	52	.408	-.368	.441
	Equal variances not assumed			-.850	13.687	.410	-.368	.433
C9.clb_2	Equal variances assumed	.425	.517	-.015	52	.988	-.009	.588
	Equal variances not assumed			-.014	12.132	.989	-.009	.652
C18.clb_3	Equal variances assumed	1.425	.238	.976	52	.333	.405	.414
	Equal variances not assumed			1.294	20.782	.210	.405	.313
C25.clb_4	Equal variances assumed	.013	.909	-.659	52	.513	-.359	.545
	Equal variances not assumed			-.655	13.335	.524	-.359	.548
C5.se_1	Equal variances assumed	.179	.674	.254	52	.801	.127	.502
	Equal variances not assumed			.233	12.325	.820	.127	.547
C6.se_2	Equal variances assumed	.011	.918	.816	52	.418	.432	.530
	Equal variances not assumed			.794	13.042	.441	.432	.544
C12.se_3	Equal variances assumed	1.745	.192	1.453	52	.152	.509	.350
	Equal variances not assumed			2.213	29.453	.035	.509	.230

C15.se_4	Equal variances assumed	2.766	.102	1.192	52	.239	.577	.484
	Equal variances not assumed			1.834	30.288	.077	.577	.315
C20.se_5	Equal variances assumed	.081	.776	1.506		.138	.636	.423
	Equal variances not assumed			.637	14.829	.123	.636	.389
C21.se_6	Equal variances assumed	3.618	.063	1.208	52	.233	.468	.388
	Equal variances not assumed			1.601	20.789	.124	.468	.292
C29.se_7	Equal variances assumed	.880	.353	.814	52	.419	.323	.396
	Equal variances not assumed			.949	16.403	.356	.323	.340
C31.se_8	Equal variances assumed	.953	.334	.410	52	.683	.177	.432
	Equal variances not assumed			.544	20.752	.593	.177	.326

Group Statistics: Gender and Expectancy Component

	Gender	N	Mean	Std. Deviation	Std. Error Mean
C2.clb_1	0 (male)	10	5.20	1.229	.389
	1 (female	44	5.57	1.265	.191
C9.clb_2	0	10	4.90	1.912	.605
	1	44	4.91	1.626	.245
C18.clb_3	0	10	6.20	.789	.249
	1	44	5.80	1.250	.188
C25.clb_4	0	10	4.30	1.567	.496
	1	44	4.66	1.554	.234
C5.se_1	0	10	4.90	1.595	.504
	1	44	4.77	1.395	.210
C6.se_2	0	10	5.00	1.563	.494
	1	44	4.57	1.500	.226
C12.se_3	0	10	6.60	.516	.163
	1	44	6.09	1.074	.162
C15.se_4	0	10	5.60	.699	.221
	1	44	5.02	1.486	.224
C20.se_5	0	10	5.50	1.080	.342
	1	44	4.86	1.231	.186
C21.se_6	0	10	5.90	.738	.233
	1	44	5.43	1.169	.176
C29.se_7	0	10	5.80	.919	.291
	1	44	5.48	1.171	.177
C31.se_8	0	10	5.70	.823	.260
	1	44	5.52	1.303	.196

Gender and Test Anxiety Component

Independent Samples Test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
C3.tanx_1	Equal variances assumed	3.095	.084	-1.839	60	.071	-1.203	.654	-2.512	.106
	Equal variances not assumed			-2.117	20.278	.047	-1.203	.568	-2.388	-.019
C8.tanx_2	Equal variances assumed	.267	.607	-.235	60	.815	-.143	.610	-1.363	1.076
	Equal variances not assumed			-.228	16.121	.823	-.143	.629	-1.476	1.189
C14.tanx_3	Equal variances assumed	1.715	.196	-1.361	57	.179	-.970	.712	-2.396	.457
	Equal variances not assumed			-1.450	18.576	.164	-.970	.669	-2.372	.432
C19.tanx_4	Equal variances assumed	3.849	.055	-1.884	54	.065	-1.053	.559	-2.174	.068
	Equal variances not assumed			-2.421	27.625	.022	-1.053	.435	-1.945	-.161
C28.tanx_5	Equal variances assumed	.960	.332	.091	53	.928	.045	.501	-.960	1.051
	Equal variances not assumed			.105	19.139	.917	.045	.432	-.858	.949

