



2008

# An Exploration of Satisfaction, Psychological Stress, and Readiness for Interprofessional Learning in Medical, Nursing, Allied Health, and Social Work Students in an Interprofessional Health Care Course

Anne M. Haskins

Follow this and additional works at: <https://commons.und.edu/theses>

 Part of the [Psychology Commons](#)

## Recommended Citation

Haskins, Anne M., "An Exploration of Satisfaction, Psychological Stress, and Readiness for Interprofessional Learning in Medical, Nursing, Allied Health, and Social Work Students in an Interprofessional Health Care Course" (2008). *Theses and Dissertations*. 706.  
<https://commons.und.edu/theses/706>

This Dissertation is brought to you for free and open access by the Theses, Dissertations, and Senior Projects at UND Scholarly Commons. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of UND Scholarly Commons. For more information, please contact [zeinebyousif@library.und.edu](mailto:zeinebyousif@library.und.edu).

AN EXPLORATION OF SATISFACTION, PSYCHOLOGICAL STRESS, AND  
READINESS FOR INTERPROFESSIONAL LEARNING IN MEDICAL, NURSING,  
ALLIED HEALTH, AND SOCIAL WORK STUDENTS IN AN  
INTERPROFESSIONAL HEALTH CARE COURSE

by

Anne M. Haskins

Bachelor of Science in Occupational Therapy, University of North Dakota, 1998  
Master of Arts, College of St. Catherine, 2003

A Dissertation

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

Grand Forks, North Dakota

May  
2008

UMI Number: 3324267

### INFORMATION TO USERS

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleed-through, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

**UMI**<sup>®</sup>

---

UMI Microform 3324267

Copyright 2008 by ProQuest LLC.

All rights reserved. This microform edition is protected against unauthorized copying under Title 17, United States Code.

ProQuest LLC  
789 E. Eisenhower Parkway  
PO Box 1346  
Ann Arbor, MI 48106-1346

Copyright Anne M. Haskins 2008

This dissertation, submitted by Anne M. Haskins in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

Richard L. Hendry  
Chairperson

Kotulak Gaslman

Jan Stube

LaVone Fox

This dissertation meets the standards for appearance, conforms to the style, and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

Joseph D. Benoit  
Dean of the Graduate School

April 29, 2008  
Date

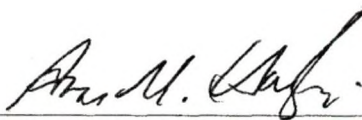
PERMISSION

Title                    An Exploration of Satisfaction, Psychological Stress and Readiness  
for Interprofessional Learning in Medical, Nursing, Allied Health,  
and Social Work Students in an Interprofessional Health Care  
Course

Department            Teaching and Learning

Degree                 Doctor of Philosophy

In presenting this dissertation in partial fulfillment of the requirements for a graduate degree from the University of North Dakota, I agree that the library of this university shall make it freely available for inspection. I further agree that permission for extensive copying for scholarly purposes may be granted by the professor who supervised my dissertation work, or in his absence, by the chairperson of the department or the dean of the Graduate School. It is understood that any copying or publication or any other use of this dissertation or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and the University of North Dakota in any scholarly use which may be made of any material in my dissertation



\_\_\_\_\_  
Signature

4/21/2008

\_\_\_\_\_  
Date

## TABLE OF CONTENTS

LIST OF FIGURES .....	x
LIST OF TABLES .....	xi
ACKNOWLEDGEMENTS .....	xiii
ABSTRACT .....	xiv
CHAPTER	
I.    INTRODUCTION .....	1
Purpose of the Study .....	4
Research Questions .....	4
Assumptions .....	5
Delimitations .....	6
Definitions .....	7
Summary .....	9
II.   REVIEW OF LITERATURE .....	10
Medical Errors .....	11
Etiologies of Communication and Collaboration Barriers .....	15
Prospective Solutions to Communication and Collaboration Issues in Health Care .....	21
Interprofessionalism in Health Care Academia .....	24
The History of Interprofessional Education .....	25

	21 <sup>st</sup> Century Interprofessional Education.....	26
	Problem-Based Interprofessional Learning Approach .....	33
	Student Surveys .....	36
	General Outcomes.....	36
	Course Satisfaction and Achievement of Knowledge: Medical, Nursing, and Allied Health Students .....	38
	Student-Related Variables .....	39
	Instructor/Course-Related Variables.....	40
	Psychological Stress.....	42
	Perceived Psychological Stress by Health Care Students.....	43
	Perceived Psychological Stress and Interprofessional Students.....	45
	Perceived Psychological Stress and Interprofessional Collaboration .....	46
	Rationale for Further Research .....	48
	Research Purpose .....	49
III.	METHODOLOGY .....	50
	Design and Sample .....	50
	Course Description.....	52
	Instrumentation .....	54
	Demographic Questionnaire .....	54
	Readiness of Health Care Students for Interprofessional Learning Scale .....	54



	Retrospective Pre-Test/Post-Test Design .....	55
	Perceived Stress Questionnaire.....	57
	Interprofessional Health Care Student Feedback Questionnaire.....	58
	Procedures.....	58
	Preliminary Procedures.....	58
	Data Collection .....	59
IV.	RESULTS .....	60
	Pre-Analysis Data Screening .....	60
	Missing Data and Case Deletion.....	60
	Instrument Reliability .....	61
	PSQ-Revised.....	61
	RIPLS.....	61
	IPHC SFQ .....	63
	Respondent Demographics .....	63
	Research Question Analysis .....	67
	Students' Psychological Stress – All Disciplines .....	67
	Achievement of Knowledge – All Disciplines .....	68
	Students' Course Satisfaction – All Disciplines.....	69

Students' Psychological Stress by Discipline .....	71
Students' Course Satisfaction by Discipline .....	71
Psychological Stress, Course Satisfaction, and Achievement of Knowledge by Discipline .....	71
Retrospective and Post-Test Achievement of Knowledge .....	74
Retrospective and Post-Test Achievement of Knowledge by Discipline.....	74
Course Satisfaction, Psychological Stress, Achievement of Knowledge, and Time of the Course Offering .....	78
Relationships Between Psychological Stress, Course Satisfaction, and Achievement of Knowledge .....	78
Relationships between Psychological Stress, Course, Satisfaction, Achievement of Knowledge, and Demographic Variables.....	79
Summary .....	81
V. CONCLUSIONS AND RECOMMENDATIONS .....	82
Achievement of Knowledge .....	83
Psychological Stress.....	91
Interprofessional Health Care Course Satisfaction .....	96
Limitations .....	97
Recommendations.....	98

Future Research .....	99
Practice.....	100
Summary .....	101
APPENDICES .....	102
Appendix A: Demographic Questionnaire .....	103
Appendix B: Interprofessional Health Care Student Feedback Questionnaire .....	105
Appendix C: Statement of Informed Consent .....	108
REFERENCES .....	109

## LIST OF FIGURES

Figure	Page
1. RIPLS Pre-Test and Post-Test Scores by Discipline .....	77

## LIST OF TABLES

Table	Page
1. Reliability (Cronbach's Coefficient Alpha) Results for the PSQ-Revised .....	62
2. Reliability (Cronbach's Coefficient Alpha) Results for the RIPLS .....	63
3. Frequencies and Percentages of Participants by Discipline and by Course Sequence.....	64
4. Frequencies and Percentages of Participants for Academic Discipline and Program Experience .....	66
5. Frequencies and Percentages of Study Time by Discipline .....	67
6. PSQ-Revised Mean Scores, Standard Deviations, and Middle Scale Scores .....	68
7. RIPLS Pre-Test and Post-Test Mean Scores, Standard Deviations, and Middle Scale Scores .....	70
8. IPHC SFQ Mean Score, Standard Deviation, and Middle Scale Score .....	70
9. Univariate Analysis of the PSQ-Revised Total and Subscale Scores by Discipline .....	72
10. Bonferroni Post Hoc Analysis of Between Discipline Scores for the PSQ-Revised, RIPLS Pre-test and Post-test, and IPHC SFQ .....	75
11. Univariate Analysis of RIPLS Total and Subscale Scores by Discipline .....	76

12.	Univariate Analysis of IPHC SFQ by Discipline .....	76
13.	Bonferroni Post Hoc Results for RIPLS Scores between Disciplines .....	77
14.	Spearman rho Correlation Coefficients for Demographics and Instrument Scores.....	81

## ACKNOWLEDGEMENTS

Thank you to my brilliant advisor and teacher, Dr. Richard Landry, for your sharing of knowledge, your kindness, your patience, and for keeping me on the right track.

Thank you to my committee members, LaVonne Fox, Ph.D., Kathy Gershman, Ed.D., and Jan Stube, Ph.D., whose knowledge, efforts, and wonderful personalities made this an incredibly enjoyable process.

A special thank you as well to:

Clint Hosford, Ph.D. and Sue Offutt, Ph.D. for sharing your expertise and resources.

The University of North Dakota Department of Occupational Therapy Faculty and Staff and the UND School of Medicine and Health Sciences Interprofessional Health Care Committee members for your support.

All of the amazingly talented University of North Dakota communication sciences and disorders, medical, nursing, occupational therapy, physical therapy, and social work students who were willing to lend their ideas and time which allowed me to complete this project.

Dana Plorin for your constant support, willingness to spend three years eating alone, and for making me laugh when I wanted to cry.

Marci Gefroh for your understanding, encouragement, and amazing advice.

All of my family and friends who have put up with my absence for the past three years. I love all of you dearly.

## ABSTRACT

Medical errors are a prominent problem in health care systems in many countries, including the U.S. One source of medical errors is communication and collaboration between health care team members. Many medical, nursing, and allied health care programs have implemented interprofessional health care courses to improve communication between future team members. However, a dearth of literature on the effectiveness of interprofessional education and the variables that may influence its efficacy continues to persist.

This survey research explored medical, nursing, occupational therapy, physical therapy, and social work students' achievement of knowledge, psychological stress, and satisfaction in an interprofessional health care course. Ninety-six students enrolled in medical, nursing, occupational therapy, physical therapy, and social work academic programs were surveyed following their completion of a 6-week, problem-based learning, interprofessional health care course.

Students, overall, acknowledged improved achievement of interprofessional health care knowledge after completion of the course and were satisfied with the course. Results found differences between disciplines in the area of achievement of knowledge, psychological stress, and course satisfaction. Notably, medical students were found to benefit the least from the course in terms of achievement of knowledge and also reported



the lowest satisfaction scores when compared with other disciplines. Medical, occupational therapy, and physical therapy students reported higher psychological stress than nursing students.

A positive relationship was revealed between the length of the students' program experience and students' professional identity, amounts of time spent studying and psychological stress, and satisfaction and achievement of knowledge. A negative relationship was found between time spent studying and achievement of knowledge, and psychological stress and length of time in the students' academic disciplines. No relationship was established between the time of the semester in which the course was offered and students' achievement of knowledge, course satisfaction, and psychological stress.

Variables that may warrant consideration when designing interprofessional health care curricula include discipline-specific values as they relate to interprofessional collaboration, students' professional identity acquisition, the amount of time students dedicate to studying, and students' psychological stress. Additional research is needed to further understand the complexities that influence students' learning in interprofessional health care courses.

To James H. Haskins

My hero, my first teacher, my friend, my Dad

## CHAPTER I

### INTRODUCTION

*First, do no harm... Hippocrates*

Medical errors have become a major focus for health care consumers, legislators, medical, and allied health care faculty and students since the publication of the Institute of Medicine's (IOM) report *To Err is Human* in 1999, which highlighted the noteworthy frequency of medical errors that occur annually in the United States. The IOM's (1999) approximation of patient deaths annually was 44,000 to 98,000. The safety of patients receiving medical treatment is the primary concern of health care providers, educators, and researchers though financial and legal considerations do not lag far behind (Carpenter, 2007; IOM, 1999). Multiple suggestions for reducing medical errors have been postulated by a plethora of researchers, health care professionals, academicians of health care, and legislators. Third-party payers have implemented reimbursement policies that prohibit reimbursement to health care institutions for care that is the resultant of a medical error (Carpenter, 2007). While medical errors have been associated with errors by the individual in some cases, most literary sources agree that the failure of the western health care system in providing safe and effective care is due largely to the breakdown of systems (Gawande, Zinner, Studert, & Brennan, 2003; Leape & Berwick, 2005; Peterson, Brennan, O'Neill, Cook & Lee, 1994; Regenbogen, 2007; Rothschild et al., 2005; WHO, 2007a; IOM, 1999). Highlighted in the systems breakdown arena are such factors as

ineffective, inefficient, and poorly informed communication between members of the medical and allied health field that appear to stem from a multitude of sources (Furåker, Hellström-Muhli & Walldal, 2004; Gawande et al., 2003; Kripalani et al., 2007; Leape & Berwick, 2005; Peterson et al., 1994; Reader, Flin, & Cuthbertson, 2007; Rothschild et al., 2005; WHO, 2007a) including increasing complexity in patients' diagnoses (Peterson et al., 1994; Regenbogen, 2007), interpersonal and interprofessional issues (Atwal & Caldwell, 2005; Pollard, Meyer & Gilchrist, 2004), lack of time (Furåker et al., 2004) and provider fatigue (Gawande et al., 2003). These are but a small proportion of the issues that appear to influence the health care system in the U.S. International, national, and local organizations comprised largely of health care professionals, researchers, and academicians have begun to explore methods for improving the failing systems. One such method that has received considerable attention is the improvement of interprofessional communication through the implementation of collaborative, interdisciplinary learning experiences for medical and allied health students (Allen, Penn & Nora, 2006; Cleak & Williamson, 2006; Walrath et al., 2006; Xyrichis & Lowton, 2007).

Published research has supported the infusion of interprofessional education in medical and allied health curriculums though the quality of published reports has been criticized (Zwarenstein et al., 2000). Primary areas of measurement have been student satisfaction and achievement of knowledge in interprofessional health care courses. The spectrum of variables that are thought to impact student interprofessional collaboration and satisfaction in interprofessional health care courses is immense. Authors have indicated that students' role identity (Barnes, Carpenter, & Dickinson, 2000; Hind et al.,

2003), age (Ansari, 2002a, 2002b, 2004), ethnicity (Ansari, 2004), academic experience (Ansari, 2002b; Stith, Butterfield, Strube, Deusinger & Gillespie, 1998), and gender (Ansari, 2002a, 2002b, 2004) contribute to students' satisfaction and/or students' acquisition of knowledge in interprofessional health care courses.

While the body of interprofessional health care education knowledge is growing, many of the published studies reviewed for the purposes of this report were characterized by small sample sizes, limited varieties of health care disciplines in the same study, conflicting student demographic and satisfaction related relationships, and contradictory outcomes. Little is known about the influence of students' perceived stress on interprofessional health care course satisfaction and their subsequent achievement of knowledge in an interprofessional health care course. In fact, no research was located that directly assessed this potential relationship. An additional variable that has received little consideration in student satisfaction research is the timing of the course offering with regards to the term or semester. Ansari's (2004) findings about the influence of course timing represented the only literature that was located during a literature search.

A scarcity of consistent of research outcomes persists and further research is needed to assess student-related variables that may influence learning, the efficacy of interprofessional education in promoting student achievement of interprofessional knowledge, and the potential relationship between student satisfaction and the time that courses are offered within an academic year. The anticipation of this researcher is that this study adds to the emergent body of literature intended to improve interprofessional

health care education, improve patient care, and, ultimately, reduce the occurrence of medical errors.

### Purpose of the Study

The purpose of this study was to explore students' perceived satisfaction with a problem-based learning (PBL) interprofessional health care course, interprofessional knowledge acquisition, and appreciation for multiple health care disciplines. A secondary intention of this study was to explore the potential relationship of students' perceived psychological stress on overall satisfaction scores, readiness for interpersonal learning, and the timing of the students' course completion.

### Research Questions

Specifically, the researcher sought to answer the following questions: What were the stress levels of students, overall? What was the students' perceived achievement of knowledge, retrospectively, as measured by readiness for interprofessional learning? What were the satisfaction ratings of students, overall, in an interprofessional health care course? What were the psychological stress levels of students with regards to academic discipline? What were the satisfaction ratings of students in an interprofessional health care course when considering discipline? Was there a difference between psychological stress levels, course satisfaction, and achievement of knowledge retrospective and post-test scores when considering academic discipline? Was there a difference, retrospectively, for students' achievement of knowledge in readiness for interprofessional learning? Was there a difference, retrospectively, for students' achievement of knowledge in readiness for interprofessional learning when considering participants' academic

discipline? Was there a difference between students' course satisfaction, psychological stress, and achievement of knowledge in readiness for interprofessional learning when considering the time the course was offered? Was there a relationship between students' perceived psychological stress scores, their course satisfaction scores, and their achievement of knowledge in readiness for interprofessional learning scores? Was there a relationship between students' perceptions of stress, achievement of knowledge, and course satisfaction, and participants' program experience, age, employment status, and time spent studying?

Though the questions posed were expansive and numerous, each was intended to gather information to assist interprofessional healthcare educators in expanding their knowledge regarding medical, nursing, and allied health students, characteristics that may influence student learning, and the effectiveness of a problem-based interprofessional health care course.

#### Assumptions

While the researcher anticipated that the participants provided truthful responses to the survey items due to the voluntary nature of this study, the validity of the participants' responses cannot be guaranteed. An unequal distribution of nurses, medical students, physical therapy students, occupational therapy students, and social work students composed the sample and while this may have affected the statistical results, the distribution of disciplines was similar to ratios observed in practice settings.

## Delimitations

Students in the communication sciences and disorders, medical, nursing, occupational therapy, physical therapy, and social work disciplines enrolled in the interprofessional health care course at the University of North Dakota were required to complete three of the four survey instruments used in this study. The fourth instrument, a psychological stress scale, was optional and participants' informed consent was required. Those participants who did not complete all four survey instruments were not included in this study. This limits this study's outcomes as those students who were not included in the study may represent an important portion of the population under study. Instances in which the participants' did not offer a response for items occurred, though these appeared to be inadvertent failures to respond due to the seemingly random nature of the missing data. Missing data for these cases were replaced with the mean responses for the respective items. Only one communication sciences and disorders student was enrolled during the semester data was collected and this case was deleted from analysis to protect the anonymity of the participant. The surveys were composed of close-ended questions to enhance management of data and allow for statistical analysis. Three open-ended questions were present on the course satisfaction questionnaire but were not included in this study due to the constraints of the proposal submitted to and approved by the university's Institutional Review Board (IRB). While instructor-related surveys were collected as part of the normal educational practices for the interprofessional course in this study, data from these surveys were not assessed due to the facilitative nature of the instructor's role. For the purposes of this study, emphasis was on the student-related



variables. Lastly, the primary investigator in this study was serving on the interprofessional health care course committee and was an assistant professor in the Department of Occupational Therapy at the University of North Dakota throughout the course of this study which may have influenced her interpretation of the results.

### Definitions

The following definitions are important to understanding interprofessional health care education, student satisfaction, psychological stress, and interprofessional health care students' achievement of knowledge in the area of readiness for interprofessional learning. These definitions have been provided to ensure readers a uniform understanding of this study.

**Academic Discipline** - Refers to the professional program in which the participant was enrolled during data collection. Academic disciplines in this study included: medicine, nursing, occupational therapy, physical therapy, and social work.

**Achievement of Knowledge** - Refers to the participants' perceived understanding of their own learning as determined by the Readiness for Interprofessional Learning Scale (RIPLS); an instrument intended to measure the subcategories of teamwork and collaboration, professional identity, and professional roles and responsibilities (Parsell & Bligh, 1999).

**Interpersonal Effectiveness** – Refers to “[s]kills for achieving specific objectives in relationships, getting and keeping good relationships, and maintaining self-respect in relationships” (Cole, 2005, p. 160). This includes “[r]ecogniz[ing]...the factors that interfere with relationships, strategies for challenging these negative factors,

and self-reinforcing positive responses...” (p. 160). Interpersonal effectiveness also includes expressions of opinions, negotiating, and reciprocating (2005).

**Interprofessional Approach** - Refers to a of interaction that “...[a]llows more flexibility in member collaboration and shared assessments, reports, goals, and intervention plans” (Cole, 2005, p. 101) than multidisciplinary approaches. Also referred to as interdisciplinary approach.

**Interprofessional Education** – Refers to “[t]he process by which a group of students (or workers) from health-related occupations with different educational backgrounds learn together during certain periods of their education, with interaction as an important goal, to collaborate in providing promotive, preventative, curative, rehabilitation and other services.” (WHO, 1988, p. 6-7) Also referred to as multiprofessional education.

**Practicing in a Silo** – Refers to autonomous practice by the health care professional in which he or she has little collaboration with other health care professionals (Smith et al., 2007).

**Problem-Based Learning** – Refers to an approach that encourages student learning through the presentation of a problem and student-driven initiatives to solve the problem (Richards & Inglehart, 2006).

**Psychological Stress** – Refers to “[a] result of how a person interacts with the environment and can be regarded as a complex system of interacting psychological, physiological, and environmental factors.” (Bergdahl, Larsson, Nilsson, Ahlstrom & Nyberg, 2005, p. 395).

Retrospective Pre-Test (Then) and Post-Test (Now) – Refers to a survey in which participants answer questions based on how they felt prior (then) to the introduction of the independent variable and how they felt after (now) the introduction of the independent variable (Rohs, Langone, & Coleman, 2001).

Teamwork – Refers to “[c]oordinated action, carried out by two or more individuals, jointly, concurrently, or sequentially. It implies commonly agreed goals; a clear awareness of, and respect for others’ roles and functions on the part of each member of the team; adequate human and material resources; supportive cooperative relationships and mutual trust; effective leadership; open, honest, and sensitive communications; and provisions for evaluation...It entails the ability to work as colleagues rather than a superior-subordinate relationship.” (WHO, 1988, p. 5)

### Summary

Chapter I consists of an introduction to the literature and the purpose of this study, the study design and sample, research questions, assumptions, delimitations, and definitions. Chapter II provides a more detailed examination of the literature introduced in Chapter I with emphasis on the following: medical errors, factors influencing the occurrence of medical errors and initiatives for reducing the prevalence of these factors. Additionally, Chapter II highlights the history and present state of interprofessional health care education, student learning in interprofessional health care courses, psychological stress and students learning, and rationale for further research in interprofessional health care education.

## CHAPTER II

### REVIEW OF LITERATURE

The complexities involved in medical errors, health care practice, and interprofessional health care education are immense and it is imperative that those issues are considered in relation to professional practice. The following literature review expresses the incidence of medical errors worldwide and possible etiologies of their occurrence in health care settings. Specifically, the literature review addresses the barriers that impede effective team communication and collaboration in practice. Next, proposed solutions to the barriers in collaboration, including interprofessional health care education, are reviewed. Interprofessional health care education history, past and present research on the effectiveness of interprofessional health care education in promoting collaborative practice, and student-related variables that may influence the efficacy of interprofessional health care education are established. The student-related variables that were highlighted in this review of literature include, but are not limited to, psychological stress, employment, gender, role identity, and academic discipline. Finally, methods for determining students' course satisfaction and achievement of knowledge with consideration for the aforementioned student variables were reviewed. This review of literature culminates in a summary that provides a rationale for the need for ongoing

research in interprofessional education with consideration for student- related demographics, psychological stress, and achievement of learning.

### Medical Errors

The quality of health care in the U.S., Canada, Australia, and Europe continues to be a highly debated topic in public, political, and professional forums. Concerning particularly is the continued increase in the frequency of medical errors that is occurring not only in the U.S. but in other countries throughout the world (Smith et al., 2007). Rothschild et al. (2005) defined medical errors as “[f]ailure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim” (p. 1,695) and further delineated the errors as “serious medical errors” (p.1,695) and “adverse events” (p. 1,695). Each of the distinctions presented by Rothschild et al. represented errors that resulted in patient harm and ranged from severe to fatal. Each year an estimated 44,000 to 98,000 Americans die (Institute of Medicine [IOM], 1999) secondary to errors in medical care and 1 in 10 people worldwide are affected by errors in their health care (Reuters, 2007; WHO 2007b). Gawande et al. (2003) reported that “[s]ixty percent of incidents occurred in the operating room, 12% in an intensive care unit, and 16% on a non-intensive care hospital floor; three quarters involved non-emergent care” (p. 616). Regardless of the location, the primary concern is the “unnecessary harm” (Reader et al., 2007, p. 732) of patients which result from medical errors.

While these statistics are astounding, unfortunately, the published statistics may be lower than the actual occurrence of medical errors. Kaldjian et al. (2008) reported that in a survey study of 138 faculty physicians and 200 resident physicians, 16.9% of those

surveyed indicated that they had not reported minor health care errors and 3.8% reported that they had not reported a major error. The potential underreporting of medical errors supports the likelihood that estimations of the presence of medical errors in health care are conservative and illustrates further the need to improve health care processes to deter the occurrence of medical errors and improve patient care.

The results of health care errors are wrought with financial implications as the IOM (1999) reported that 17 billion to 29 billion dollars is spent annually by hospitals in the U.S. secondary to direct and indirect costs of medical errors. In August 2007, Medicare announced a payment policy that relieves the governmental insurer from payment for patient treatment that is required due to eight preventable medical errors that often occur in hospital. These preventable medical errors include falls, a variety of infectious processes, pressure ulcers, and objects left in patients during surgery (Carpenter, 2007). While professionals disagree about the potential punitive nature of withholding payment for medical errors, Carpenter reported that private insurance companies will soon follow Medicare's payment model. These changes in funding policies support the need for the health care professionals to find solutions to reducing the medical errors that occur in the United States health care system.

Quality of care issues extend beyond direct patient harm and financial concerns to encompass the emotional experiences of the patients and patients' families who have been reported to find the decentralized nature of health care systems "bewildering" (IOM, 2001, ¶ 1) and may be at risk for losing confidence in western health care systems (Northcott et al., 2007). Health care recipients appeared to have recognized the presence

of systems and individual medical error etiologies that occurred in health care as 23% of the respondents to a survey in Alberta, Canada reported that the system was the most important cause of the medical error and 56% reported that errors were resultants of individual error (Northcott et al., 2007). The Kaiser Family Foundation (2008) published similar statistics in which 52% of the respondents cited individuals to be responsible for the errors. Despite subjects' reports on likely causes of medical errors, the respondents appeared unaware of the prevalence with which preventable medical errors occurred. Northcott et al. reported that subjects in their study believed that "...preventable medical errors are a relatively rare occurrence..." (p. 5). Their findings are incongruent with the public opinions reports of the Kaiser Family Foundation (2008) which reported that 47% of the American public was "very concerned" (p. 1) that a medical error would occur during general or hospital related health care. However, when asked to rank general health care concerns, 38% of respondents were concerned most with the cost of health care while only 6% were concerned with the occurrence medical errors (Kaiser Family Foundation, 2008). This concern may be related to the data collected by the Kaiser Family Foundation in 2004 which indicated that 49% of the public believed "...that 5,000 deaths or fewer occur in hospitals each year due to preventable medical errors" (Kaiser Family Foundation, 2008, p. 9); data in stark contrast to the estimates provided by the IOM (1999). The inconsistency of public opinion about medical errors highlights the complexities of the western health care system, attitudes and knowledge of health care processes, and exemplifies the need for further research about preventative strategies for reducing health care errors.

An increased number of specialty areas in health care, a multitude of third party payers, and managed care are believed to contribute to patient experiences of disjointed, inefficient, and ineffective provision of care (IOM, 1999). During the course of treatment, patients may encounter professionals from a multitude of disciplines in settings that range from inpatient hospital care, outpatient care, general and specialty services, intensive and emergent care, and rehabilitation (WHO, 2007a). Each of these settings and the respective disciplines in each possess a culture, a distinct language, and a set of procedures that often differ from other practice settings and which can act as a barrier when a patient transfers from one setting to another; impeding communication and teamwork effectiveness. Even the presentation of health care provider teamwork and interaction related issues in the medical literature presents with complexity; interprofessional, multidisciplinary, and interdisciplinary are a small number of the terms used to describe the nature of health care provision in the U.S. The seemingly continued proliferation of separate health care entities and increased complexity of the system processes associated with this growth may contribute to the breakdown of communication between health care providers and, ultimately, result in errors in patients' health care provision. Professor James Reason (as cited in Leape & Berwick, 2005) stated

that health care is also more complex than any other industry he knows in terms of relationships, with more than 50 different types of medical specialties and subspecialties interacting with each other and with an equally large array of allied health professions (p. 2, 384).

In 1995, the Pew Health Professions Commissions (as cited in Garman, Leach & Spector, 2006) reported more than 200 allied health professions operating in western health care.

Despite the growing convulsion that is western health care, Leape and Berwick



acknowledged the changes in health care professionals' perceptions as these professionals have begun to recognize that it most often is "...bad systems, not bad people, lead to the majority of errors and injuries..." (p. 2,385). The generation of literature regarding the systems failures that contribute to medical errors has grown tremendously since the IOM's report on medical errors in 1999 and provided insight about factors that may contribute to breakdowns in health care systems.

#### *Etiologies of Communication and Collaboration Barriers*

Health care professionals do not question or dispute that medical errors are a serious issue in health care. But what is the etiology of medical errors? It is imperative that health care professionals understand the nature of this phenomenon to work effectively toward a solution for reducing the prevalence of errors in patient treatment and improving patient safety. A surfeit of literature exists on the factors that are perceived to contribute to health care errors in a variety of health care settings. Potential causes of errors have been associated with a range of issues which include technical or knowledge error of the health care provider (Gawande et al., 2003; Regenbogen, 2007; Rothschild et al., 2005; WHO, 2007a), complexity of patients' diagnoses (Peterson et al., 1994; Regenbogen, 2007), equipment failure or misuse of equipment (Regenbogen, 2007), health care provider fatigue (Gawande et al., 2003; Peterson, et al., 1994), interruptions (Gawande et al., 2003), lack of patient centeredness (WHO, 2007a) and systems breakdown (Gawande et al., 2003; Peterson et al., 1994; Regenbogen, 2007; Rothschild et al., 2005; WHO, 2007a). The pervasive perceived cause of medical errors that permeates a substantial portion of medical literature is communication issues

between health care professionals (Furåker et al., 2004; Gawande et al., 2003; Kripalani et al., 2007; Leape & Berwick, 2005; Peterson et al., 1994; Reader et al., 2007; Rothschild et al., 2005; WHO, 2007a). Despite the prevalence of literature on this topic, Reader et al. (2007) reported that interprofessional communication in health care, specifically intensive care units, is understood more poorly than in any other high-risk industry.

Results of research in the field of interprofessional health care have illustrated that poor communication stems from a multitude of etiologies including lack of time (Furåker et al., 2004), issues with written communication (Furåker et al., 2004; Kripalani et al., 2007), discipline specific terminology (Furåker et al., 2004;), differences in determining appropriate patient outcomes (Furåker et al., 2004), the increasingly complex nature of the chronic disease processes of patients (Furåker et al., 2004), power struggles between team members (Atwal & Caldwell, 2005; Pollard et al., 2004) or role overlap (Booth & Hewison, 2002), impaired self-identity of team members (Atwal & Caldwell, 2005), negative stereotyping of team members based on their profession (Mandy, Milton, & Mandy, 2004), and lack of knowledge of health care providers' roles and scope of practice (Gawande et al., 2003; Hooper, Thomas & Clark, 2007; Xyrichis & Lowton, 2007). Gawande et al. (2003) reported that "...organization, planning, and interaction among team members appeared to play a critical and underappreciated role" (p. 619). Researchers and practitioners have worked to research and publish literature regarding the communication issues that impair quality patient care and patient safety. Many of

these efforts have been directed toward communication difficulties that occur in a variety of health care practice settings.

Gawande et al. (2003) acknowledged the interactive processes involved in the occurrence of medical errors and cited their anticipation that most medical errors were a result of multiple breakdowns in health care. Overall, they found that systems factors contributed to 86% of the incidents of medical errors. After interviewing 38 surgeons, Gawande et al. reported that communication breakdown between team members was prevalent in 43% of cases that involved medical errors and that a median of two systems errors were involved in each case. The influence of multiple factors on communication quality is highlighted by Furaker et al., (2004) who examined health care professionals' reactions to the use of a critical care pathway for patients who had experienced a cerebrovascular accident. Participants in that study reported a lack of collaboration between disciplines due to time constraints, complexity of the patients' disease process, documentation issues, and a lack of a consensus on patient outcomes prior to the implementation of the pathway.

Issues with delineation or knowledge of professional roles in patient-care and power struggles between health care professionals appear also to play a role in communication ineffectiveness in health care settings. In an examination of communication in hospital team meetings, Atwal and Caldwell (2005) found a prevalence of unequal distribution of contributions by team members in which nurses, physical therapists, social workers, and occupational therapists failed to share and ask for information during team meetings while personnel from the medical staff tended to

dominate the communication in the meetings. Atwal and Caldwell suggested allied health professionals' lack of verbal contributions and requests for information regarding patient care in team meetings may have been a result of an impaired perception of the value of their own profession. Societal norms, values, and the culture of medicine illustrate the tiered structure of medical and allied health professional roles in western culture and health care and may often influence practitioners' view of their roles in patient care. Participants in a qualitative study by Herbert et al. (2007) reflected on the societal norms and culture in certain health care arenas that influenced their career path and the devaluing of certain professions. Herbert et al. reported that some participants reflected on their personal feelings of humiliation and not being a valued member of the health care team; participants identified the hierarchy between disciplines that existed during their internships as a contributor to their feelings of limited self-worth. Specifically, they identified the devaluing of occupational therapists and physical therapists in relation to the medical students (Herbert et al., 2007); perceptions which ultimately shaped negatively the occupational and physical therapists' views of interprofessional collaboration. The presence of this occurrence may have been influenced by a variety of factors including societal norms, personality characteristics, and values that contribute to the choice of discipline, the goals and values associated with each discipline and the structural hierarchy that permeates many health care settings (Garman et al., 2006; Whitehead, 2007). Whitehead (2007) explained that this hierarchy is supported by the segregation of physicians from their colleagues by "...their claims to exclusive authority over particular knowledge and skills" (p. 1,013). While the hierarchical structure may

play a role in communication dissention between team members, other issues have been identified between disciplines in the allied health field. Booth and Hewison (2002) investigated occupational and physical therapists viewpoints regarding role overlap and found that dissention between each respective discipline occurred when the similarities between the treatment provided to patients was beyond “a certain level” (p. 39). This finding seems to reflect the sentiments offered by Leape and Berwick (2005) and Garman et al. (2006) as the authors discussed the autonomous quality of professionalism that has historically permeated western medicine and led to impaired communication between interdisciplinary team members. Meads and Ashcroft (2005) further supported this notion as they noted the historical presence of professionals “...jealously guard[ing]...” (p. 29) their autonomy but also asserted that integrative approaches to independence can be a supportive endeavor. Barnes et al. (2000) emphasized that competition between team members and a failure to recognize the value, roles, and contributions of other professions has led to collaboration breakdowns or absences. Whitehead (2007) noted the unavoidable tension that occurs when team members differ in their perception of who should be the decision-making authority.

Other researchers have suggested, however, that it is not competition or power struggles between team members that limit the quality of patient care, but rather an absence of the understanding of interprofessional team members roles, qualifications and the purposes that each discipline supports during the course of patient treatment. In a qualitative study in Australia, Hooper, Thomas, and Clark (2007) examined the professional relationships between occupational therapists and aboriginal health care

workers and found that one barrier impeding patient care was the lack of knowledge regarding the roles of the respective disciplines. This lack of knowledge resulted in a deficiency of communication engagement by members from each discipline (Hooper et al., 2007). Given the emphasis on the individual in western health care systems and the tendency for professionals to practice in silos (Smith et al., 2007), this finding is not surprising though the influence of autonomous practice can result in negative effects on not only patient care but the psychosocial health of health care professionals. Herbert et al. (2007) reported on the diminished satisfaction in professional collaboration reported by participants in whom the isolation "...left them feeling isolated, unable to connect with other professionals and meet the needs of patients..." (p. 1,323). In a research protocol paper, Zwarenstein et al. (2007) reported findings that arose during preliminary observations of their study site. Interpersonal effectiveness between health professionals was problematic particularly and four areas were identified specifically: knowledge of team members' names, professional titles, roles and credentials were absent; little discipline specific knowledge was shared during treatment planning interactions and usually one-way communication between team members (Zwarenstein et al., 2007). This lack of interpersonal consideration during professional communication may be related to a multitude of factors such as the lack of time and depersonalization that often occurs secondary to burn out; topics discussed further in this review.

While a breadth of literature exists regarding the interprofessional communication and the collaboration issues that affect western health care systems, questions regarding solutions to these problems persist. Researchers and governmental agencies have begun

to address these concerns and have offered suggestions to diminish their prevalence and ebb the pervasiveness of medical errors that infiltrates western health care systems.

*Prospective Solutions to Communication and Collaboration Issues in Health Care*

In 1998, the IOM created the Committee on Quality Health care (CQHC) in the U.S. to evaluate patient safety and develop a strategic plan for improving drastically the quality of health care in the U.S. The findings of the IOM CQHC regarding the impaired status of interdisciplinary health care communication substantiated the findings of the aforementioned research studies and identified specific issues and recommendations for improving patient safety. The culmination of the CQHC's investigation resulted in the creation of a textbook containing multiple recommendations to improve patient care (IOM CQHC, 2001).

Two of the primary areas for improvement identified by IOM CQHC were interprofessional collaboration and communication. The 10<sup>th</sup> and final rule in the IOM CQHC's (2001) fourth recommendation suggested improved partnerships between health care providers from multiple disciplines: "Cooperation among clinicians. Clinicians and institutions should actively collaborate and communicate to ensure an appropriate exchange of information and coordination of care." (p. 9) and is supported by Recommendation 7 which promoted the "development of effective teams" (p. 112). This rule has been further emphasized and direction for achieving it was the focus of the IOM CQHC's 12<sup>th</sup> recommendation:

Recommendation 12: A multidisciplinary summit of leaders within the health professions should be held to discuss and develop strategies for (1) restructuring clinical education to be consistent with the principles of the 21st-century health system throughout the continuum of undergraduate, graduate, and continuing

education for medical, nursing, and other professional training programs; and (2) assessing the implications of these changes for provider credentialing programs, funding, and sponsorship of education programs for health professionals. (2001, p. 208)

The IOM CQHC (2001) interprofessional collaboration recommendations are congruent with the World Health Organization's (WHO) nine Patient Safety Solutions (2007) that also indicated a need for improved communication between health care disciplines. Solution 3 addressed health care personnel communication, identified as a leading cause of medical error and patient harm (The Joint Commission 2007; WHO, 2007).

Many health care professionals and researchers have recognized the influence of poor communication on patient care and have investigated and/or promoted methods of intervention to improve the process of team communication. Leape and Berwick (2005) proposed a need for continued and increased interprofessional communication training with a focus on patient safety. Researchers have cited addressing team interaction as a measure to improve interprofessional communication (Furåker et al., 2004; Xyrichis & Lowton, 2007). Roberts and Perryman (2007) promoted the streamlining values and expectations between disciplines to promote a patient-safe culture. Specifically, they promoted relationships that were "...built on trust, respect, confidentiality, responsiveness, empathy, effective listening, and communication..." (p. 156). Schmalenberg et al. (2005) asserted similar findings in a qualitative study in which they found that respect, trust, collaborative relationships, open communication, and teamwork contributed to improved patient outcomes. Furåker et al. (2004) reported on health care professionals who used a critical pathway when treating patients who had experienced a



cerebrovascular accident to facilitate communication between team members; implementation of this pathway included regularly scheduled team meetings. As a result of the continued interaction between professionals, respondents reported that roles of team members became more defined, a common language emerged, and interprofessional learning occurred resulting in improved team competence (2004). The work of Furåker et al. may indicate that interaction and interpersonal contact between members of interprofessional care results in greater collaboration and team functioning; a view congruent with Sanders et al. (2007) who, in a report at the AMEE conference, found more than 95% of survey respondents reported a need for combined learning opportunities for nurses and pharmacists. Dieleman et al. (2004) investigated community health care teams that were formed for the purposes of study and reported that communication, job satisfaction, understanding of team member roles, preference for working in teams, and comfort levels of working with professionals from other disciplines increased as a result of regular meetings. Regularity in team member collaboration has been also supported by Xyrichis and Lowton (2007) who conducted a review of literature to examine variables that positively and negatively influenced the effectiveness of health care teams. One recommendation based on the outcomes of their research was to increase funding for interprofessional education.