Gender and Test Anxiety Descriptives

Group Statistics

	A5.Gender	N	Mean	Std. Deviation	Std. Error Mean
C3.tanx_1	0	12	2.42	1.676	.484
	1	50	3.62	2.108	.298
C8.tanx_2	0	12	3.92	1.975	.570
	1	50	4.06	1.878	.266
C14.tanx_3	0	12	3.58	2.021	.583
	1	47	4.55	2.244	.327
C19.tanx_4	0	12	3.58	1.165	.336
	1	44	4.64	1.831	.276
C28.tanx_5	0	11	5.64	1.206	.364
	1	44	5.59	1.545	.233

Appendix E: Age and Motivational Beliefs

Age and Value Component

One-way ANOVA		Sum of Squares	df	Mean Square	F	Sig.
C1.intrin_1	Between Groups	1.396	2	.698	.524	.595
	Within Groups	74.638	56	1.333		
	Total	76.034	58			
C16.intrin_2	Between Groups	3.657	2	1.828	.985	.380
	Within Groups	100.238	54	1.856		
	Total	103.895	56			
C22.intrin_3	Between Groups	.698	2	.349	.344	.711
	Within Groups	52.829	52	1.016		
	Total	53.527	54			
C24.intrin_4	Between Groups	1.353	2	.676	.269	.765
	Within Groups	130.829	52	2.516		
	Total	132.182	54			
C7.extr_1	Between Groups	2.087	2	1.044	.384	.683
	Within Groups	149.430	55	2.717		
	Total	151.517	57			
C11.extr_2	Between Groups	7.028	2	3.514	1.256	.293
	Within Groups	151.113	54	2.798		
	Total	158.140	56			
C13.extr_3	Between Groups	1.358	2	.679	.243	.785
	Within Groups	150.642	54	2.790		
	Total	152.000	56			
C30.extr_4	Between Groups	3.245	2	1.623	.594	.556
	Within Groups	139.292	51	2.731		

	Total	142.537	53			
C4.tv_1	Between Groups	6.020	2	3.010	1.704	.191
	Within Groups	98.895	56	1.766		
	Total	104.915	58			
C10.tv_2	Between Groups	10.375	2	5.187	2.811	.069
	Within Groups	99.661	54	1.846		
	Total	110.035	56			
C17.tv_3	Between Groups	7.753	2	3.876	2.249	.116
	Within Groups	89.629	52	1.724		
	Total	97.382	54			
C23.tv_4	Between Groups	.798	2	.399	.339	.714
	Within Groups	61.129	52	1.176		
	Total	61.927	54			
C26.tv_5	Between Groups	.245	2	.123	.114	.893
	Within Groups	54.958	51	1.078		
	Total	55.204	53			
C27.tv_6	Between Groups	.342	2	.171	.187	.830
	Within Groups	46.492	51	.912		
	Total	46.833	53			

Age and Expectancy Component

One-way ANOVA		Sum of Squares	df	Mean Square	F	Sig.
C2. clb_1	Between Groups	1.605	2	.803	.504	.607
	Within Groups	89.141	56	1.592		
	Total	90.746	58			
C9. clb_2	Between Groups	3.871	2	1.936	.692	.505
	Within Groups	151.006	54	2.796		
	Total	154.877	56			
C18. clb_3	Between Groups	.571	2	.285	.195	.824
	Within Groups	76.229	52	1.466		
	Total	76.800	54			
C25. clb_4	Between Groups	11.504	2	5.752	2.492	.093
	Within Groups	117.700	51	2.308		
	Total	129.204	53			
C5. se_1	Between Groups	1.188	2	.594	.298	.744
	Within Groups	109.708	55	1.995		
	Total	110.897	57			
C6. se_2	Between Groups	4.600	2	2.300	1.093	.342
	Within Groups	117.807	56	2.104		
	Total	122.407	58			
C12. se_3	Between Groups	.469	2	.234	.201	.818
	Within Groups	62.900	54	1.165		
	Total	63.368	56			
C15. se_4	Between Groups	.134	2	.067	.033	.967
	Within Groups	108.708	54	2.013		
	Total	108.842	56			

C20. se_5	Between Groups	.298	2	.149	.097	.907
	Within Groups	79.629	52	1.531		
	Total	79.927	54			
C21. se_6	Between Groups	.975	2	.487	.380	.686
	Within Groups	66.771	52	1.284		
	Total	67.745	54			
C29. se_7	Between Groups	1.201	2	.600	.436	.649
	Within Groups	70.225	51	1.377		
	Total	71.426	53			
C31. se_8	Between Groups	1.481	2	.741	.484	.619
	Within Groups	78.000	51	1.529		
	Total	79.481	53			

Age and Affective component

One-way ANOVA		Sum of Squares	df	Mean Square	F	Sig.
C3.tanx_1	Between Groups	13.053	2	6.526	1.602	.211
	Within Groups	228.167	56	4.074		
	Total	241.220	58			
C8.tanx_2	Between Groups	4.645	2	2.322	.693	.504
	Within Groups	187.660	56	3.351		
	Total	192.305	58			
C14.tanx_3	Between Groups	6.410	2	3.205	.677	.513
	Within Groups	255.800	54	4.737		
	Total	262.211	56			
C19.tanx_4	Between Groups	8.007	2	4.004	1.302	.281
	Within Groups	156.826	51	3.075		
	Total	164.833	53			
C28.tanx_5	Between Groups	11.170	2	5.585	2.742	.074
	Within Groups	103.867	51	2.037		
	Total	115.037	53			

Appendix F: Prior Degree and Motivational Beliefs

Prior Degree and Value Component

Group Statistics

	Complete baccalaureate	N	Mean	Std. Deviation	Std. Error Mean
C1. intrin_1	0 (no)	33	5.52	.939	.164
	1 (yes)	30	5.33	1.348	.246
C16. intrin_2	0	32	5.72	1.085	.192
	1	28	5.46	1.598	.302
C22. intrin_3	0	31	5.52	1.180	.212
	1	27	5.56	1.188	.229
C24. intrin_4	0	31	4.87	1.708	.307
	1	26	4.92	1.468	.288
C7. extr_1	0	33	4.09	1.739	.303
	1	29	4.07	1.689	.314
C11. extr_2	0	32	4.25	1.566	.277
	1	28	3.82	1.945	.368
C13. extr_3	0	32	4.72	1.800	.318
	1	28	5.18	1.565	.296
C30. extr_4	0	30	5.03	1.712	.313
	1	26	5.08	1.765	.346
C4. tv_1	0	33	5.27	1.232	.214
	1	30	5.07	1.437	.262
C10. tv_2	0	32	6.09	1.027	.182
	1	28	5.50	1.667	.315
C17. tv_3	0	31	5.58	1.177	.211
	1	27	5.26	1.457	.280
C23. tv_4	0	31	6.13	1.056	.190
	1	26	6.00	1.095	.215
C26. tv_5	0	30	5.67	.884	.161
	1	26	5.54	1.174	.230
C27. tv_6	0	30	6.00	.830	.152
	1	26	5.96	1.076	.211