Leape and Berwick (2005) cited culturally-related issues regarding communication challenges that face institutions attempting to improve communication and collaboration between disciplines. They asserted that the one barrier to systems changes was "...medicine's tenacious commitment to individual, professional autonomy"

(p. 2,387). Findings substantiated by Herbert et al.(2007), who found that professional isolation was a mitigating factor for unsatisfied health professionals and poorer patient outcomes. Some authors have proposed joint learning opportunities for students from a variety of disciplines. Smith et al. (2007) promoted joint learning opportunities to enhance team effectiveness and asserted that “[i]f health professionals are to work more effectively in teams they must learn together interactively, from and about each other, rather than in the traditional unidisciplinary educational ‘silos’ or in multidisciplinary mass-lectures where interaction is minimal” (p. 867). Dieleman et al. (2004) reported that learners must be willing to learn about and from other disciplines as a vital component in interprofessional collaboration.

While an impaired process of interprofessional communication is documented in the literature, further investigation is required to understand the etiology of this phenomenon. In one commentary, Mattick and Bligh (2006) called for continued commitment to and investigation of interprofessional learning to evaluate its effectiveness.

#### Interprofessionalism in Health Care Academia

While practicing health care providers seek out methods to improve team communication and collaboration in patient care settings, proponents of interprofessional health care education promote the infusion of interprofessional teamwork in the academic curriculum (Allen et al., 2006; Barnsteiner, Disch, Hall, Mayer & Moore, 2007; Walrath et al., 2006). This proposed implementation of interprofessional health care courses in medical and allied health curriculum has been supported by multitudes of researchers,

health care professionals, and academicians intent on improving patient care and patient safety through the promotion of collaborative engagement of future practitioners by shaping the cultural standards, values, and skills of students. Interprofessional education has been defined "...as any type of educational, training or teaching initiative involving more than one profession in joint interactive learning" (Zwarenstein et al., 2000, p. 2) and also as "[o]ccasions when two or more professions learn with, from and about each other to improve collaboration and the quality of care" (Barr et al., 2006, p. 75). It is an educational endeavor that has been gaining an international spotlight since the 1970s.

#### *The History of Interprofessional Education*

The concept of interprofessional education is not a novel initiative. Educators, health care professionals and researchers have been suggesting the implementation of interprofessional health care curriculum in universities for decades. Given and Simmons discussed interdisciplinary health care in an article in 1977 (as cited in Allen et al., 2006). The WHO began considering interprofessional collaboration in 1978 (Barr et al., 2005; Mandy et al., 2004) though as noted by Barr et al. (2005) the WHO did not begin actually promoting interprofessional education until 1988 when the organization published a 72-page document outlining the need and rationale for implementing multi-professional education in health care curriculums. In this report, the WHO (1988) outlined the global objectives of interprofessional education:

Education programmes should stress ways of enabling health team members to learn how to work efficiently together and understand (1) the responsibility of the team as a group; (2) the role of each team member in carrying out the team's responsibilities; (3) the extent to which roles of team members overlap; (4) the processes needed for working together; and (5) the part played by the team in the overall delivery system. (p. 7-8)

### *21<sup>st</sup> Century Interprofessional Education*

Following the WHO's 1988 report on interprofessional education, medical schools in the United States, Europe, and Australia began to introduce interprofessional health care courses to improve communication between and knowledge of multiple health care disciplines and team processes (Allen et al., 2006; Cleak & Williamson, 2006; Walrath et al., 2006; Xyrichis & Lowton, 2007). Allen et al. (2006) promoted the concept of interdisciplinary health care education as they asserted health provider collaboration is the critical component in improving patient outcomes; a view substantiated by Barnsteiner et al. (2007), though the latter authors specify that the positive benefits of interprofessional health care may often be subtle and difficult to detect in practice situations due to the presence of multiple confounding variables that exist in all health care systems. Herbert et al. (2007) emphasized also the importance of positive experiences with mentors and interprofessional environments and reported that participants recounted the positive impact of nurturing collaborative experiences and role models on students' eventual viewpoints regarding interprofessional teamwork.

Sanders et al. (2007) highlighted recommendations for patient safety developed, originally, at a conference at the Association for Medical Education in Europe (AMEE) in 2006 and addressed, specifically, interprofessional collaboration and intrapersonal skills building that should be a focal point of the medical curriculum. Recommendations included: “[d]evelop a willingness to take responsibility, [d]evelop communication skills, especially inter-personal, [and] [d]evelop team-working skills” (Sanders et al., 2007, p. 60). It is noteworthy that of the five main recommendations of the AMEE for patient

safety improvements, three related directly to communication and collaboration skill building (Sanders et al., 2007).

The promotion of collaborative learning in medical and allied health student learning is logical given the structure and organization of most medical, nursing, and allied health curricula. Medical, nursing, physical therapy, occupational therapy, social work, and communication sciences and disorders students represent only a small portion of the disciplines in which students are introduced to and master multiple skills and the theoretical foundations specific to their discipline. The intentions of these mastery requirements are to provide efficient and comprehensive patient care. Medical students have a history rich in the sciences while nursing, allied health professionals and social workers are considered traditionally to utilize a more humanistic or social theoretical foundation for practice (Barnes et al., 2000; Garman et al., 2006). Hypothetically, this dichotomy should be beneficial for patient treatment as the application of alternative viewpoints when considering patient health should result in advanced and comprehensive treatment planning. However, issues appear to arise when health care students become health care practitioners and must integrate those discipline-specific theoretical frameworks and skills into a comprehensive team approach to provide patient care; a venture that requires that students possess knowledge of the theoretical backgrounds and roles of other disciplines (while maintaining their own sense of identity) and the ability to communicate effectively and efficiently with other team members to identify best care practices. Researchers and proponents of interprofessional health care education question whether students can independently transition from working within their own discipline

to working with professionals from other disciplines to function as a team. This is not surprising given the predominant nature of health care education in which students from medicine, nursing and allied health fields learn their roles in distinct and discipline specific departments; often, with little or no interaction with students from other disciplines represented on their future health care teams. Advocates of interprofessional education have asserted that students must practice these collaborative skills in the academic setting as they seek to master other discipline specific skills critical to their evolution from student to health care professional (Barr et al. 2005; Barnsteiner et al., 2007; Smith et al., 2007).

With the advent of international and national support, a multitude of practitioners, researchers, and educators have begun to research the value of interprofessional education in academia and the variables that may be affecting its effectiveness. Researchers have identified several variables that may influence interprofessional learning experiences including student self-identity (Barnes et al., 2000; Hind et al., 2003), stereotyping of other disciplines (Mandy et al., 2004; Street et al., 2007), and the sequence of the course offering within an academic discipline (Mandy et al., 2004), previous experiences in health care contexts (Pollard et al., 2004), and educational background (Pollard et al., 2004).

In one study of interprofessional education readiness, Hind et al. (2003) discovered that allied health and medical students who stereotyped positively their profession also demonstrated a strong self-identity with their respected profession. This positive self-identity likewise correlated with positive stereotypes about other allied

health and medical disciplines (2003). The notion of self-identity as a precursor to positive relationships between team members may be supported indirectly by the results of a pre-test/post-test study in which Mandy et al. (2004) reported an increase in negative stereotyping between first-year physiotherapy and podiatry students following an interprofessional health care course. The authors suggested that the timing and sequence of the course in the students' curriculum may have played an important role in growth of negative attitudes. However, Reynolds (2003) reported that occupational therapy and physical therapy students in their first year of their respective programs reported satisfaction with a problem-based, interprofessional course. Despite these findings, it is unknown whether students in their first-year of a professional program have yet achieved a strong professional identity, which would provide them with the ability to appreciate the contributions of other members.

Confounding the prior studies and presenting contrasting results was the outcome of the primary phase of a longitudinal survey of 852 health care students which indicated that students who had experience working in health care and those who had more education demonstrated a greater tendency toward negatively stereotyping people from other disciplines (Pollard et al., 2004). Further, Pollard et al. found that occupational therapy and social work students had "particularly negative views" (p. 356) on how health care workers worked together but did not offer potential influences of this occurrence.

Barnes et al. (2000) published outcomes of a mixed method study in which they investigated attitudes, identity, role delineation, and status of post-professional social

workers, occupational therapists, nurses, psychologists, and psychiatrists who completed an interprofessional health care course as part of a post-graduate certification process. Complete pre-test and post-test data were not available for all of the samples selected; however, their findings indicated that professionals identified strongly with their own profession before and after the course, achieved greater clarity regarding their own roles on the health care team, identified a hierarchical status of professionals, and demonstrated adherence to stereotypes of persons based on their professional title (Barnes et al., 2000). Hierarchical rank by discipline was presented as psychiatrists, psychologists, nurses, occupational therapists, and social workers. Each profession was related with differing degrees of expertise by their peers in the areas of academic rigor, leadership skills, interpersonal skills, practical skills, and life experience (Barnes et al., 2000). They discovered, further, that professionals from each discipline disagreed often with the stereotyped variables assigned to their own discipline by their peers from different disciplines. Notably, stereotypes and status perceptions did not change following the course (Barnes et al., 2000). Nursing students, in a mixed method research design, also reported the presence of stereotypes related to “professional hierarchy, knowledge levels, academic ability and achievement and social background” (Street et al., 2007, p. 775) which was contrasted by the medical students in the study who reported that they did not perceive those stereotypes.

An additional source of potential conflict in interprofessional health care education courses, that appears consistent with issues reported in practice settings (Booth & Hewison, 2002), is role overlap (Insalaco, Ozkurt, & Santiago, 2006). Insalaco et al.



investigated the perceptions of physical therapy, occupational therapy, and speech-language pathology students about their roles and responsibilities on a health care team. They indicated that their findings illustrated the agreement of each of the disciplines on the major roles each discipline was responsible for, but also noted the tendency of each of the disciplines to overemphasize their own role or underemphasize the role of the other disciplines in certain areas of treatment. Insalaco et al. proposed that a primary etiological basis for this occurrence was the participants' lack of awareness of each discipline's role and educational background in those treatment areas, especially those in the occupational therapy and speech-language pathology disciplines.

Despite the perplexing polarization of study results, researchers have published outcomes that have demonstrated student interest and optimism regarding enrollment in interprofessional health care courses. Hind et al. (2003) found that while students in pharmacy, physiotherapy, nursing, and medical programs all expressed a positive attitude regarding their potential engagement in interprofessional learning, nursing students expressed significantly higher scores than students from the other disciplines. This positive attitude was also supported by the work of Pollard et al. (2004) who, despite their findings of negative attitudes regarding interprofessional collaboration in health care students, reported students in ten health care disciplines expressed a positive attitude toward interprofessional learning. Street et al. (2007) examined the collaborative ability, attitude, and learning experiences of 160 nursing and medical students. Their findings revealed that nursing students demonstrated more positive attitudes at baseline regarding interprofessional learning when compared with medical students' baseline measurements.

Students were then matched with either a student from their own discipline or a student from the other discipline. Post learning experience scores indicated only nursing students who had been matched with medical students demonstrated statistically significant improvements in their attitude toward interprofessional learning though the medical students who were matched with nursing students did show improvements in mean scores. Interestingly, Street et al. reported nursing students identified communication skills, confidence, and independence as their primary achieved learning goals while medical students reported that having the chance to treat a client in an authentic context was the most satisfying goal of their learning experience. Cleak and Williamson (2006) published the results of a pilot study of an interprofessional health care course which included allied health students in their last undergraduate year. Participants in their study indicated they gained knowledge about their own role and the perspectives and roles of students from other disciplines. Further, the participants expressed an overall positive attitude toward interprofessional teamwork and the collaborative learning experience. Lumague et al. (2006) provided a summary of nursing, occupational therapy, pharmacy, physiotherapy, and social students' perspectives of an interprofessional learning experience. Their findings indicated that students appreciated the importance of interprofessional health care education and the benefits that it may have on patient care. Despite the published benefits of interprofessional health care education, further research is required to support not only the institution of this academic endeavor, but to identify which methods are most appropriate for promoting collaborative learning. One learning

approach that has been implemented in interprofessional education is the problem-based learning approach.

### *Problem-Based Interprofessional Learning Approach*

Problem-based learning (PBL) has received a substantial amount of attention in discipline specific literature such as medical, nursing, and allied health; however, limitations exist in the evidence of its application in interprofessional learning experiences. Though PBL is used interchangeably with case-based learning, the two are actually quite different (Richards & Inglehart, 2006). Richards and Inglehart defined PBL as an approach that encourages student learning through the presentation of a problem and student-driven initiatives to solve the problem while Hendry, Ryan and Harris (2003) identified PBL as "...students work[ing] collaboratively on understanding a problem" (p. 609). PBL also involves cases presented to the students prior to the students' reception of information related to the topic from course instructors (Reynolds, 2003). The students are then required to locate vital information to solve the case and act as peer teachers as they present their topic research to team members; the contributions of the team members should coalesce to provide a comprehensive understanding of the problem and the solutions (Reynolds, 2003). Another factor that differentiates PBL from case-based learning is the role of the course instructor who facilitates and supports the direction and group processes rather than teaching (Hendry et al., 2003; Reynolds, 2003).

Richards and Inglehart (2006) distinguished PBL from case-based learning, an approach in which the instructor presents the case and facilitates the students' consideration of treatment considerations to achieve a certain outcome; most often a

component of the case warrants greater consideration. While Richards and Inglehart found case-based learning contributed to increased students' considerations for the multiplicity of components that should be considered in patient care, other researchers have promoted the use of PBL to facilitate interprofessional learning.

Reynolds (2003) examined the influence of PBL on the interprofessional learning of occupational and physiotherapy students and suggested PBL resulted in a positive learning experience for male and female students, alike. Females did, however, appear to respond more favorably to "...the collaborative nature of the learning task and the responsibility for self-managed learning" (2003, p. 39). In a short report, Oliffe et al. (2005) also found that PBL was a positive addition to interprofessional learning for a group of nursing, dietetics, medicine, pharmaceutical sciences, and social work students. They indicated, however, participants reported higher satisfaction rates with the interprofessional learning experience than the use of PBL and recommended traditional teaching methods be implemented in conjunction with PBL methods. Goelen, De Clercq, Huyghens and Kerckhofs (2006) studied PBL interprofessional learning experiences in medical, nursing, and physiotherapy students who were exposed to "real" patients. Their findings supported statistically significant improvements in the attitudes of male students. Goelen et al. also found students in the PBL group demonstrated significant gains in autonomy and competence when compared to participants in the control group. In a qualitative study of 23 social work, nursing, medical, and pharmaceutical sciences students and their perceptions on interprofessional learning, O'Neill and Wyness (2005) discovered students valued collaborative learning with peers and a focus on practice-

based learning. Psychological benefits to interprofessional education appeared as well. In a position paper, Hanson (2005) proposed that one benefit of interprofessional ethics education is the formation of improved communication between nursing and medical students that may result in decreased “moral stress and burnout” (p. 168).

Despite, the positive support for PBL, limited quantities of evidence support this learning approach in interprofessional health care education literature. Often studies are limited by the small number of disciplines involved in the study, limited numbers of participants, and in generalizability of the results attributable to the diversity that presents in medical, nursing, and allied health curricula.

Existing literature substantiates the need for continued research in interprofessional health care education to understand further the experiences, perceptions, and other variables that affect students’ ability to contribute to healthy and effective teamwork. In addition to the illustrations of varying and complex outcomes that dominate interprofessional health care education literature, additional barriers to successful implementation of interprofessional learning experiences persist. Two of the barriers impeding the implementation of increased prevalence of communication building education in medical curricula are time and opportunity in the programs of study for an additional class. Sanders et al. (2007) acknowledged the difficulty of implementing another course in an “...already crowded curriculum” (p. 60), but insisted patient safety and achievement through increased collaborative learning should be of foremost concern. Zwarenstein et al. (2000) conducted a systematic review of 89 research articles and concluded that none provided enough rigor to maintain conclusively the implementation

of interprofessional health care education; their results supported the need for further research. Their recommendations were substantiated by Street et al. (2007) who reported a dearth of evidence regarding interprofessional educational effectiveness and, especially, a lack of rigorously conducted interprofessional research. Lumague et al. (2006) also promoted that further research be completed at universities to understand student learning in interprofessional health care education. Little or no dissent exists between interprofessional health care educators, researchers, and authors that a deficiency of academic interprofessional literature and research demonstrating consistency in outcomes regarding student learning continues to persist.

#### Student Surveys

##### *General Outcomes*

Historically, educators in the U.S. and abroad have procured information on how to improve higher education courses through the use of student surveys. Student surveys, also referred to as student ratings (McKeachie, 1997) or student performance appraisals (Barr et al., 2005), have been used for data gathering about higher education course content and course instructors. As noted by Doyle (as cited in d'Apollonia & Abrami, 1997), student ratings have been used heavily in the United States since their introduction in the 1920s. Student assessments of satisfaction have also been used to evaluate the effectiveness and overall learning of interprofessional health care courses, i.e., students' perceived achievement of knowledge (Cleak & Williamson, 2006). The results of student surveys often serve as a catalyst for course modification (McKeachie, 1997). Though researchers and academicians (Durrant & Dorrius, 2007; McKeachie, 1997; Nuhfer,

2003) have acknowledged the limitations of using student surveys of course satisfaction, they have simultaneously supported the use of student surveys to acquire knowledge regarding students' perceptions of student learning, students' satisfaction with the course and instruction, and suggestions for content improvement as well as potential avenues for enhancing student learning experiences (McKeachie, 1997). Following a review of literature, Greenwald (1997) described the trend of research related to student ratings from the 1970s through the 1980s and suggested the majority of the research has supported the validity of student surveys. He reported further that student-rating investigation has decreased substantially in prevalence since the 1980s (Greenwald, 1997). In one study, Durrant and Dorrius described the benefits and costs of using surveys to assess the learning of students' learning abroad, while they concurred that student surveys contribute to the educators understanding of students' academic achievement. Nuhfer also explained the advantages and disadvantages of using student surveys to assess teaching proficiency and reported, ultimately, that student surveys are a valuable tool in assessing student satisfaction. Despite the widespread use of student surveys, they have been criticized for potential subjectivity of student perceptions, the difficulty in controlling for extraneous variables, and questionable validity. McKeachie acknowledged the potential limitations of the student surveys that may include bias created by grade inflation and student blaming of instructors for student failing of courses, but supported the use of student ratings. "No matter how valid the evidence provided by students may be, it is almost certainly more valid than many personnel committees give credit for being." (McKeachie, 1997, p. 1, 222) In an exploratory study,

Stalmeijer et al. (2007) concluded ongoing determinations of interprofessional health care education quality should include student ratings. Despite minor controversies related to student ratings, educators will likely continue to use student surveys to gather data as they are relatively easy to administer, can be used to gather information from large samples of students, and provide valuable information regarding students' perceptions of academic curriculum and acquisition of knowledge.

*Course Satisfaction and Achievement of Knowledge:  
Medical, Nursing, and Allied Health Students*

In health care courses, potential relationships between student satisfaction outcomes and student-related demographics (Ansari, 2002a; Ansari, 2002b; Ansari, 2004; Stith et al., 1998) and/or instructor/course-related characteristics (Guarino et al., 2007; Stith et al., 1998) have often been the focal points of study. Each of these variables is important when identifying trends in student learning. The influence of student-related, instructor-related, and course-related variables is a important particularly when making formative decisions about changing the content and structure of a course. Faculty's understanding of the variables that influence student satisfaction can lead to improvement in course content and teaching strategies.

*Student-Related Variables*

Evaluating student course satisfaction is often a perplexing endeavor due to the host of variables to be considered. The characteristics of students who enroll in health care programs are diverse and exist in multiplicity. Age, gender, ethnicity, educational background, employment history and status, and spousal and caregiver status represent a small number of the variables that have been considered during the research of student



satisfaction (Ansari, 2002a; Ansari, 2002b; Ansari, 2004). Ansari (2004) investigated student satisfaction with three research learning modules, potential demographic-related variables, and the time the course was offered. Ansari (2004) found the academic term, enrollment status, ethnicity, and age (among other variables) of participants contributed to differences in student satisfaction ratings. Specifically, Ansari (2004) determined students in the second term had more favorable responses on 65% of the assessment items, part-time students reported greater satisfaction on “84% of the items” (p. 360), more white students reported satisfaction on items related to team knowledge and early information provision, and students older than 25 years reported greater satisfaction in multiple areas when compared to their younger counterparts. In an earlier study, Ansari (2002a) evaluated 460 nursing students in England to assess the influence of student demographics on course satisfaction and found age to be one variable impacting student satisfaction. Traditional students (less than 21 years old) expressed less satisfaction than their non-traditional counterparts (greater than 21 years old), and when considering three categories of age, students in the uppermost age bracket demonstrated the greatest satisfaction with their courses (Ansari, 2002a). Further investigation revealed no differences when considering gender or disability status although student ethnicity did influence satisfaction as white students demonstrated greater satisfaction than non-white students (Ansari, 2002a).