Prior Degree and Value Component

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
C1.intrin_1	Equal variances assumed	1.260	.266	.626	61	.534	.182	.291	-.399	.763
	Equal variances not assumed			.615	51.224	.541	.182	.295	-.411	.775
C16.intrin_2	Equal variances assumed	3.128	.082	.729	58	.469	.254	.349	-.444	.953
	Equal variances not assumed			.711	46.561	.480	.254	.358	-.465	.974
C22.intrin_3	Equal variances assumed	.673	.415	-.127	56	.900	-.039	.311	-.663	.585
	Equal variances not assumed			-.127	54.808	.900	-.039	.312	-.664	.585
C24.intrin_4	Equal variances assumed	.121	.729	-.122	55	.903	-.052	.426	-.906	.802
	Equal variances not assumed			-.124	54.958	.902	-.052	.421	-.895	.791
C7.extr_1	Equal variances assumed	.184	.670	.050	60	.960	.022	.437	-.852	.895
	Equal variances not assumed			.050	59.377	.960	.022	.436	-.850	.894
C11.extr_2	Equal variances assumed	2.372	.129	.945	58	.349	.429	.453	-.479	1.336
	Equal variances not assumed			.932	51.802	.356	.429	.460	-.495	1.352
C13.extr_3	Equal variances assumed	1.331	.253	-1.049	58	.299	-.460	.439	-1.338	.418
	Equal variances not assumed			-1.058	57.999	.294	-.460	.434	-1.329	.410
C30.extr_4	Equal variances assumed	.330	.568	-.094	54	.926	-.044	.465	-.976	.889
	Equal variances not assumed			-.093	52.374	.926	-.044	.466	-.979	.892

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
C4.tv_1	Equal variances assumed	.099	.754	.613	61	.542	.206	.336	-.466	.879
	Equal variances not assumed			.608	57.453	.545	.206	.339	-.472	.884
C10.tv_2	Equal variances assumed	8.099	.006	1.684	58	.098	.594	.353	-.112	1.300
	Equal variances not assumed			1.633	43.728	.110	.594	.364	-.139	1.327
C17.tv_3	Equal variances assumed	1.408	.240	.929	56	.357	.321	.346	-.372	1.014
	Equal variances not assumed			.915	49.964	.364	.321	.351	-.384	1.027
C26.tv_5	Equal variances assumed	1.227	.273	.465	54	.644	.128	.276	-.424	.681
	Equal variances not assumed			.456	46.026	.651	.128	.281	-.438	.694
C27.tv_6	Equal variances assumed	1.810	.184	.151	54	.881	.038	.255	-.473	.550
	Equal variances not assumed			.148	46.729	.883	.038	.260	-.484	.561

Prior Degree and Expectancy Component

	Complete baccalaureate	N	Mean	Std. Deviation	Std. Error Mean
C2.clb_1	0 (no)	33	5.64	1.194	.208
	1 (yes)	30	5.37	1.326	.242
C9.clb_2	0	32	4.84	1.609	.284
	1	28	4.93	1.720	.325
C18.clb_3	0	31	6.06	.814	.146
	1	27	5.52	1.451	.279
C25.clb_4	0	30	4.40	1.589	.290
	1	26	4.73	1.485	.291
C5.se_1	0	33	5.03	1.287	.224
	1	29	4.62	1.568	.291
C6.se_2	0	33	4.61	1.321	.230
	1	30	4.60	1.714	.313
C12.se_3	0	32	6.31	.780	.138
	1	28	5.68	1.565	.296
C15.se_4	0	32	5.25	1.191	.211
	1	28	4.86	1.580	.299
C20.se_5	0	31	5.16	.969	.174
	1	27	4.78	1.396	.269
C21.se_6	0	31	5.58	1.057	.190
	1	27	5.41	1.185	.228
C29.se_7	0	30	5.73	.944	.172
	1	26	5.15	1.347	.264
C31.se_8	0	30	5.80	.847	.155
	1	26	5.19	1.497	.294