In a separate report, Ansari (2002b) published results of the same 460 nursing students' surveys. After controlling for the age, Ansari (2002b) found that students who had completed more of their program of study (level 3 students versus level 1 students)

reported lesser satisfaction with learning experiences. Contrasting results were reported by Stith et al. (1998) who found that female physical therapy students completing their fifth clinical experience reported greater satisfaction than those completing their third clinical experience. These researchers questioned the effect of gender on overall satisfaction as male physical therapy students reported the greater satisfaction with their fifth clinical experience when compared with their third clinical experience. In the same study, Stith et al. reported that physical therapy students' life satisfaction also contributed to their perception of clinical satisfaction.

Baykal et al. (2005) conducted a three-year study on the satisfaction of nursing students at a Turkish university. Their findings indicated a fluctuating satisfaction rating as students reported high, low, the highest, and the lowest satisfaction ratings for their first, second, third, and last year, respectively, in their professional program. Baykal et al. acknowledged the likely presence of a combination psychosocial and economic student variables and university/course related variables as co-conspirators in determining the dynamic levels of student satisfaction. While student-related variables have often been the focus of studies involving student satisfaction and achievement in higher education, instructor-related variables and course characteristics have also been investigated.

#### *Instructor/Course-Related Variables*

Instructor or course-related variables can be as difficult to assess as student variables. Educators, like students, display a vast array of personal and professional characteristics that may be perceived by students to hinder or promote the students' learning experiences. One primary theme that has emerged from multiple sources and

appears to positively influence students' course satisfaction is positive interpersonal skills of the educators. Using a survey design, Guarino et al. (2006) investigated 1, 530 medical students' satisfaction with the teaching practices of their attending physician. Results indicated time spent with the interning students, enthusiasm for teaching, spontaneous discussions with students, and students' patient interaction time positively correlated with higher satisfaction scores (2006). Stith et al. (1998) also found that physical therapy student satisfaction was influenced by the interpersonal skills of the students' clinical instructors. Despite the importance of instructor characteristics in student satisfaction, this was not a variable included in this study due to the facilitative nature of the course instruction. As the course in the study is a PBL course, the role of the facilitator was secondary to the role of the students involved.

Group dynamics and individual characteristics of students have also been assessed as variables that may contribute to student satisfaction in interprofessional health care courses. In a study on PBL from a student and tutor perspective, Hendry et al. (2003) found medical students perceived that disorganization, lack of in-depth examination of the problem, and group members who dominated the group processes were the variables that most impeded their learning. Identified also as a barrier to learning was the group's absence of commitment to the process (Hendry et al., 2003).

An additional course-related variable, for which only one study has been found, is the timing of the course offering within the academic year. Ansari (2004) reported improved student satisfaction in the second term when compared to the first term in 65% of the items tested. No research has been found regarding the influence of timing of the

course offering of student satisfaction surveys in one semester. Student satisfaction surveys are often given at the conclusion of a course which often occurs at the end of a semester. The semester's end often represents multiple due dates for large assignments and final examinations. Questions arise regarding the potential impact of the students' perceived psychological stress on their satisfaction with their courses.

### Psychological Stress

The influence of student perceived psychological stress on cognitive, mental and physical well-being is gaining popularity in educational health care literature though the presence of existing publications remains limited. Existing definitions of stress range from simplistic to complex; stress has been defined as "physical, mental, or emotional strain or tension" (Webster's, 1994, p. 1,406) or as "a result of how a person interacts with the environment and can be regarded as a complex system of interacting psychological, physiological and environmental factors" (Bergdahl, Larsson, Nilsson, Ahlstrom & Nyberg, 2005, p. 395). Seaward (2006) documented and defined the three types of psychological stress: eustress, neustress, and distress. Eustress is a positive stress that enhances performance while neustress occurs as a result of events that are small and often dismissed by the person experiencing them (Seaward, 2006). Monk (2004) proposed that "[s]ome individuals need a certain level of stress or eustress in order to enable them to function effectively. Pressure and deadlines only serve to increase their aptitude for work and give them the impetus to conquer the task" (p. 408). Distress is the type of stress most often addressed in day-to-day conversations, represents the negative perception of the events and is further delineated into two subcategories: acute and

chronic (Seaward, 2006). Many researchers agree that stress in acute levels (defined by a short duration) (Seaward, 2006), can enhance performance in areas ranging from physical to psychological to cognitive functioning. Chronic stress is “stress that is not as intense as acute stress but that lingers for a prolonged period of time” (Seaward, 2006, p. 7) and can affect negatively the same areas of functioning that acute stress is thought to enhance.

Chronic stress has also been reported as burnout, strain, and distress (Ridner, 2004).

Burnout has been defined by Maslach as “emotional exhaustion, depersonalization and low sense of personal accomplishment” (as cited in Dyrbe et al., 2006a, p. 374). Mayo

Clinic (2007) elaborated on their definitions and described burnout as:

a three-pronged syndrome of professional distress in which the person: 1) feels emotionally depleted by work, 2) develops a tendency to treat people less as humans and more as impersonal objects, and 3) experiences a low sense of personal accomplishment. (¶ 3)

The presence of each of these concepts would likely impair an individual’s ability to cultivate healthy relationships with team members and patients; an important consideration when evaluating the ability of interprofessional team members to work collaboratively and form professional relationships. Additional areas for consideration arise include the influence of psychological stress and/or burnout on students’ satisfaction in interprofessional health care courses.

#### *Perceived Psychological Stress by Health Care Students*

Multiple research studies have been completed on the effects of the psychological stress experienced by medical students. Assessing personal life events and burnout, Dyrbye et al. (2006a) surveyed 545 medical students and found that 46% of the students sampled met the criteria for burnout. Their findings also suggested positive relationships

between prevalence of burnout and later years of training (2006a). Further, Dyrbye et al. asserted that the subjects in their sample demonstrate a lower level of “mental quality-of-life” (p. 379) than national samples of persons of similar age. They also found “personal life events” (p. 377) and “...depression and at-risk alcohol use event after adjustment for age, sex, and year in training” (p. 377). Niemi and Vainiomäki (2006) investigated the reports of Finnish medical students’ psychological stress as they related to gender and time in medical school. Psychological stress was measured by emotional stress scores and somatic scores; both scores increased as students progressed through their medical education (Niemi & Vainiomäki, 2006). Slight differences in the onset of increased stress presented with regard to gender (Niemi & Vainiomäki, 2006). In a systematic review of psychological distress and medical students, Dyrbye, Thomas and Shanafelt (2006b) found contradictory outcomes related to perceived stress and gender, lower stress in married students, and no association between life events and distress. Further, they identified a dearth of research outcomes relating to the student variables associated with distress.

The stress of nursing students has also been examined with moderate prevalence in health science research (Billingsley, Collins & Miller, 2007). Burnard et al. (2007) compared the stress levels of students from five countries and found the variables influencing students’ perceptions of stress varied depending on the students’ country of origin. These variables included academic and personal stressors as well as level of education (2007). Following an examination of 990 student nurses and stress, Prymachuk and Richards (2007) reported that while perceived stress between specialty

areas varied, the most common sources of stress were tests, fear of failure, and financial issues. These authors also indicated gender may influence students' perceptions of stress. Pryjmachuk and Richards identified the social role of caregiver that women often assume a potential variable in psychological stress perception.

Despite the detrimental effects burnout may have on the professional efficiency and effectiveness of health care students, few published studies have been completed that directly measure perceived psychological stress of students from health professions other than medicine and nursing. The last published study of perceived psychological stress of occupational therapy students located in the Pub Med Database was conducted in 1994 (Everly, Poff, Lamport, Hamant & Alvey, 1994). Everly et al. reported that occupational therapy students identified academics workload, examinations, grades, and limited free time as major stressors. Physical therapy literature also revealed a shortage of research regarding psychological stress in physical therapy students. In 1991, Frazer and Echternach found that physical therapy students also reported academic related stressors as the primary source of their distress. No published literature about the experienced stress of social work and communication sciences and disorders students was located during the literature review.

#### *Perceived Psychological Stress and Interprofessional Students*

A limited number of studies which evaluated the perceived psychological stress with consideration for interprofessional education exist, although a number of studies have been conducted that included the investigation of stress in students from multiple health care fields. Dutta, Pyles and Miederhoff (2005) conducted a literature review to

investigate health care students and stress. Their findings illustrated explorations of discipline-specific student stress but none of the studies they reviewed involved students enrolled together in an interprofessional course. Monk and Mahmood (1999) conducted a qualitative pilot study in the England to explore the factors that influenced 40 allied health care and medical students' stress, though the specific discipline titles were not provided and these students did not appear to be enrolled in interprofessional education courses. They found academic work and the students' emotional status were important influences on students' stress followed by financial implications. In a later research study, Monk (2004) examined, quantitatively, the stress and coping related variables in 16 "physiotherapy, radiography, podiatry, human nutrition and dietetics, orthoptics and occupational therapy" (p. 401), though it is important to note that these students were not enrolled in an interprofessional course but rather were completing independent coursework including fieldwork. Monk (2004) asserted while students exhibited poor coping methods and high levels of stress, they did not appear to suffer academically. Monk (2004) purported that coursework and finances contributed largely to the students' perceptions of stress and that these variables could influence various aspects of the students' self including "...emotional, physical, psychological, social and relationships" (p. 410).

#### *Perceived Psychological Stress and Interprofessional Collaboration*

The level of psychological stress in interprofessional health care students may play an important role in their ability to function as part of a healthy health care team. Chronic stress can lead to depersonalization; concern for the occurrence should not only



be applied to interaction with clients, but with colleagues as well. Acute stress can also influence the ability of persons to form relationships. Seward (2006) identified three major factors which influence stress: bioecological, psychointrapersonal, and social. Of these three contributors to stress, Seward (2006) proposed that psychointrapersonal stressors represent the majority of people's stressors and wrote,

Psychointrapersonal stressors involve those thoughts, values, beliefs, attitudes, opinions, and perceptions that we use to defend our identity or ego... When any of these is challenged, violated, or even changed, the ego is often threatened and the stress response is the outcome. (p. 9)

Seward's (2006) stance on psychological stress and role identity may illustrate important relevance when coupled with the research of Hind et al. (2003) and Mandy et al. (2004) in which they examined the relationships between self-identity and positive or negative stereotyping of other professions. While perceptions and the value of stress may be determined largely by a health care professionals' discipline, stress can actually enhance the self-identity of an individual, although this enhancement may be detrimental to the team processes (Whitehead, 2007). Whitehead wrote "while doctors are often extremely busy, being rushed and over-extended adds to their sense of self-importance, limiting interest in interaction" (p. 1,013). Regardless of the influence of perceived psychological stress on role identity of health care professionals, it is a variable that deserves careful consideration when evaluating team collaboration and communication. Following a literature review of 40 studies of medical students and distress, Dyrbye et al. (2006b) concluded that "[d]espite the strikingly high prevalence of distress, little is known about how the demographic variables, personality characteristics, and stressful life events relate to student distress" (p. 361). They asserted further that comparisons of

medical students' stress and other professions should be considered though this endeavor could not be completed using the available students. Presently, little information regarding perceived psychological stress is provided regarding interprofessional health care students. More specifically, a limited understanding about health care students' interprofessional education, including relationships with other team members and overall course satisfaction, and the influence of their level of psychological stress exists.

#### Rationale for Further Research

While the body of knowledge regarding interprofessional health care education and student learning continues to grow, the complexities of this topic are well defined across disciplines and warrants further examination. Interprofessional education research has demonstrated a positive response to collaborative learning but many studies have included only a small number of the primary disciplines that are involved in patient care and often explored limited sample sizes. Additionally, much of the research that has been examined in this literature review was completed in Europe, Canada, and Australia. Though all of these studies have provided valuable information about interprofessional education, generalizability limitations endure and limit the application of that research to universities in the U.S. These limitations exist not only because of the system differences that exist between health care systems in the respective countries, but are due also, in part, to the cultural differences that exist in academic institutions in the U.S. and abroad. Irrespective of locale, there continues to be a dearth of information regarding interprofessional health care curriculum and student satisfaction, learning, and appreciation for team processes (Allen et al., 2006; Walrath et al., 2006).

Additionally, while medical students and perceived psychological stress have been the topics of multiple research studies (Redwood & Pollak, 2007), none of the studies reviewed by this researcher have examined the perceived psychological stress of students from multiple health care disciplines or the potential relationships between students' perceived stress and their satisfaction in an interprofessional health care course and influence those variables may have on the student' overall development towards becoming collaborative medical or allied health professionals.

#### Research Purpose

The purpose of this study was to explore students' satisfaction in a PBL interprofessional health care course, interprofessional knowledge acquisition, and appreciation for teamwork involving multiple health care disciplines. A secondary intention of this study was to explore the potential relationship of students' perceived psychological stress on overall satisfaction scores and readiness for interpersonal learning. The final purpose of this study was to explore students' psychological stress, readiness for interprofessional learning, and course satisfaction scores with consideration for selected demographic variables.

The accomplishment of the aims of this study was achieved through the implementation of a survey research design in which interprofessional health care students from five disciplines and enrolled in an interprofessional health care course answered questions related to demographics, course satisfaction, readiness for interprofessional learning, and psychological stress. The sample, instrumentation, and data collection procedures are provided in Chapter III.

## CHAPTER III

### METHODOLOGY

This study was approved by the Institutional Review Board at the University of North Dakota (UND) in Grand Forks, North Dakota. A non-experimental, survey research design was implemented to gather data from the sample participants. Data were analyzed using descriptive and inferential statistical procedures. The methodology section describes the research design, sampling procedures, course description, instrumentation, and research procedures used in this study.

#### Design and Sample

A retrospective pre-test/post-test survey design was implemented to gather data from communication sciences and disorders, medical, nursing, occupational therapy, physical therapy, and social work students enrolled in two separate and sequential sections of a six-week PBL interprofessional health care course during the fall semester of the 2007 academic year in the School of Medicine and Health Sciences at UND. The early fall session took place from August to September, 2007 and the late fall session took place from October to December, 2007 at the same location. The course was an elective option for communication sciences and disorders, occupational therapy, and social work students and a required course for medical, nursing, and physical therapy students. Additionally, a small percentage of the occupational therapy students completed

this course through interactive distance learning. This variable was not considered for the purposes of this dissertation due to the small number of students who were recipients of this method of course delivery. Four of the five surveys used to gather data were assessments that required completion by students to conclude the course. These surveys included a demographic questionnaire, a course satisfaction questionnaire, a questionnaire to measure student knowledge, and a facilitator questionnaire. The results of the facilitator questionnaire are not examined within this dissertation but were utilized for course-related assessment. As the survey completion functioned as a requirement for receiving a grade in this course, a process supported by Durrant and Dorius (2007), a 100% survey return rate was expected. The fourth assessment, a stress questionnaire, was administered as an optional survey for which informed consent was obtained for those who chose to complete the survey. Refer to Appendix A to view the informed consent statement provided to the participants.

Of the 121 students enrolled in the interprofessional health care course (IPHC), 119 completed the required assessments for an overall response rate of 98.3%. Ninety-six of the 119 participants who completed the required assessments also provided informed consent and completed the optional stress questionnaire representing an 80.6% response rate. The response rate for the participants in the early fall session was 81.7% (49 of 60) while 70.7% (47 of 59) of the late fall participants responded. Additional demographic related information is presented in the results section of this report.

## Course Description

The interprofessional health care course was a six-week PBL experience in which students met in groups one time per week for three hours. Each group was composed of students from the aforementioned disciplines with efforts by course administrators to provide well-balanced groups when possible. Notably, because of the high number of nursing students who were required to complete this course, the nursing discipline had greater representation than the other disciplines involved. While the unequal ratio of nursing students to students from other disciplines may lend itself to criticism, this ratio is reflective of practice settings in which nurses constitute larger numbers than other health care professionals. Each six-week course was comprised of 10 groups with six to eight group members in each group, excluding the course facilitator. Groups were each assigned trained facilitators from varying health related backgrounds to assist the students during the problem-based learning experiences and to progress the students through the other learning experiences, which were integrated into the course. Of the disciplines involved, the medical students had the most previous exposure to problem-based learning due to the nature of the medical school curriculum that extensively applied this learning approach.

The course consisted of three problem-based client-centered cases in which students were presented with the initial case information (i.e., the problem) followed by group discussion and development of student developed learning objectives. Once the students had progressed adequately on the information that they had been provided initially, they were given another section of the case and continued to problem-solve

collaboratively. After the students had progressed to a certain point in group problem-solving, they were provided with faculty learning objectives, which may or may not have been consistent with the student learning objectives. During the next course session, the students provided their group members with presentations about the topics derived from the learning objectives (topics that they had determined during their previous meeting). Following the students' presentations, collaboration on the case continued. This process continued until the students had adequately achieved the appropriate case outcomes. Upon completion of the case, a new case was initiated and the sequence continued. A total of three cases were presented in each interprofessional health care course.

Small group activities were also applied in a structured format throughout the course and included introductions of group members, discussions of stereotypes of each discipline, and member goals for the future of health care. During the third week, the group worked together to evaluate its progress and ability to work as a group. During the final meeting (week six), the group viewed a series of video clips and identified the problems and solutions that occurred during the featured teamwork scenarios. Finally, each group worked together on a final case study to answer specific and pre-determined questions; this final case served a final exam for the course. Following completion of the final case study, students completed an interprofessional teamwork self-assessment in which they, again, assessed and reflected upon their progress and ability to work collaboratively.

Following the course completion, students were allowed a two-week timeframe to complete the on-line course assessments for the interprofessional health care course.

Students were required to log-on to Blackboard and access a link to the surveys. The first webpage required students to enter their discipline and name and submit this to the web server. Completion of this step then presented the participants with the on-line surveys. Use of this method allowed students to maintain their anonymity as the web page on which the students' names were entered sent information to a secure server that was not connected to the survey server database.

### Instrumentation

Participants were presented with four surveys that included a demographic questionnaire, Readiness of Health care Students for Interprofessional Learning (Bligh & Parsell, 1999), the Perceived Stress Questionnaire, and a course satisfaction survey. Each of the assessments is described fully in the proceeding sections of this paper.

#### *Demographic Questionnaire*

The demographic questionnaire included 11 questions; two of which were contingency questions. The demographic questions included those pertaining to age, gender, race, discipline, years in a professional program, health care experience prior to enrollment in his or her discipline, hours per week spent studying, marital status, caregiver status, and method of IPHC course delivery. The contingency questions involved work status and past academic degree status. Refer to Appendix A to view the demographic survey.

#### *Readiness of Health Care Students for Interprofessional Learning Scale*

The Readiness for Interprofessional Learning Scale (RIPLS) was developed to assess the readiness of health care students to engage in collaborative learning



experiences and evaluate student attitudes in the areas of “team-working and collaboration, professional identity and professional roles” (Parsell & Bligh, 1999, p. 95). Internal consistency reliability for the 19-item questionnaire has been reported at 0.90 in testing with “medicine, dentistry, physiotherapy, nursing, occupational therapy, orthopedics, and both therapy and diagnostic radiography” (p. 96). An extended version of the RIPLs has been subjected to testing with health care postgraduates, including general practitioners, nurses, allied health professionals, and pharmacists, which resulted in internal consistency measures of 0.76 (Reid, Bruce, Allstaff, & McLernon, 2006). Since its conception and initial testing, the RIPLS has been used in multiple research studies to assess students’ readiness to engage in shared learning experiences. Students were asked to complete the RIPLS as a retrospective pre-test/post-test (then/post-test) to provide data that would be used to evaluate knowledge acquisition and attitude changes in the area of interprofessional health care.

#### *Retrospective Pre-Test/Post-Test Design*

A retrospective pre-test and post-test design (or a then/now post-test) was implemented to measure students’ attitudes and readiness for interprofessional learning. The retrospective pre-test component of this design was selected to reduce the influence of *response-shift bias* (Howard & Dailey, 1979) that has received considerable attention in research literature. Howard and Dailey described response-shift bias as a change in the participants’ understanding of the construct that is being measured due to the intervention that is applied. Stated simply, subjects often “do not know what they do not know” and their exposure to new areas of learning may change their understanding of the scope of

the construct that they are studying thereby providing them with great awareness of their level of competency within a given subject. The validity of the subjects' self-reports is thought to rest on their perception of the construct itself. Howard and Dailey reported subjects in their study of the effectiveness of training programs overestimated their abilities during self-reported pre-test measures which limited the effect that the training programs had on knowledge when pre-test scores were compared with the subjects' scores on the post-tests. The results of the inclusion of retrospective pre-tests in this study demonstrated a greater effect when those scores were compared with the post-test scores (Howard & Dailey, 1979). Similar findings were reported by Timmerman, Anteunis, and Meesters (2003) who completed a validation study of an assessment instrument for parents of children with otitis media. Respondents in this study underestimated their child's condition and overestimated their child's quality of life resulting in a supported response-shift bias. Rohs, Langone, and Coleman (2001) also substantiated the prevalence of response shifting as they investigated its presence in an examination of learning for foodservice staff. They asserted that the pre-test (then) and post-test (now) responses were a more accurate representation of the subjects' learning experiences. Conversely, Townsend et al. (1999) reported that response-shift bias did not occur in between pre-test and retrospective pre-tests in their assessment of the anxiety in math students. However, it should be noted that anxiety is a construct with which the subjects may have understood largely prior to their engagement in the course. For the purposes of this study, retrospective pre-tests (then) and post-tests (now) were selected in lieu of the addition of pre-tests to ease the burden of time required for survey completion for

participants; thereby, increasing authentic subject responses and also limiting the presence of response-shift bias.

### *Perceived Stress Questionnaire*

While there is “no gold standard for validating a measure of stress” (Levenstein et al., 1992, p. 26), researchers have been attempting to establish a standard assessment. Two primary instruments that measure perceived psychological stress have been identified through a review of literature: the *Perceived Stress Scale* (PSS) and the *Perceived Stress Questionnaire* (PSQ) (Levenstein et al., 2005). The PSS is a 10-item scale intended to identify how the person completing the scale has felt or thought in the past month (MacArthur & MacArthur, 2007). This scale was originally developed by Cohen, Kamarck and Mermelstein in 1983 and demonstrates a presence throughout psychological stress-related literature (MacArthur & MacArthur, 2007). Despite the predominance of the PSS in psychological journals, the present researcher sought to utilize another scale in health sciences research and which could provide a greater depth of understanding of perceived stress.

The PSQ was developed and initially researched by Levenstein et al. (2005). Two-hundred-thirty participants, who included colitis inpatient and outpatient participants, were involved in the initial testing (2005). The original PSQ was a 30-item questionnaire presented in Italian and English that measured seven factors: “harassment, overload, irritability, lack of joy, fatigue, worries, and tension” (2005, p.26) and required participants to rate their feelings regarding specific questions on a four-point Likert-type scale. The PSQ was later translated into the German language and tested by Fliege et al.

(2005) with 1,808 participants who had larger characteristic variations and included “psychosomatic, tinnitus, inflammatory bowel disease patients, pregnant women and healthy adults” (2005, p. 78). Fliege et al.’s exploratory factor analyses resulted in a revision of the scale and the presentation of four factors: worries, tension, joy and demands. Fliege et al.’s (2005) version of this scale was administered, with permission from both Levenstein and Fliege. Fliege et al.’s scale was used due to the reliability testing that was completed with healthy adults, a sample that was more consistent with the sample in this study. The shorter length of this instrument was also anticipated to elicit a greater response rate than the initial version. Throughout this report Fliege et al.’s version of the PSQ was referred to as the PSQ-Revised.

#### *Interprofessional Health Care Student Feedback Questionnaire*

The Interprofessional Health Care Student Feedback Questionnaire (IPHC SFQ) was developed by a committee of interdisciplinary health care educators who are responsible for the creation and the development of the interprofessional course in this study. This purpose of this instrument was to identify student satisfaction with the interprofessional health care course. The questionnaire consists of 25 items in which the respondents are to rank their level of agreement on a five-point Likert-type scale. Refer to Appendix A to view the Interprofessional Health Care Student Feedback Questionnaire.

#### Procedures

##### *Preliminary Procedures*

A literature search of related topics was conducted using Pub Med, SCOPUS, and CINAHL via the Harley French Library of Health Science at UND. Written permission to

use the PSQ-Revised and the RIPLS was obtained from the appropriate sources. Website surveys developed using *Microsoft Expression Web*. IRB approval was achieved for data collection upon which time the student surveys were posted on-line with the assistance of Clint Hosford, Ph.D., the SMHS senior statistician.

#### *Data Collection*

Upon completion of each six-week interprofessional health care course, students from the respective course completed four on-line surveys. Students were presented with an informed consent statement, which included the purpose of the study and the risks involved, prior to the presentation of PSQ. Participants who choose to complete the PSQ provided informed consent by completing the survey. Students in the early fall session submitted their surveys in October, 2007 and those in the late fall session submitted their surveys in December, 2007. Data from the server was downloaded upon the receipt of all surveys for each course. Analysis of the data was then completed.

This retrospective pre-test/post-test research design, using convenience sampling procedures, culminated in the acquisition of quantitative data from students in five health-related, academic disciplines and included participants' demographics, responses to the PSQ-Revised, RIPLS and Interprofessional Health Care Student Feedback Questionnaire (IPHC SFQ).

The data collected were analyzed using descriptive and inferential statistical analysis to determine the answers to the research questions. The results of the analyses are presented in Chapter IV.

## CHAPTER IV

### RESULTS

Prior to parametric calculation of the data to determine the results of the research questions, pre-analysis data screening was implemented. These procedures were completed to enhance accuracy of the results; examine the potential influence of missing data and outliers, and investigate the degree to which the assumptions for parametric analysis were achieved (Mertler & Vannatta, 2005). Analysis of the instrument reliability was conducted followed by descriptive statistical analysis of the demographic responses and instrument responses. Finally, inferential statistical analyses were completed to answer the remaining research questions.

#### Pre-Analysis Data Screening

##### *Missing Data and Case Deletion*

There were 23 occurrences of missing data in the final data file; each appeared to represent an inadvertent failure to respond. As this is a relatively small occurrence in a moderately sized sample, missing data were replaced using the mean of the respective variable (Field, 2005; Mertler & Vannatta, 2005); an acceptable, though conservative, method in exploratory research and an appropriate measure as this study includes group comparisons (Mertler & Vannatta, 2005).

The final sample included one student participant from communication sciences and disorders. This participant was excluded from data analysis to protect his or her anonymity. Twenty-three participants choose not to complete the optional portion of the survey and thus each of these cases presented with missing data. The absence of responses for each of these provided for a substantial amount of missing data for each variable, these cases were deleted as noted in the limitations section of this report.

#### Instrument Reliability

The reliability of the PSQ-Revised, the RIPLs retrospective and post-test instruments, and the student satisfaction survey was calculated. Cronbach's Coefficient Alphas are presented in the proceeding sections.

#### *PSQ-Revised*

The PSQ-Revised is composed of four subscales: worries, tension, lack of joy, and demands. All subscales were analyzed to determine the instrument's internal consistency and resulted in Cronbach's Alphas that ranged from .724 to .886. The total score for the PSQ-Revised demonstrated a Cronbach's Coefficient Alpha of .937. Refer to Table 1 to view the reliability for each subscale, number of items in each subscale, and the entire scale. The internal consistency for the subscales and entire instrument were more than adequate for this research (Cronk, 2006; Field, 2005).

#### *RIPLS*

The RIPLS is composed of three subscales: teamwork and collaboration, professional identity, and roles and responsibilities. Cumulatively, these subscales are

intended to measure readiness for interprofessional learning. The higher the participant's score, the greater was the participant's readiness for interprofessional learning. The *RIPLS* internal consistency of each subcategory was calculated for the *RIPLS* as a retrospective instrument and a post-test instrument. Cronbach's Coefficient Alpha for each subcategory ranged from .637 to .918 (Table 2). Cronbach's Coefficient Alpha for the *RIPLS* total score was .894 for the retrospective test and .920 for the post-test (Table 2). All of the measures represented adequate internal consistency (Field, 2005). Markedly, the reliability of the subcategory of teamwork and collaboration presented with the greatest reliability when compared to the professional identity and the roles and responsibility subcategories. This incidence is due likely to the greater number of items that comprise the teamwork and collaboration subscale (Table 2).

Table 1  
*Reliability (Cronbach's Coefficient Alpha) Results for the PSQ-Revised*

PSQ-Revised Subcategories & Total	Number of Items	Cronbach's Coefficient Alpha
Tension	5	.837
Lack of Joy	5	.724
Demands	5	.866
Worries	5	.872
Total	20	.937



Table 2  
*Reliability (Cronbach's Coefficient Alpha) Results for the RIPLS*

RIPLS Subcategories & Total	Number of Items	Cronbach's Coefficient Alpha	
		Pre-Test	Post-Test
Teamwork and Collaboration	10	.876	.918
Professional Identity	6	.809	.857
Roles and Responsibility	3	.653	.637
Instrument Total	19	.894	.920

#### *IPHC SFQ*

The Interprofessional Health Care Student Feedback Questionnaire (IPHC SFQ) was analyzed to determine the internal consistency of the scale. This instrument consisted of 27 close-ended items intended to measure students' satisfaction with the interprofessional healthcare course. Analysis was completed and revealed a Cronbach's Coefficient Alpha of .959, which is more than adequate for the purposes of this study.

#### Respondent Demographics

Ninety-six participants composed the final sample in this study and represented five academic disciplines. Nursing participants composed the largest portion of the sample (49%) followed by medical, occupational therapy, physical therapy, and social work participants, respectively (Table 3). The participants were enrolled nearly evenly in the early fall and late fall session (Table 3).

Table 3  
*Frequencies and Percentages of Participants by Discipline and Course Sequence*

Academic Discipline	Course Sequence				Total	
	Early Fall		Late Fall		Entire Course	
	All Disciplines		All Disciplines		All Disciplines	
	n	%	n	%	n	%
Medicine	10	20.4	7	14.9	17	17.7
Nursing	22	44.9	25	53.2	47	49.0
Occupational Therapy	5	10.2	9	19.1	14	14.6
Physical Therapy	8	16.3	4	8.5	12	12.5
Social Work	4	8.2	2	4.3	6	6.3
Total	49	51.0	47	49.0	96	100.0

The frequencies and percentages for the participants' ages were calculated and revealed 91.7% (n = 88) of respondents were 30 years old or younger, 3.1% (n = 3) were 30-35 years old, and 5.2% (n = 5) of respondents were 41 years or older. Females composed 72.9% (n = 70) of the total sample. The largest percentage of males by discipline was found in medicine in which 76.5% (n = 13) of participants were male. Participants whose race was white, not of Hispanic origin, comprised 87.5% (n = 84) of the total sample; the remaining 12.5% (n = 12) of participants represented a minority racial or ethnic background of which 9.4% (n = 9) reported an American Indian or Alaskan Native background.

The frequencies and percentages for the students' experience within their respective disciplines were calculated. Participants with three years of experience composed the largest portion of the sample. Participants with less than one year and two years of experience were represented almost evenly while those with four years of experience comprised the smallest portion of the sample. Notably, nursing had the highest percentage of participants who reported having three or four years of experience. This occurrence was due to the structure of the nursing curriculum that required most students to complete the interprofessional course during their third or fourth academic year. When considering the total number of students per discipline, the occupational therapy students were also strongly represented in the three years of experience category. A larger number of third year occupational therapy students were enrolled in this course as it was the first year occupational therapy students were eligible to enroll in the interprofessional course. Refer to Table 4 to view the program experience of participants by discipline.

The frequencies and percentages for amount of time the participants' spent studying were calculated. Cumulatively, respondents reported the following: 19.8% studied less than 10 hours per week, 42.7% studied 10-20 hours per week, 28.1% studied 20-40 hours per week, and 9.4% studied more than 40 hours per week. Refer to Table 5 to view study time by discipline.

The frequencies and percentages for the employment status of the participants' were calculated. Participants' responses indicated that, cumulatively, 54.2% (n = 52) of respondents were not employed, 18.8% (n = 18) worked less than 10 hours per week,

12.5% (n = 12) worked 10-20 hours per week, 13.5% (n = 13) worked 20-40 hours per week, and 1% (n = 1) worked more than 40 hours per week.

Table 4  
*Frequencies and Percentages for Academic Discipline and Program Experience*

Discipline	Program Experience							
	1 Year or Less		2 Years		3 Years		4 Years	
	n	%	n	%	n	%	n	%
Medicine	15	15.6	2	2.1	0	0.0	0	0.0
Nursing	0	0.0	6	6.3	31	32.3	10	10.4
Occupational Therapy	4	4.2	3	3.1	7	7.3	0	0.0
Physical Therapy	3	3.1	8	8.3	1	1.0	0	0.0
Social Work	4	4.2	1	1.0	0	0.0	1	1.0
Total	26	27.1	20	20.8	39	40.6	11	11.5

Table 5  
*Frequencies and Percentages of Study Time by Discipline*

Discipline	Study Time							
	< 10 Hrs./Wk		10-20 Hrs./Wk		20-40 Hrs./Wk		>40 Hrs./Wk	
	n	%	n	%	n	%	n	%
Medicine	0	0.0	1	1.0	9	9.4	7	7.3
Nursing	14	14.6	27	28.1	6	6.3	0	0.0
Occupational Therapy	1	1.0	8	8.3	4	4.2	1	1.0
Physical Therapy	2	2.1	2	2.1	7	7.3	1	1.0
Social Work	2	2.1	3	3.1	1	1.0	0	0.0
Total	19	19.8	41	42.7	27	28.1	9	9.4

#### Research Question Analysis

To answer the research questions, analysis was conducted to determine the overall means and standard deviations for the PSQ-Revised, the RIPLS pre-test and post-test, and the IPHC SFQ. The means for the RIPLS and PSQ-Revised subscales were also calculated.

#### *Students' Psychological Stress – All Disciplines*

Mean and standard deviation calculations were completed to answer the first question: What were the stress levels of students, overall? The PSQ-Revised consisted of

20 items with four subscales. Higher scores on the PSQ-Revised indicated greater psychological stress while lower scales represented lesser psychological stress.

Participants reported relatively low psychological stress as evidenced by the total score and the tension, worries, and lack of joy subscales. Participants' reports of demands were higher than the middle scale score. Refer to Table 6 to view the means, standard deviations, and middle scale scores for the PSQ-Revised.

Table 6  
*PSQ-Revised Mean Scores, Standard Deviations, and Middle Scale Scores*

Instrument	Actual Mean Score ( <i>n</i> = 96)	<i>SD</i>	Middle Scale Score
PSQ			
Tension	12.2	± 3.2	12.5
Worries	10.0	± 3.5	12.5
Lack of Joy	11.1	± 2.7	12.5
Demands	13.4	± 3.6	12.5
Total	47.5	± 11.3	50

#### *Achievement of Knowledge – All Disciplines*

Means and standard deviations were calculated to answer the second research question: What was the students' perceived achievement of knowledge, retrospectively, as measured by readiness for interprofessional learning? The RIPLS Pre-Test and Post-test were comprised of 19 identical items. Greater achievement of knowledge was denoted with higher scores on the subscales and total scores. The maximum score

possible for the instrument total was 95, indicating the respondent “strongly agreed” with the idea of interprofessional learning, while the least possible score was 19 indicating the respondent “strongly disagreed” with the concept of interprofessional learning.

The mean scores for the RIPLS pre-test and post-test showed that respondents “agreed” with the concept of interprofessional learning. Further, the RIPLS post-test mean score, overall, indicated an improvement in scores after the interprofessional health care course when compared to the respondents’ pre-test scores. Each of the RIPLS subscales demonstrated a greater score in the post-test calculations than the pre-test calculations though the change in the subscale of roles and responsibilities responses was slight. Remarkably, the retrospective scores for each subscale was one to two standard deviations greater than the middle scale score. Refer to Table 7 to view the mean scores and standard deviations for each RIPLS subscale.

#### *Students’ Course Satisfaction - All Disciplines*

Calculations of the means and standard deviations for the participants’ responses to the IPHC SFQ were conducted to answer the third research question: What were the satisfaction ratings of students, overall, in the interprofessional health care course? The IPHC SFQ consisted of 26 items in which higher scores indicated greater satisfaction with the course. The highest score possible was 130, which indicated the respondent was strongly satisfied with the course, while the lowest possible score was 26, which indicated the respondent was strongly dissatisfied with the course. The overall mean response supported that participants were satisfied with the interprofessional course. Notably, the mean score was more than one standard deviation greater than the middle

scale score. Refer to Table 8 to view the overall IPHC SFQ instrument mean and standard deviation.

Table 7  
*RIPLS Pre-test and Post-test Mean Scores, Standard Deviations and Middle Scale Scores*

Instrument	Actual Mean Score ( <i>n</i> = 96)	<i>SD</i>	Middle Scale Score
RIPLS Pre-test			
Teamwork & Collaboration	37.7	± 4.8	27
Professional Identity	27.7	± 4.1	21
Roles & Responsibilities	12.0	± 2.1	9
Total	77.4	± 9.1	57
RIPLS Post-test			
Teamwork & Collaboration	39.5	± 5.6	27
Professional Identity	29.1	± 4.7	21
Roles & Responsibilities	12.1	± 2.3	9
Total	80.7	± 10.7	57

Table 8  
*IPHC SFQ Mean Score, Standard Deviation, and Middle Scale Score*

Instrument	Actual Mean Score ( <i>n</i> = 96)	<i>SD</i>	Middle Scale Score
IPHC SFQ	98.8	± 16.3	78



### *Students' Psychological Stress by Discipline*

Means and standard deviations were calculated to identify the psychological stress levels of medical, nursing, social work, and the allied health students (Table 9) to answer the fourth research question: What were the psychological stress levels of students when considering academic discipline? The overall mean score for the total PSQ-Revised was 47.5 ( $SD = 11.3$ ). Respondents with the highest mean total score were the physical therapy students ( $M = 53.3, SD = 12.4$ ) while nursing students demonstrated the lowest levels of stress ( $M = 43.9, SD = 11.0$ ). Medical students' reported a mean stress score of 51.1 ( $SD = 10.8$ ), occupational therapy students demonstrated a mean score of 51.0 ( $SD = 10.0$ ), and social work students had an average stress score of 46.8 ( $SD = 7.3$ ).

### *Students' Course Satisfaction by Discipline*

Mean and standard deviations were calculated to determine the satisfaction ratings of students in an interprofessional health care course by discipline and answer the fifth research question. Results indicated that social work participants reported the highest satisfaction ( $M = 108.3, SD = 8.0$ ) with interprofessional health care course followed by physical therapy participants ( $M = 102.8, SD = 15.5$ ), occupational therapy participants ( $M = 102.4, SD = 11.1$ ), nursing participants ( $M = 101.1, SD = 13.7$ ), and medical participants ( $M = 82.9, SD = 20.4$ ), respectively.

### *Psychological Stress, Course Satisfaction, and Achievement of Knowledge by Discipline*

A MANOVA was conducted to answer the sixth research question: Was there a difference between psychological stress levels, course satisfaction, and achievement of knowledge retrospective and post-test scores when considering academic discipline?

Wilks Lambda was calculated and revealed a significant effect (*Wilks Lambda* (44,312) = .303,  $p < .001$ ) between disciplines when comparing all three dependent variables.

Follow-up univariate ANOVAs were calculated to determine the differences that existed between disciplines on each scale. The results of the first univariate ANOVA revealed a difference between disciplines in PSQ-Revised total scores and subscale scores for demands, worries, and tension (Table 9). No significant difference was found between disciplines on the PSQ-Revised lack of joy subscale scale score (Table 9).