Prior Degree and Expectancy Component

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
C5.se_1	Equal variances assumed	2.351	.130	1.130	60	.263	.410	.363	-.316	1.135
	Equal variances not assumed			1.115	54.305	.270	.410	.367	-.327	1.146
C6.se_2	Equal variances assumed	3.133	.082	.016	61	.987	.006	.384	-.761	.773
	Equal variances not assumed			.016	54.410	.988	.006	.388	-.772	.785
C12.se_3	Equal variances assumed	6.535	.013	2.024	58	.048	.634	.313	.007	1.261
	Equal variances not assumed			1.943	38.443	.059	.634	.326	-.026	1.294
C15.se_4	Equal variances assumed	1.176	.283	1.095	58	.278	.393	.359	-.325	1.111
	Equal variances not assumed			1.075	49.804	.288	.393	.365	-.341	1.127
C29.se_7	Equal variances assumed	3.055	.086	1.883	54	.065	.579	.308	-.038	1.197
	Equal variances not assumed			1.837	43.954	.073	.579	.316	-.056	1.215
C31.se_8	Equal variances assumed	4.860	.032	1.901	54	.063	.608	.320	-.033	1.248
	Equal variances not assumed			1.831	38.252	.075	.608	.332	-.064	1.279

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
C2.clb_1	Equal variances assumed	.339	.563	.850	61	.399	.270	.317	-.365	.904
	Equal variances not assumed			.845	58.646	.401	.270	.319	-.369	.908
C9.clb_2	Equal variances assumed	.075	.785	-.197	58	.844	-.085	.430	-.945	.776
	Equal variances not assumed			-.196	55.721	.845	-.085	.432	-.950	.780
C18.clb_3	Equal variances assumed	8.254	.006	1.797	56	.078	.546	.304	-.063	1.155
	Equal variances not assumed			1.732	39.622	.091	.546	.315	-.091	1.183
C25.clb_4	Equal variances assumed	.122	.729	-.801	54	.427	-.331	.413	-1.159	.497
	Equal variances not assumed			-.805	53.672	.425	-.331	.411	-1.155	.493

Prior Degree and Affective Component

	Complete baccalaureate	n	Mean	Std. Deviation	Std. Error Mean
C3.tanx_1	0 (no)	33	3.85	2.093	.364
	1 (yes)	30	2.93	1.964	.359
C8.tanx_2	0	33	4.24	1.888	.329
	1	30	3.83	1.859	.339
C14.tanx_3	0	32	4.84	2.201	.389
	1	28	3.86	2.138	.404
C19.tanx_4	0	30	4.40	1.923	.351
	1	27	4.48	1.578	.304
C28.tanx_5	0	30	5.67	1.373	.251
	1	26	5.54	1.581	.310

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
C3.tanx_1	Equal variances assumed	.658	.420	1.784	61	.079	.915	.513	-.110	1.941
	Equal variances not assumed			1.790	60.933	.078	.915	.511	-.107	1.938
C8.tanx_2	Equal variances assumed	.032	.859	.865	61	.390	.409	.473	-.536	1.354
	Equal variances not assumed			.866	60.600	.390	.409	.472	-.536	1.354
C14.tanx_3	Equal variances assumed	.266	.608	1.755	58	.084	.987	.562	-.139	2.112
	Equal variances not assumed			1.759	57.346	.084	.987	.561	-.137	2.110
C19.tanx_4	Equal variances assumed	2.104	.153	-.174	55	.863	-.081	.469	-1.021	.858
	Equal variances not assumed			-.176	54.563	.861	-.081	.464	-1.012	.849
C28.tanx_5	Equal variances assumed	.569	.454	.325	54	.747	.128	.395	-.663	.919
	Equal variances not assumed			.322	49.966	.749	.128	.399	-.673	.929

Appendix G: Statement of Original Work

I attest that:

1. I have read, understood, and complied with all aspects of the Concordia University-Portland Academic Integrity Policy during the development and writing of the this dissertation.

2. Where information and/or materials from outside sources has been used in the production of the dissertation, all information and/or materials from outside sources has been properly referenced and all permissions required for use of the information and/or materials have been obtained, in accordance with research standards outlined in the *Publication manual of The American Psychological Association*.

Lorraine Clarke

Digital/Typed Signature

June, 5th, 2018

Date