Table 9  
*Univariate Analysis of the PSQ-Revised Total and Subscale Scores by Discipline*

Instrument	Academic Disciplines					df	F	p
	Medicine (n = 17)	Nursing (n = 47)	OT (n = 14)	PT (n = 12)	SW (n = 6)			
PSQ								
Tension	12.8	11.3	13.2	13.9	11.3	4, 91	2.57	.043
Worries	12.1	9.8	11.6	12.7	10.2	4, 91	2.80	.030
Lack of Joy	11.2	10.9	11.2	11.3	11.7	4, 91	.19	.945
Demands	14.9	11.9	15.0	15.4	13.7	4, 91	5.17	.001
Total	51.1	43.9	51.0	53.3	46.8	4, 91	3.00	.022

OT- Occupational Therapy; PT- Physical Therapy; SW- Social Work

Bonferroni's post hoc test was used to determine the location of the differences in the aforementioned PSQ scores between disciplines. Significant differences were found

between medicine and nursing, nursing and occupational therapy, and nursing and physical therapy. Specifically, medicine, occupational therapy, and physical therapy participants' reported experiencing greater stress-related demands than nursing participants (Table 10). No other significant differences were found between the PSQ-Revised subscales scores of each discipline. Notably, an univariate ANOVA revealed a significant difference in the total score ( $p < .043$ ) for the PSQ-Revised with regard to discipline; however, a Bonferroni post hoc analysis results did not demonstrate significant differences between disciplines (Table 10).

Follow-up univariate ANOVAs also indicated significant differences between disciplines for all of the RIPLS pre-test and post-test total and subscale scores (Table 11). Significant differences between RIPLS pre-test total scores were found between medical participants and nursing, occupational therapy, physical therapy, and social work participants using a Bonferroni post hoc test (Table 10). This finding suggested medical participants had lesser readiness for interprofessional learning than other disciplines prior to the beginning of the interprofessional health care course. Significant differences were also found between RIPLS pre-test subscale scores for teamwork and collaboration, professional identity, and roles and responsibilities when comparing medical participants' scores to the scores of participants from all other disciplines with one exception; no significant difference was noted between medicine and social work participants' scores for roles and responsibilities.

A Bonferroni post hoc analysis also revealed differences between medicine and all other disciplines for the RIPLS Post-test total scores and all subscale scores (Table

10). One exception was that there was no significant difference between the medical and social work participants' scores on the roles and responsibilities subscale.

Lastly, follow-up univariate ANOVAs revealed a significant difference in IPHC SFQ scores between disciplines (Table 12). This difference indicated medical students were less satisfied with the interprofessional health care course than all other disciplines (Table 10).

#### *Retrospective and Post-Test Achievement of Knowledge*

A one-way repeated measures ANOVA was conducted to answer the seventh question: Was there a difference, retrospectively, for students' achievement of knowledge in readiness for interprofessional learning? A significant effect was found ( $F(1,91) = 16.16, p < .001$ ) indicating that post-test RIPLS scores ( $M = 80.8, SD = 10.7$ ) were significantly higher than retrospective pre-test scores ( $M = 77.8, SD = 9.1$ ).

#### *Retrospective and Post-Test Achievement of Knowledge by Discipline*

A one-way repeated measures ANOVA was conducted to answer the eighth research question: Was there a difference, retrospectively, for students' achievement of knowledge in readiness for interprofessional learning when considering participants' academic discipline? A significant difference was found ( $F(4,91) = 2.93, p < .05$ ). Bonferroni's post hoc analysis was conducted to determine the nature of the differences between disciplines (Table 13 and Figure 1). Results indicated that medical students demonstrated significantly lower retrospective achievement of knowledge scores than students in other disciplines.

Table 10

Bonferroni Post Hoc Analysis of Between Discipline Scores for the PSQ-Revised, RIPLS Pre-test, RIPLS Post-test, and IPHC SFQ

Instrument	Disciplines									
	1-2	1-3	1-4	1-5	2-3	2-4	2-5	3-4	3-5	4-5
PSQ-Revised										
Total	--	--	--	--	--	--	--	--	--	--
Demands	.018	--	--	--	.030	.016	--	--	--	--
Worries	--	--	--	--	--	--	--	--	--	--
Joy	--	--	--	--	--	--	--	--	--	--
Tension	--	--	--	--	--	--	--	--	--	--
RIPLS Pre-Test										
Total	<.001	<.001	<.001	.003	--	--	--	--	--	--
Teamwork	<.001	.004	.003	.005	--	--	--	--	--	--
Identity	.008	.013	.011	.005	--	--	--	--	--	--
Roles	.001	.004	.031	--	--	--	--	--	--	--
RIPLS Post-test										
Total	<.001	<.001	<.001	<.001	--	--	--	--	--	--
Teamwork	<.001	<.001	<.001	<.001	--	--	--	--	--	--
Identity	<.001	<.001	.001	<.001	--	--	--	--	--	--
Roles	.001	.040	.043	--	--	--	--	--	--	--
IPHC SFQ										
	<.001	.004	.005	.005	--	--	--	--	--	--

1 - Medicine 2 - Nursing 3 - Occupational Therapy 4 - Physical Therapy 5 - Social Work; (--) denotes an alpha level of 1.00 or non-significant findings.

Table 11  
*Univariate Analysis of RIPLS Total and Subscale Scores by Discipline*

Instrument & Subscales	Academic Disciplines					df	F Ratio	p
	Medicine	Nursing	OT	PT	SW			
	M (n = 17)	M (n = 47)	M (n = 14)	M (n = 12)	M (n = 6)			
RIPLS Pre-Test								
Teamwork/Collaboration	33.1	38.3	40.7	39.2	40.5	4, 91	6.36	<.001
Professional Identity	24.2	27.9	28.7	29.0	39.7	4, 91	5.25	<.001
Roles/Responsibilities	10.2	12.5	12.8	12.4	10.7	4, 91	5.82	<.001
Total	67.5	78.7	80.4	80.7	81.8	4, 91	8.32	<.001
RIPLS Post-Test								
Teamwork/Collaboration	32.5	40.7	40.7	41.3	42.8	4, 91	12.00	<.001
Professional Identity	23.7	29.9	31.0	29.9	32.7	4, 91	10.31	<.001
Roles/Responsibilities	10.3	12.7	12.5	12.6	10.8	4, 91	5.09	<.001
Total	66.5	83.4	84.2	83.8	86.3	4, 91	14.60	<.001

OT- Occupational Therapy; PT- Physical Therapy; SW- Social Work

Table 12  
*Univariate Analysis of IPHC SFQ Scores by Discipline*

Instrument	Academic Disciplines					df	F Ratio	p
	Medicine	Nursing	OT	PT	SW			
	M (n = 17)	M (n = 47)	M (n = 14)	M (n = 12)	M (n = 6)			
IPHC SFQ	82.8	101.1	102.4	102.8	108.3	4, 91	6.31	<.001

OT- Occupational Therapy; PT- Physical Therapy; SW- Social Work

Table 13

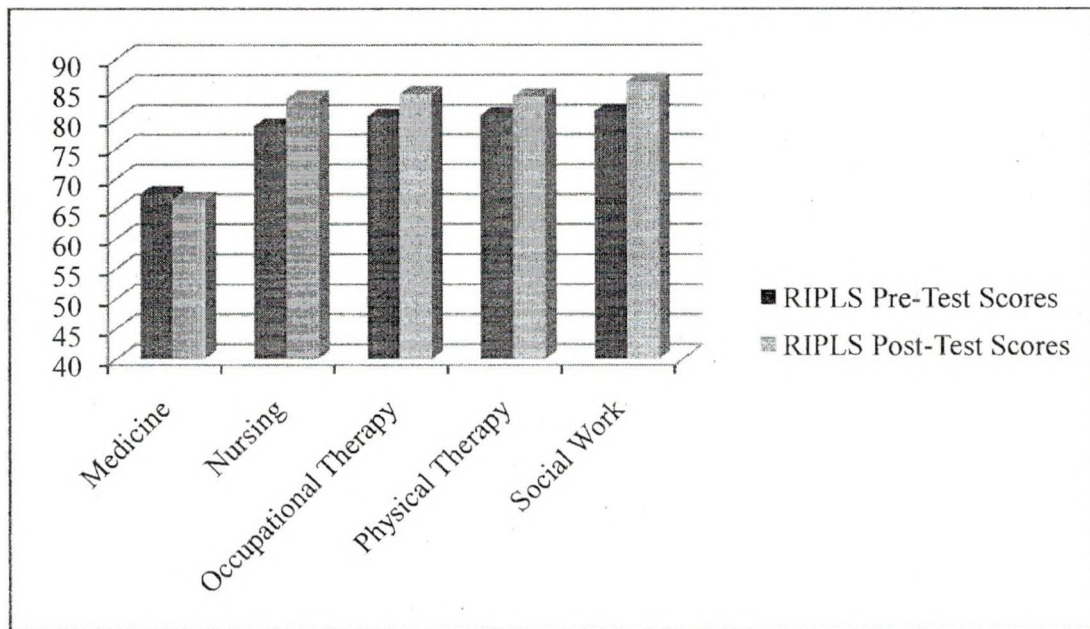
*Bonferroni Post Hoc Results for RIPLS Scores between Disciplines*

Discipline Comparisons	<i>p</i>
1-2	<.001
1-3	<.001
1-4	<.001
1-5	<.001
2-3	1.00
2-4	1.00
2-5	1.00
3-4	1.00
3-5	1.00
4-5	1.00

1 – Medicine 2 - Nursing 3 - Occupational Therapy 4 - Physical Therapy 5 - Social Work

Figure 1

*RIPLS Pre-Test and Post-Test Scores by Discipline*



*Course Satisfaction, Psychological Stress, Achievement of Knowledge,  
and Time of the Course Offering*

A MANOVA was calculated to answer the ninth research question: Was there a difference between students' course satisfaction, psychological stress, and achievement of knowledge in readiness for interprofessional learning when considering the time the course was offered? No significant difference was found (*Wilks Lambda* (95,84) = .839,  $p > .05$ ). The time the course was offered did not appear to influence students' course satisfaction, psychological stress, and readiness for interprofessional learning.

*Relationships between Psychological Stress, Course Satisfaction,  
and Achievement of Knowledge*

A Pearson correlation coefficient was calculated to answer the tenth research question: Was there a relationship between students' perceived psychological stress scores, their course satisfaction scores, and their achievement of knowledge in readiness for interprofessional learning scores?

A positive, moderate correlation was found ( $r(94) = .524$ ,  $p < .001$ ) indicating a significant linear relationship between student responses for the IPHC SFQ and the RIPLS pre-test. This finding suggested that as participants' satisfaction in the course increased, their readiness for interprofessional learning also increased. Participants' IPHC SFQ scores were also positively correlated ( $r(94) = .692$ ,  $p < .001$ ) with RIPLS post-test scores indicating that greater course satisfaction was indicative of greater readiness for interprofessional learning upon course completion. A negative, though weak, correlation was found ( $r(94) = -.203$ ,  $p < .05$ ) between IPHC SFQ scores and PSQ-Revised scores indicating a significant inverse linear relationship between satisfaction and stress which



suggested that as stress increased, participants' course satisfaction diminished. PSQ-Revised scores were also found to be negatively correlated ( $r(94) = -.253, p < .001$ ) with RIPLS post-test scores illustrating a significant difference. RIPLS pre-test and post-test scores were found to be positively and strongly correlated ( $r(94) = .816, p < .001$ ) indicating a significant linear relationship in which higher retrospective RIPLS scores were related to higher RIPLS post-test scores. A final Pearson correlation was calculated to examine the relationship between PSQ-Revised scores and RIPLS post-test scores. No correlation ( $r(94) = -.194, p > .05$ ) was found between psychological stress and post-test readiness for interprofessional learning.

*Relationships between Psychological Stress, Achievement of Knowledge,  
Course Satisfaction, and Demographic Variables*

Analysis was conducted using Spearman's *rho* to answer the eleventh research question: Was there a relationship between students' perceptions of stress, achievement of knowledge, and course satisfaction, and participants' program experience, age, employment status, and time spent studying? Significant relationships were found between RIPLS retrospective scores, RIPLS post-test total scores, PSQ scores and the following variables: program experience and time spent studying. No relationships were found between instrument scores and age or employment (Table 14). Kielhofner's (2006) description of correlation coefficient strength was used to assess the results. A low, positive relationship was discovered between program experience and participants RIPLS pre-test scores (Table 14). This finding indicates participants with more experience in their program reported greater readiness for interprofessional learning. Program experience also demonstrated a low, inverse correlation with PSQ scores (Table

14). This result suggested that more program experience might be related to lower psychological stress. Lastly, a low, positive relationship was found between program experience and total scores on the RIPLS post-test indicating that participants' with more experience in the program have greater readiness for interprofessional learning after the interprofessional health care course than those with lesser program experience (Table 14). A Spearman rho correlation coefficient was calculated for the relationship between age and psychological stress, achievement of knowledge, and course satisfaction scores. No relationships were found between psychological stress, achievement of knowledge, course satisfaction, and age (Table 14). Results of a Spearman rho analysis demonstrated a low, inverse relationship ( $\rho(94) = -.211, p < .05$ ) between time spent studying, and RIPLS pre-test scores (Table 14). This finding indicates that as study time increases RIPLS pre-test scores decrease and as time spent studying decreases, RIPLS pre-test scores increase. A Spearman rho correlation coefficient was also calculated to analyze the relationship between the time participants spent studying and RIPLS post-test scores. A low, inverse correlation was found ( $\rho(94) = -.233, p < .05$ ) which indicated a significant relation between these variables (Table 14). As study time decreased, RIPLS post-test scores increased and vice versa. Lastly, Spearman rho correlation coefficient calculation was completed to analyze the relationship between the time participants' spent studying and their PSQ scores. A low, positive relationship was found indicating that as the amount of time spent studying increased, psychological stress increased (Table 14).

Table 14

*Spearman rho Correlation Coefficients for Demographics and Instrument Scores*

Demographics	Course Satisfaction		PSQ		RIPLS Pre-Test		RIPLS Post-test	
	<i>rho</i>	<i>p</i>	<i>rho</i>	<i>p</i>	<i>rho</i>	<i>p</i>	<i>rho</i>	<i>p</i>
Program Experience	.133	.195	-.247	.015	.341	.001	.318	.002
Age	-.103	.317	.108	.294	-.087	.398	-.074	.474
Employment	.089	.387	-.047	.652	.122	.237	.068	.511
Time Spent Studying	-.181	.077	.278	.006	-.211	.039	-.233	.022

## Summary

Chapter IV provided the results of pre-analysis data screening, instrument reliability analyses, descriptive analyses, and inferential statistical analyses used to answer the eight research questions in this study. These findings are examined further in Chapter V.

## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

The occurrence of medical errors continues to be a primary concern in health care. To deter the incidence of errors, health care educators have implemented interprofessional health care education to improve communication between team members and enhance collaborative effectiveness and efficiency. Though research regarding interprofessional education has expanded during the last decade, a deficiency in understanding the complex processes that occur during learning experiences of students from diverse disciplines persists. The results of this study provide interesting and important findings for interprofessional health care educators as the outcomes supply information that may be useful during interprofessional curriculum enhancement. The outcomes of this research are particularly relevant to educational institutions in the U.S. due to the dearth of study in the area of interprofessional health care education. Cooper, Carlisle, Gibbs, and Watkins (2001) reported the majority of interprofessional education research had been conducted in the United Kingdom. The following section provides a discussion of the results in the areas of participants' demographics, achievement of knowledge, course satisfaction, and psychological stress. Chapter V terminates with recommendations for areas of further study and practice.

Few previous studies have examined interprofessional education with the combination of disciplines that were involved in this study. Participants in this study comprised a sample of 96 medical, nursing, occupational therapy, physical therapy, and social work students; disciplines often critically involved in patient care in U.S. health care settings. Ninety-five percent of the participants were under the age of 30 years and reflected a largely traditional student sample. Many of these variables as they related to achievement of knowledge, course satisfaction, and psychological stress are examined in proceeding sections.

#### Achievement of Knowledge

Results of analysis of participant achievement of knowledge provided additional insight into the learning experiences of students in various academic disciplines. Consistent with results published by Cooper et al. (2001), Goelen et al. (2006), and Reynolds (2003), findings in this study indicated that students demonstrated more positive attitudes towards interprofessional learning upon completion of an interprofessional health care course. Students, overall, were positive toward the concept of interprofessional learning and demonstrated improvements in readiness for interprofessional learning following their completion of the PBL interprofessional healthcare course. While achievement of knowledge gains appear small, they were nonetheless significant. It is important to acknowledge the high retrospective scores on each of the RIPLS subscales. It appears that students began the course with high scores reflecting positive attitudes toward teamwork and collaboration, professional identity, and knowledge of roles and responsibilities. This may be due to students' previous

experience and knowledge of interprofessional teamwork. Considering the high retrospective scores, the improvement in RIPLS post-test scores is promising for interprofessional healthcare educators as the fundamental purpose of interprofessional education is to improve collaboration and communication; an endeavor that requires improving student attitudes toward teamwork. The RIPLS was designed to measure attitudes in varying dimensions of interprofessionalism. The increase in RIPLS scores suggested nursing, occupational therapy, physical therapy, and social work students demonstrated an increase in positive attitudes toward interprofessional learning following the completion of the course and, hence, greater achievement of knowledge in this area.

Distinctions in readiness for interprofessional learning were, however, present between disciplines as not all students demonstrated greater achievement of knowledge following the interprofessional health care course. Medical students demonstrated the lowest scores on RIPLS pre-test and post-test scores when compared to other disciplines. These findings are consistent with outcomes published by Street et al. (2007) who, despite differing methodology, reported nursing students were more open to and benefited more from interprofessional learning than did medical students. The results of RIPLS pre-test and post-test total score analysis in this research demonstrated a decline in the medical students' post-test scores when compared to the pre-test scores while students in other disciplines in this study demonstrated an increase in post-test scores. Medical students demonstrated significantly lower scores in the areas of teamwork and collaboration, and professional identity on RIPLS pre-test and post-test scores when compared with the same scores of the participants in all other disciplines. No difference

was found between medical and social work students on the RIPLS subscale of roles and responsibilities. However, medical students reported lower scores on the RIPLS pre-test and post-test subscale of roles and responsibilities when compared to nursing, occupational therapy, and physical therapy. Declines in this discipline's scores were noted in the areas of teamwork and collaboration, and professional identity. This finding is of concern given the leadership role physicians often assume during interprofessional collaboration in practice settings; a role that would seemingly mandate appreciation for teamwork. As Whitehead (2007) noted "...doctors are particularly influential players in the medical hierarchy" (p. 1, 011). It should be noted that despite the significant difference discovered in achievement of knowledge between disciplines and the decline in scores noted on the RIPLS post-test, medical students' responses on the RIPLS pre-test and post-test did convey a mean score that was mid-way between "neutral" and "agree"; a score that indicates a slightly positive attitude toward interprofessional learning. This finding is promising, but also supports a need for ongoing research to determine methods to enhance medical students' achievement of knowledge in interprofessional education experiences.

As mentioned previously, social work students' scores did not differ significantly from the RIPLS pre-test and post-test scores of medical students on the roles and responsibilities subscales. This outcome is fairly consistent with the findings of Barnes et al. (2000) who noted only a slight increase in the clarity of social workers' roles following interprofessional education. One explanation of this occurrence may be the influence of the content of the PBL cases used in the interprofessional health care course

which were principally medically based and may be inconsistent with the theoretical foundations of the social work profession which, according to Barnes et al. (2000), has a strong emphasis on humanistic philosophy and the absence of medical sciences. In addition, 66.7% of social work students in this research study reported experience of one year or fewer in their program of study. These students may be in the early stages of gaining knowledge of their roles and responsibilities on a health care team.

Multiple arguments can be posed regarding the medical students' reported lower readiness for interprofessional learning scores. While it is not the intention of this research to determine cause and effect, several variables were explored that may provide information to enhance understanding of this outcome. First, the theoretical background of the students with regard to their discipline may have played an important role in interprofessional achievement of knowledge. As noted by Barnes et al. (2000) and Garman et al. (2006), medical students typically experience greater emphasis on sciences during their coursework than nursing, occupational therapy, physical therapy, and social work students who often have greater knowledge emphasis in the area of social sciences. This emphasis and distinction may have influenced the value that students in each of the professions had for their engagement in interprofessional education in which the process, not the content, is largely a social science-related area of study. Gender may have also influenced the value of interprofessional education held by students in each discipline. Medical students were represented largely by male participants. Reynolds (2003) reported that female medical students tended to appreciate the socialization involved in PBL interprofessional educational process with greater fervor than male participants. An



additional variable that may have influenced achievement of knowledge is professional identity. Nursing, occupational therapy, physical therapy, and social work students may have experienced greater comfort with the process of the interprofessional course as its social science foundation was perhaps more consistent with their own professional identity than that of the medical students. In a report on beginning medical students' characterizations of medical practice, Dall'Alba (1998) purported that medical students identified core dimensions of medicine including patient and doctor interactions and knowledge of the physician but did not include interprofessional collaboration, teamwork, or related concepts.

Program experience may have also influenced the professional identity of all students in this course. Medical students reported less than two years of experience in their academic discipline; most (88%) had one year of experience as compared to their team members who largely reported two or three years of program experience. This research resulted in findings of a positive relationship between program experience and readiness for interprofessional learning. Although greater program experience is not an absolute determinant of stronger professional identity, it is an important consideration. Funnell (as cited in Mandy et al., 2004) "...argued that a lack of professional identity results in role insecurity, and that this, in turn leads to inflexible role boundaries and a reluctance towards role sharing" (p. 165). This is interesting given the significant difference between medical students and nursing, occupational therapy, and physical therapy students in the area of roles and responsibilities on the RIPLS subscale. While medical students had the most knowledge about the PBL process, arguably, nursing,

occupational therapy, and physical therapy students may have had greater knowledge of their own role and the roles of others secondary to having accumulated more program experience. Additionally, the greater program experience of nursing, occupational therapy, and physical therapy students enhanced the likelihood that they had experienced an internship, which would have also strengthened their knowledge of their discipline's role on the health care team. Mandy et al. suggested students' interprofessional learning might be improved if they completed an interprofessional course following a clinical experience rather than early in their curriculum. Nursing, occupational therapy, physical therapy, and social work students' reported significantly higher professional identity scores on the RIPLS pre-test and post subscales. Educators must question whether students who have had limited exposure to their own discipline have yet achieved a strong professional identity and fully understand their role on the health care team. This proposition is, however, incongruent with the views of Cooper et al. (2001) who reported existing literature supported health care students' early enrollment in interprofessional health care education to be beneficial to improving the relationships between team members when compared with later enrollment. The discrepancy in viewpoints regarding the timing of interprofessional education in health care curricula promotes examination of the inequality that existed between participants' program experience in this study. Perhaps the disparate program experience of participants heightened the professional identity of participants with greater experience while impeding the professional identity development of those with less experience. Obviously, the presence of varying professional and educational experiences is predominant in health care practice settings

and, therefore, the enrollment procedures in this interprofessional course would be fundamentally reflective of practice. However, it is also possible exposure to students in other disciplines with greater program experience, and perhaps stronger professional identity, than those with lesser program experience may ultimately be damaging to participants' views on future collaboration and teamwork. Further research is required to examine the intrapersonal and interprofessional dynamics that occur between health care students from different disciplines with varying levels of program experience.

Findings also showed an inverse relationship between time spent studying and achievement of knowledge on RIPLS pre-test and post-test scores. This relationship indicates as time spent studying increased, achievement of knowledge scores decreased, and vice versa. Of participants in this sample, medical students reported the highest percentages of studying in the category of greater than 40 hours per week (41%) and only one medical student reported spending 10-20 hours per week studying. Physical therapy students demonstrated the highest percentage (58%) of studying 20-40 per week by discipline although medical students followed closely (53%). Several potential explanations for the inverse relationship between achievement of knowledge and time spent studying exist. It is important to acknowledge that while physical therapy students reported spending a great deal of time studying, they demonstrated among the highest RIPLS pre-test scores, second only to social work, and the third highest RIPLS post-test scores. Medical students, however, demonstrated the lowest RIPLS pre-test and post-test scores. The rigorousness of some programs may require students in those disciplines to dedicate more time studying. Medical programs, in particular, are synonymous with high

academic expectations as evidenced by the absence of medical students in this study who reported employment. As projected in previous research, participants in medical school often experience greater magnitudes of stress, particularly as they progress through the medical school curriculum (Niemi & Vainiomäki, 2006). The psychological stress reports by participants in this program are examined more thoroughly in proceeding sections of this report; however, it is an important consideration when examining the relationship between time spent studying and achievement of knowledge in interprofessional learning. In a brief review of literature, Hamstra, Woodrow, and Mangrulkar (2008) examined the development of professional identity and reported that engagement in long work hours is a common value among many residents; a value that may often negatively influence residents' effectiveness and satisfaction with patient care. They called for an increase of the emphasis on teamwork in the curriculum to assist in decreasing physician workload and changing the socialization processes for physicians. It is possible that increased time spent studying, which may equate with long work hours, may also impede medical students' effectiveness in achieving greater readiness for interprofessional learning. A question then arises: Why did physical therapy students, despite their reports of increased study time, achieve greater readiness for interprofessional learning than medical students? One rationale is, given the social science foundation that physical therapy curricula often maintain, that physical therapy students may hold greater value for interprofessional education than medical students and, thus, dedicate more of their study time to interprofessional learning. Further, it is possible that if medical students did hold lesser value for interprofessional learning, which seems likely given their lower scores on

the RIPLS pre-test and post-test scores, that they have dedicated less time to interprofessional health care course despite the elevated amount of time spent studying that they reported. The influence of student values as they relate to learning is examined further in proceeding sections of this report.

### Psychological Stress

Cumulatively, participants reported, on average, they experienced psychological stress “sometimes” to “often” which appears appropriate given their enrollment in professional health care programs that are often considered to be rigorous in nature. Unexpected findings related to psychological stress included the absence of differences of psychological stress as reported by students in varying disciplines. Despite the plethora of research devoted to assessing psychological stress in medical students and the shortage of research that has been conducted on occupational and physical therapy students, each of these disciplines demonstrated similar mean total scores on the PSQ-Revised. This finding is rather surprising given the association of high stress rates and medical program enrollment; one might expect that medical students would report higher levels of stress than other disciplines. Perhaps medical students, due to pre-determined expectations of stress associated with enrollment in medical school, are more prepared to encounter higher levels of demands, worries, and tension than those students who enroll in occupation therapy and physical therapy programs. An additional rationalization for the congruency in perceived psychological stress by medical, occupational therapy, and physical therapy students is one that is consistent with the findings of Niemi and Vainiomäki (2006) who found that during the first year of medical school female

participants reported greater levels of psychological stress than male participants. They reported that male students tended to report greater stress levels during later years of medical school. Given the large percentage of students in their first year of medical school and the predominantly male medical student sample, it is possible that the medical students' perceptions of stress were accurate reflections of their perceptions of stress at the time of data collection.

It is also possible the professions of occupational and physical therapy have not adequately addressed the students' expectations of stress within those respective disciplines; this viewpoint seems to be supported by the scarcity of literature that exists regarding the stress levels of students in these disciplines. Students in occupational and physical therapy programs may be unaware of the demands that they will encounter once enrolled in their program of study. Further argument may be applied that students in the medical, nursing, and social work programs may have been experiencing lower levels of stress due to the requirements of their program during the time that data was collected while students in occupational therapy and physical therapy may have been experiencing heightened academic-related demands during those timeframes.

Resistance to stress is another variable that may have influenced the results. Seaward (2005) described personality differences that are associated with resistance to stress. A hardy personality type was identified as the most resistant to stress (2005) and "...defined by the perceptions of situations and events as challenging rather than threatening; a strong sense of commitment (whether to work, family, or community); and a sense of being in control" (Prymachuk & Richards, 2007, p. 399). Seaward's

propositions are, however, incongruent with Monk's (2004) findings of no association between students' stress levels and personality. Nonetheless, few would argue that personality is a primary motivator in the selection of an academic field of study and, thus, it is possible that students in specific fields possess hardier personality types than those in other fields.

Additional variables warrant further consideration. Educators should also give careful thought to the theoretical background of students in varying disciplines. It is possible each respective discipline's program of study may have enhanced or diminished the students' awareness of their own psychological stress which may have resulted in heightened scores in the social science-related disciplines. It is also possible that students in each discipline overestimated or underestimated their psychological stress. Medical students, in particular, may be prone to underestimating stress in self-reports as Haas and Shaffir (as cited in Whitehead, 2007) indicated that doctors must adopt "...a cloak of competence" (p. 1,010). Hamstra et al. (2008) echoed this notion and identified the tendency of medical residents to value "staying late" (p. 8); a concept likely associated with increased stress though consistent with their professional identity.

Lastly, the parallel nature of perceived psychological stress by medical, occupational therapy, and physical therapy students may be explained by a "goodness of fit" between the students and the academic programs in which they were enrolled. Students in these disciplines may have been enrolled in programs that matched their learning needs and provide a "just right" academic challenge; pairings which resulted in a

consistent perception of psychological stress across the disciplines of medicine, occupational therapy, and physical therapy.

Post hoc analysis of PSQ-Revised scores by discipline resulted in three significant findings, all within the subscale of demands. Medical, occupational therapy, and physical therapy students reported higher experiences of demands than did nursing students; in fact, during post hoc analysis the subscale of demands was the only of the subscales scores that indicated a significant difference between disciplines. Further contemplation should be applied to the finding in which nursing students reported lower levels of stress than students in the medical, occupational therapy, and physical therapy disciplines. Nursing is a discipline that is known for its academic rigor and, yet, nursing students reported significantly lower levels of stress in the area of demands than students in the aforementioned disciplines. Numerous explanations for this occurrence may be posed. First, nursing students may have been experiencing fewer demands during the semester in which data was collected. It is also possible that the length of experience in the program contributed to nursing students' lower perceptions of stress.

A correlational analysis revealed a negative relationship between psychological stress and program experience. Notably, nursing constituted the greatest percentage of participants with three or four years of program experience while most medical, occupational therapy, and physical therapy students reported one to two years of program experience. Multiple assertions regarding the relationship between program experience and stress may be implemented. Nursing students may have adjusted to their academic role in the nursing program and, therefore, experienced greater ease of transition into the



interprofessional course resulting in a perception of experiencing lesser demands. Nursing students demonstrated greater professional identity on the RIPLS pre-test and post-test subscales than medical students. Thus, they may have encountered fewer psychointrapersonal stressors that are considered to be the most influential of stressors (Seaward, 2006). However, no differences were found between nursing and occupational therapy or physical therapy on the RIPLS professional identity subscale; an outcome that indicates a need for further exploration of the difference in the experience of demands between disciplines. It is important to note at this time that the PSQ-Revised did not include the subscale of “harassment” (Fliege et al., 2005, p. 86) that was present on the original instrument which was largely reflective of social stressors and, thus, the conjecture presented in this paragraph warrants further examination in future studies.

The finding that a positive relationship existed between psychological stress and time spent studying indicated the more that students studied, the greater the stress they perceived or vice versa. Monk and Mahmood (1999) reported coursework was a primary stressor for allied health and medical students. Perhaps students who studied more perceived greater academic pressures than those who studied less. The perception of this pressure may be reflective of personal ideals or it may be that some students simply must study more to meet the academic requirements of their program. Additionally, some students may have perfectionist tendencies that propel them to study more while others may believe that they can never study enough to meet the requirements of their academic program. Lastly, students who have limited professional identity, which is largely reflective of knowledge of one’s profession, may feel greater pressure to spend more time

studying than their counterparts who feel that they have a strong professional identity. Regardless, students who spend greater amounts of time studying may feel more pressure and greater demands within their courses. Millings et al. (1999) acknowledged student psychological related issues have been historically overlooked in university settings and called for more research in this area.

#### Interprofessional Health Care Course Satisfaction

Interprofessional course satisfaction results indicated that participants were satisfied with the interprofessional course. Students' mean scores, overall, were slightly more than one standard deviation greater than the IPHC SFQ's middle scale scores; a positive finding for interprofessional health care educators. Differences in satisfaction were found between academic disciplines. Social work, physical therapy, occupational therapy, and nursing students demonstrated significantly higher satisfaction scores than medical students. Medical students' satisfaction scores demonstrated a fairly "neutral" response to questions regarding their satisfaction with the interprofessional course. Speculation about potential influences that may have contributed to lower satisfaction scores among medical students than other groups is similar to those arguments presented in the abovementioned achievement of knowledge section. Notably, no relationship was discovered between course satisfaction and program experience, age, employment, or time spent studying. There was, however, a positive relationship between students' satisfaction and achievement of knowledge on RIPLS pre-test and post-tests. Presumably, students value the coursework within their program; however, it is unknown to what degree students from various disciplines value interprofessional health care education. It

is assumed that students' scores are the RIPLS pre-test and post-test scores are reflective of attitude and, therefore, appreciation of the course. If this conclusion is accurate, it would indicate that nursing, occupational therapy, physical therapy, and social work students perceive greater value of interprofessional education than medical students. Students who do not value interprofessional health care education may view their enrollment in the course as burdensome if it is not congruent with the students' values. This incongruity would likely result in lower satisfaction scores. As satisfaction scores were found to be positively related to achievement of knowledge scores, students' appreciation for the course would obviously contribute to greater learning. This conclusion is not surprising as an extensive literature foundation exists supporting the notion that students' who are satisfied with and value their learning experience are more likely to learn (Bastable, 2006) The relationship between students' course satisfaction and achievement of knowledge is an important consideration for educators seeking methods to enhance student learning.

Interestingly, results indicated the time that the course was offered did not influence course satisfaction, psychological stress, and readiness for interprofessional learning. This finding might support that students in the academic disciplines in this study are engaged in educational programs that are consistent in the ratio of the demands at the time that data were gathered.

#### Limitations

A small number of limitations were present in this study. First, the conclusions reached here cannot be generalized to all academic settings given the differences that

exist between institutions. Secondly, a moderate number of participants did not complete the PSQ-Revised and were not included in this study. While analysis of RIPLS pre-test and post-test scores and IPHC SFQ scores of participants who did and did not complete the PSQ-Revised did not reflect any significant differences between groups, the absence of these students likely influenced the findings; this obviously resulted in a less representative sample than if the entire population would have participated. The communication sciences and disorders discipline was not represented in this study; inclusion of this discipline would have provided for greater comparison between disciplines. Lastly, due to the exploratory nature of this study, cause and effect cannot be applied to the findings.

#### Recommendations

This study provided valuable information with multiple implications that educators may choose to consider as they seek to improve interprofessional health care education courses intended to increase health care provider communication and collaboration with the final goal of decreasing the occurrence of medical errors in practice. Findings of this study warrant contemplation for students' program experience, psychological stress, readiness for interprofessional learning, values associated with interprofessional health care education, and time spent studying.

This research culminated in several recommendations for practice and future areas of study for interprofessional education, overall, and for specific disciplines.

### *Future Research*

1. Medical, nursing, occupational therapy, physical therapy, and social work students are characterized by multitudes of demographic, personality, and discipline-specific theoretical differences. Further research, particularly high quality, randomized control trials, of interprofessional health care education effectiveness as related to student characteristics is needed. Greater understanding of the influence of students' characteristics on interprofessional learning will allow educators to tailor interprofessional education to maximize student learning outcomes and improvements in attitudes toward collaboration.
2. While professionals from various disciplines may assume the leadership role on a health care team, commonly physicians fill this position. An emphasis should be placed on further evaluation of medical students' value for, attitudes toward, and achievement of knowledge in interprofessional healthcare courses. Identification and implementation of methods to enhance medical students' value of collaboration with students from other disciplines will ultimately benefit the health care team, the physician, and most importantly, the patient.
3. For many participants in this study, their experiences in the interprofessional health care course was their first experience working with students from disciplines other than their own. Longitudinal studies are needed to

understand the practical influence of interprofessional education and determine whether that education improves teamwork in practice settings.

4. Health care students, regardless of discipline, are enrolled in demanding academic programs in which they develop habits, relationships, values, and methods of coping with those demands. It is imperative that educators critically analyze the relationships that exist between the variables that were examined in this research to develop curriculums that maximize student achievement in the area of interprofessional understanding and collaboration
5. The findings of this study demonstrate potential influences of perceived psychological stress on learning and satisfaction with interprofessional health care courses though further research is recommended that includes a greater emphasis on the psychological stress of students in multiple health care disciplines.
6. Little literature on the psychological stress of students in allied health fields exists. This research provided results that indicated occupational and physical therapy students experience levels of stress similar to medical students. Further examination of students' psychological stress in occupational therapy and physical therapy programs is imperative to faculty understanding of students' experiences and need for measures to address stress-related issues.

#### *Practice*

1. Program experience also appeared to influence readiness for interprofessional learning and course satisfaction. Health care educators must consider the

influence of program experience and the timing of the course offering within each discipline's curriculum. Critical to this endeavor is consideration for the development of the students' professional identity and the influence that their identity may have on interprofessional collaboration with students with greater or less program experience.

#### Summary

Finally, interprofessional health care education is critical to improving patient care in practice settings and reducing the occurrence of medical errors. Consistent with the complexities that are present in health care settings, medical, nursing, occupational therapy, physical therapy, and social work students' learning experiences are also complicated by multiple variables that warrant further research. Health care educators and researchers must continue to evaluate these variables and determine methods of improving interprofessional health care education.

## APPENDICES



Appendix A  
Demographic Questionnaire

**Demographic Information**

Please check appropriate box which *best describes you*.

1. What is your present age?	<input type="checkbox"/> 20-25 years <input type="checkbox"/> 36-40 years <input type="checkbox"/> 26-30 years <input type="checkbox"/> 41-45 years <input type="checkbox"/> 31-35 years <input type="checkbox"/> 46-50 years <input type="checkbox"/> Greater than 50 years
2. What is your gender?	<input type="checkbox"/> Male <input type="checkbox"/> Female
3. What is your race?	<input type="checkbox"/> White, Not of Hispanic Origin <input type="checkbox"/> Hispanic <input type="checkbox"/> Black, Not of Hispanic Origin <input type="checkbox"/> American Indian/Alaskan Native <input type="checkbox"/> Other
3. In which program are you enrolled?	<input type="checkbox"/> Communication Science Disorders <input type="checkbox"/> Medical School <input type="checkbox"/> Nursing <input type="checkbox"/> Occupational Therapy <input type="checkbox"/> Physical Therapy <input type="checkbox"/> Physician Assistant <input type="checkbox"/> Social Work
4. How many years have you completed in your profession program (Please do NOT include the time prior to beginning your professional program).	<input type="checkbox"/> Less than 1 year <input type="checkbox"/> 1 year <input type="checkbox"/> 2 years <input type="checkbox"/> 3 years <input type="checkbox"/> 4 years
5. Did you work in healthcare prior to beginning your professional program?	<input type="checkbox"/> Yes <input type="checkbox"/> No
6. Have you earned a degree a healthcare discipline other than that in which you are currently enrolled?	<input type="checkbox"/> Yes <input type="checkbox"/> No

<p>If <b>YES</b>, which degree did you earn?</p>	<input type="checkbox"/> Associate's Degree <input type="checkbox"/> Bachelor's Degree <input type="checkbox"/> Master's Degree <input type="checkbox"/> Doctoral Degree
<p>7. Are you currently employed?</p> <p>If <b>YES</b>, how many hours do you work per week?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Less than 10 hours <input type="checkbox"/> 10-20 hours <input type="checkbox"/> 20-40 hours <input type="checkbox"/> More than 40 hours
<p>8. How many hours do you spend studying for school each week?</p>	<input type="checkbox"/> Less than 10 hours <input type="checkbox"/> 10-20 hours <input type="checkbox"/> 20-40 hours <input type="checkbox"/> More than 40 hours
<p>9. Marital Status</p>	<input type="checkbox"/> Single <input type="checkbox"/> Married <input type="checkbox"/> Divorced <input type="checkbox"/> Widowed
<p>10. Are you the primary caregiver for anyone other than yourself?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No
<p>11. Which of the following describes the method by which you are completing this course?</p>	<input type="checkbox"/> In Classroom on Grand Forks Campus <input type="checkbox"/> Distance Education – TV <input type="checkbox"/> Distance Education – Computer <input type="checkbox"/> Distance Education - TV & Computer

Appendix B  
Interprofessional Health Care Student Feedback Questionnaire

**INTERPROFESSIONAL HEALTH CARE  
STUDENT FEEDBACK QUESTIONNAIRE**

The purpose of this questionnaire is to collect your perceptions on the six weeks of instruction in IPHC. To respond, check the box beside each statement that most accurately reflects the extent to which you agree or disagree with the statement. Your responses are anonymous!

**My primary discipline is:**

<b>IPHC Course</b>	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
1. The IPHC course was well organized.					
2. The cases contributed significantly to my knowledge and understanding of the roles of the different professionals in a healthcare team.					
3. The small group discussions contributed to the development of my understanding of the interactions of the healthcare team.					
4. I was able to access quality clinical and information resources (e.g., library materials, electronic data bases, etc.).					
5. Audio visuals, computers and other technologies were readily available and useful.					
6. The faculty-derived learning objectives were clear, concise and emphasized the most important concepts in each case.					
7. The faculty-derived learning objectives emphasized the most important concepts in each case.					
8. The group-derived learning issues were easily developed from the case discussion.					
10. Appropriate reference materials were provided in order to begin my researching of the learning objectives.					

<b>IPHC Course</b>	<b><i>Strongly Agree</i></b>	<b><i>Agree</i></b>	<b><i>Neutral</i></b>	<b><i>Disagree</i></b>	<b><i>Strongly Disagree</i></b>
11. The video describing the rationale for the course and the problem-based learning model were helpful.					
12. The amount of time allotted for each session was appropriate.					
13. The facilitator clearly explained the overview of the course, session activities, ground rules, and expectations.					
14. My small group had the appropriate mix of healthcare professionals.					
16. The mid-course formative feedback helped me to improve my participation, presentations, and attitude.					
17. The team discharge planning activity (case 1) helped me better understand the roles and responsibilities of the other disciplines.					
18. The course increased my knowledge of other healthcare professions.					
19. The course increased my ability to work effectively in an interprofessional healthcare team.					
20. The course increased my knowledge about the patient or family centered approach to healthcare delivery.					
21. The course increased my knowledge and understanding of issues involved in rural healthcare delivery.					
22. I am now more confident in discussing healthcare issues from an interprofessional perspective.					
23. I am now better able to reflect about my own participation in a healthcare team.					
24. I am now more comfortable at providing and receiving feedback.					
25. This course has provided relevant and useful information regarding sources of medical errors.					
26. The course improved my knowledge about team-building.					

IPHC Course	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
27. The course helped remove misconceptions and misinformation about the roles, responsibilities, and qualifications of other healthcare professions.					
28. I have improved my conflict resolution skills.					
29. I was satisfied with my overall IPHC experience.					

Appendix C  
Statement of Informed Consent

August, 2007

Dear Interprofessional Healthcare Student,

**I need your help.** You are invited to participate in a research study being done by Anne Haskins, a doctoral candidate in the department of Teaching and Learning at the University of North Dakota (UND). The results of this study will be used to complete the primary investigator's dissertation.

This study will help provide information about students' perceptions of stress and provide data that will be used to understand student involvement in an interprofessional healthcare course. **The study consists of completing a survey regarding your perception of your own stress and should take less than 10 minutes to complete. Completion of this survey will also provide the researcher with your permission to use your pre-test, post-test and end-of-the-course survey.**

The only foreseeable risk from this study is that you may experience mild emotional discomfort as you assess your perception of stress. The benefits which may result from this study include adding to the knowledge that we have regarding medical and health science students' perceptions of stress.

**Any information from this study and that can be identified with you will remain confidential and will be disclosed only with your permission.** All data and consent forms will be kept in separate locked cabinets for a minimum of 3 years after the completion of this study. Only the researcher, the professor of the researcher's course and people who audit research studies will have access to the data. After 3 years, the data will be destroyed.

Participation is voluntary and your decision whether or not to participate will not change your future relations with the UND School of Medicine and Health Sciences. If you decide to participate, you are free to leave the study at any time without penalty.

**Thank you for your time and consideration.** If you have any questions you can contact Anne Haskins at (701) 777-0229. If you have any other questions or concerns, please call the Research Development and Compliance office at (701) 777-4279.

Please feel free to print a copy of this consent form for further reference.

All of my questions have been answered and I am encouraged to ask any questions that I may have concerning this study in the future.

## REFERENCES

- Allen, D.D., Penn, M.A., & Nora, L.M. (2006). Interdisciplinary healthcare education: Fact or fiction?. *American Journal of Pharmaceutical Education*, 70(2), 1-2.
- Ansari, W.E. (2002a). Student nurse satisfaction levels in their courses: Part I – effects of demographic variables. *Nurse Education Today*, 22, 159-170.
- Ansari, W.E. (2002b). Student nurse satisfaction levels with their courses: Part II – effects of academic variables. *Nurse Education Today*, 22, 171-180.
- Ansari, W.E. (2004). Appraisal skills as a public health competency for evidence-based care: Students' satisfaction with their research education. *Journal of Public Health Management Practice*, 10(4), 354-365.
- Atwal, A. & Caldwell, K. (2005). Do all health and social care professionals interact equally: A study of interactions in the multidisciplinary teams in the United Kingdom. *Scandinavian Journal of Caring Science*, 19, 268-273.
- Barnes, D., Carpenter, J., & Dickinson, C. (2000). Interprofessional education for community mental health: Attitudes to community care and stereotypes. *Social Work Education*, 19(6), 565-583.
- Barnsteiner, J.H., Disch, J.M., Hall, L., Mayer, D., & Moore, S.M. (2007). Promoting interprofessional education. *Nursing Outlook*, 55(3), 144-150.

- Barr, H., Freeth, D., Hammick, M., Koppel, I., & Reeves, S. (2006). The evidence base and recommendations for interprofessional education in health and social care. *Journal of Interprofessional Care*, 20(1), 75-78.
- Barr, H., Koppel, I., Reeves, S., Hammick, M., & Freeth, D. (2005). *Effective interprofessional education – Argument, assumptions & evidence*. Oxford, UK: Blackwell Publishing.
- Baykal, U., Sokmen, S., Korkmaz, S., & Akgun, E. (2005). Determining student satisfaction in a nursing college. *Nurse Education Today*, 25, 255-262.
- Bergdahl, J., Larsson, A., Nilsson, L-G., Riklund Ahstrom, K., & Nyberg, L. (2005). Treatment of chronic stress in employees: Subjective, cognitive and neural correlates. *Scandinavian Journal of Psychology*, 46, 395-402.
- Billingsley, S.K., Collins, A.M., & Miller, M. (2007). Healthy student, healthy nurse – A stress management workshop. *Nurse Educator*, 32(2), 49-51.
- Booth, J., & Hewison, A. (2002). Role overlap between occupational therapists and physiotherapy during in-patient stroke rehabilitation: An exploratory study. *Journal of Interprofessional Care*, 16(1), 31-40.
- Burnard, P., Edwards, D., Bennett, K., Thaibah, H., Tothova, V., Baldacchino, D., et al. (2007). A comparative, longitudinal study of stress in student nurses in five countries: Albania, Brunei, the Czech Republic, Malta and Wales. *Nurse Education Today*, (xxx), 1-12.
- Carpenter, D. (2007). ‘Never’Land –Medicare declares “no pay for preventable errors.” Private insurers are sure to follow. *Hospital and Health Networks*, 81(11), 34-38.



- Carpenter, J., & Hewstone, M. (1996). Shared learning for doctors and social workers: Evaluation of a Programme. *British Journal of Social Work*, 26, 239-257.
- Cleak, H., & Williamson, D. (2006). Preparing health science students for interdisciplinary professional practice. *Journal of Allied Health*, 36(3), 141-149.
- Cole, M.B. (2005). *Group dynamics in occupational therapy – The theoretical basis and practice application of group intervention* (3<sup>rd</sup> ed.). Thorofare, NJ: Slack Incorporated.
- Cooper, H., Carlisle, C., Gibbs, T., & Watkins, C. (2001). Developing an evidence base for interdisciplinary learning: A systematic review. *Journal of Advanced Learning*, 35(2), 228-237.
- Cronk, B.C. (2006). *How to use SPSS – A step-by-step guide to analysis and interpretation* (4<sup>th</sup> ed.). Glendale, CA: Pyrczak Publishing.
- Dall’Alba, G. (1998). Medical practice as characterized by beginning medical students. *Advances in Health Sciences Education*, 3, 101-118.
- d’Apollonia, S., & Abrami, P.C. (1997). Navigating student ratings of instruction. *American Psychologist*, 52(11), 1198-1208.
- Dieleman, S.L., Farris, K.B., Feeny, D., Johnson, J.A., Tsuyuki, R.T., & Brilliant, S. (2004). Primary health care teams: Team members’ perceptions of the collaborative process. *Journal of Interprofessional Care*, 18(1), 75-78.
- Durrant, M.B., & Dorius, C.R. (2007). Study abroad survey instruments: A comparison of survey types and experiences. *Journal of Studies in International Education*, 11(1), 33-53.

- Dutta, A.P., Pyles, M.A., & Miederhoff, P.A. (2005). Stress in health professions students: Myth or reality? A review of existing literature. *Journal of the National Black Nurses Association, 16*(1), 63-68.
- Dyrbye, L.N., Thomas, M.R., Huntington, J.L., Lawson, K.L., Novotny, P.J., Sloan, J.A., & Shanafelt, T.D. (2006a). Personal life events and medical student burnout: A multicenter study. *Academic Medicine, 81*(4) 374-384.
- Dyrbye, L.N., Thomas, M.R., & Shanafelt, T.D. (2006b). Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Academic Medicine, 81*(4), 354-367.
- Everly, J.S., Poff, D.W., Lamport, N., Hamant, C., & Alvey, G. (1994). Perceived stressors and coping strategies of occupational therapy students. *The American Journal of Occupational Therapy, 48*(11), 1022-1028.
- Field, A. (2005). *Discovering statistics using SPSS* (2<sup>nd</sup> ed.). London, England: Sage Publications, Ltd.
- Fliege, H., Rose, M., Arck, P., Walter, O.B., Kocalevent, R.-D., Weber, C. & Flapp, B.F. (2005). The perceived stress questionnaire (PSQ) reconsidered: Validation and reference values from different clinical and health adult samples. *Psychosomatic Medicine, 67*, 78-77.
- Frazer, G.H., & Echtermach, J.L. (1991). Response of physical therapy students to stress indicators. *Journal of Physical Therapy Education, 5*(2), 72-77.

- Furåker, C., Hellström-Muhl, U., & Walldal, E. (2004). Quality of care in relation to a critical pathway from the staff's perspective. *Journal of Nursing Management, 12*, 309-316.
- Garman, A.N., Leach, D.C., & Spector, N. (2006). Worldviews in collision: Conflict and collaboration across professional lines. *Journal of Organizational Behavior, 27*, 829-849.
- Gawande, A.A., Zinner, M.J., Studdert, D.M., & Brennan, T.A. (2003). Analysis of errors reported by surgeons at three teaching hospitals. *Surgery, 133*(6), 614-621.
- Goelen, G., De Clercq, G., Huyghens, L., & Kerckhofs, E. (2006). Measuring the effect of interprofessional problem-based learning on the attitudes of undergraduate health care students. *Medical Education, 40*, 55-561.
- Greenwald, A.G. (1997). Validity concerns and usefulness of student ratings of instruction. *American Psychologist, 52*(11) 1182-1186.
- Guarino, C.M., Ko, C.Y., Baker, L.C., Klein, D.J., Quiter, E.S., & Escarce, J.J. (2006). Impact of instructional practices on student satisfaction with attendings' teaching in the inpatient component of internal medicine clerkships. *Journal of General Internal Medicine, 21*, 7-12.
- Hamstra, S.J., Woodrow, S.I., & Mangrulkar, R.S. (2008). Feeling pressure to stay late: Socialisation and professional identity formation in graduate medical education. *Medical Education, 42*, 7-9.
- Hanson, S. (2005). Teaching health care ethics: Why we should teach nursing and medical students together. *Nursing Ethics, 12*(2), 168-176.

- Hendry, G.D., Ryan, G. & Harris, J. (2003). Group problems in problem-based learning. *Medical Teacher, 25*(6) 609-616.
- Herbert, C.P., Bainbridge, L., Bickford, J., Baptiste, S., Brajtman, S., Dryden, T., Hall, P., Risdon, C., & Solomon, P. (2007). Factors that influence engagement in collaborative practice – How 8 health professionals became advocates. *Canadian Family Physician, 53*, 1319-1325.
- Hind, M., Norman, I., Cooper, S., Gill, E., Hilton, R., Judd, P., et al. (2003). Interprofessional perceptions of healthcare students. *Journal of Interprofessional Care, 17*(1), 21-34.
- Hooper, K., Thomas, Y., & Clarke, M. (2007). Health professional partnerships and their impact on Aboriginal health: An occupational therapist's and Aboriginal health worker's perspective. *Australian Journal of Rural Health, 15*, 46-51.
- Howard, G.S., & Dailey, P.R. (1979). Response-shift bias: A source of contamination of self-report measures. *Journal of Applied Psychology, 64*(2), 144-150.
- Insalaco, D., Ozkurt, E., & Santiago, D. (2006). Attitudes and knowledge of students in allied health professions toward their future professional team members. *Journal of Allied Health, 35*(3), 142-146.
- Institute of Medicine of the National Academies Committee on Quality Healthcare in America. (1999). To err is human: Building a safer health system [Electronic Version]. Washington, DC: National Academy Press.

- Institute of Medicine of the National Academies Committee on Quality Healthcare in America. (2001). *Crossing the quality chasm: A new health system for the 21<sup>st</sup> century* [Electronic Version]. Washington, DC: National Academy Press.
- Institute of Medicine of the National Academies. (2007). *The chasm in quality: Select indicators from recent reports*. Retrieved May, 7, 2007 from <http://www.iom.edu/CMS/8089/14980.aspx>.
- Interprofessional education: the evidence base influencing policy and policy makers. (2004). *Nurse Education Today*, 24, 157-159.
- Kaiser Family Foundation. (2008). Public opinion on medical errors. Retrieved January 19, 2008, from [http://www.kff.org/spotlight/mederrors/upload/Spotlight\\_Jan06\\_MedErrors.pdf](http://www.kff.org/spotlight/mederrors/upload/Spotlight_Jan06_MedErrors.pdf)
- Kaldjian, L.C., Jones, E.W., Wu, B.J., Forman-Hoffman, V.L., Levi, B.H., & Rosenthal, G.E. (2008). Reporting medical errors to improve patient safety – A survey of physicians in teaching hospitals. *Archives of Internal Medicine*, 168(1), 40-46.
- Kielhofner, G. (2006). *Research in occupational therapy – Methods of inquiry for enhancing practice*. Philadelphia, PA: F.A. Davis Company.
- Kripalani, S., LeFevre, F., Phillips, C.O., Williams, M.V., Basaviah, P., & Baker, D.W. (2007). Deficits in communication and information transfer between hospital-based and primary care physicians – Implications for patient safety and continuity of care. *Journal of the American Medical Association*, 297(8), 831-841.
- Leape, L.L., & Berwick, D.M. (2005). Five years after to err is human – What have we learned? *Journal of the American Medical Association*, 293(19), 2384-2390.

- Levenstein, S., Prantera, C., Varvo, V., Scribano, M.L., Berto, E., Luzi, C., & Andreoli, A. (1992). Development of the perceived stress questionnaire: A new tool for psychosomatic research. *Journal of Psychosomatic Research*, 37(1), 19-32.
- Lumague, M., Morgan, A., Mak, D., Hanna, M., Kwong, J., Cameron, C., Zener, D., & Sinclair, L. (2006). Interprofessional education: The student perspective. *Journal of Interprofessional Care*, 20(3), 246-253.
- MacArthur, J.D. and MacArthur, C.T. (2007). Perceived stress scale – 10 items. *Research Network on Socioeconomic Status and Health*. Retrieved February 7, 2007 from <http://www.macses.ucsf.edu/Research/Psychosocial/notebook/PSS10.html>.
- Mandy, A., Milton, C., & Mandy P. (2004). Professional stereotyping and interprofessional education. *Learning in Health and Social Care*, 3(3), 154-170.
- Mattick, K., & Bligh, J. (2006). Getting a measure of interprofessional learning. *Medical Education*, 40, 399-400.
- Mayo Clinic. (2007). Burnout common among medical students, Mayo Clinic study shows: medical school curriculum should address academic and personal stress factors. Retrieved January 16, 2007 from <http://www.mayoclinic.org/news2006-rst/3485.html>.
- McKeachie, W.J. (1997). Student ratings – The validity of use. *American Psychologist*, 52(11), 1218-1225.
- Meads, G., Ashcroft, J., Barr, H., Scott, R., & Wild, A. (2005). *Promoting partnership for health – The case for interprofessional collaboration in health and social care*. Oxford, UK: Blackwell Publishing Ltd.

- Mertler, C.A., & Vannatta, R.A. (2005). *Advanced and multivariate statistical methods – Practical application and interpretation* (3<sup>rd</sup> ed.). Glendale, CA: Pyrczak Publishing.
- Monk, E.M. (2004). Student mental health: The case studies. *Counselling Psychology Quarterly*, 17(4), 395-412.
- Monk, E.M., & Mahmood, Z. (1999). Student mental health: a pilot study. *Counselling Psychology Quarterly*, 12(2), 199-210.
- Niemi, P.M. & Vainiomäki, P.T. (2006). Medical students' distress – quality, continuity and gender differences during a six-year medical programme. *Medical Teacher*, 28(2), 136-141.
- Northcott, H., Vanderheyden, L., Northcott, J., Adair, C., McBrien-Morrison, C., Norton, P., & Cowell, J. (2007). Perceptions of preventable medical errors in Alberta, Canada. *International Journal for Quality in Health Care Advance Access*, 1-8.
- Nuhfer, E.B. (2003). Of what value are student evaluations?. Center for Teaching and Learning. Idaho State University. Retrieved July 3, 2007, from <http://www.isu.edu/ctl/facultydev/extras/student-evals.html>
- Oliffe, J., Roots, J., Goldstone, I., Granger, P., & Mathias, S. (2005). Integrating problem-based learning to interprofessional educational curricula using the Corbin and Strauss' illness trajectory model: Student evaluations and faculty experiences (Short Report). *Journal of Interprofessional Care*, 19(2), 172-173.
- O'Neill, B.J., & Wyness, A. (2005). Student voices on an interprofessional course. *Medical Teacher*, 27(5), 433-438.

- Parsell, G. & Bligh, J. (1999). The development of a questionnaire to assess the readiness of healthcare students for interprofessional learning (RIPLS). *Medical Education*, 33, 95-100.
- Peterson, L.A., Brennan, T.A., O'Neil, A.C., Cook, E.F., & Lee, T.H. (1994). Does housestaff discontinuity of care increase the risk for preventable adverse events? *Annals of Internal Medicine*, 121(11), 866-872.
- Pollard, K.C., Miers, M.E., & Gilchrist, M. (2004). Collaborative learning for collaborative working? Initial findings from a longitudinal study of health and social care students. *Health and Social Care in the Community*, 12(4), 346-358.
- Prymachuk, S., & Richards, D.A. (2007). Mental health nursing students differ from other nursing students: Some observations from a study on stress and coping. *International Journal of Mental Health Nursing*, 16, 390-402.
- Reader, T.W., Flin, R., & Cuthbertson, B.H. (2007). Communication skills and error in the intensive care unit. *Current Opinion in Critical Care*, 13, 732-736.
- Redwood, S.K. & Pollak, M.H. (2007). Student-led stress management program for first-year medical students. *Teaching and Learning in Medicine*, 19(1), 42-46.
- Regenbogen, S.E., Greenberg, C.C., Studdert, D.M., Lipsitz, S.R., Zinner, M.J., & Gawande, A.A. (2007). Patterns of technical error among surgical malpractice claims – An analysis of strategies to prevent injury to surgical patients. *Annals of Surgery*, 246(5), 705-711.



- Reid, R., Bruce, D., Allstaff, K. & McLernon, D. (2006). Validating the Readiness for Interprofessional Learning Scale (RIPLS) in a postgraduate context: Are healthcare professionals ready for IPL? *Medical Education*, 40, 415-422.
- Reuters Health Information. (2007, May 2). Healthcare errors affect one in 10 patients – *World Health Organization*. Retrieved May 7, 2007, from [http://www.nlm.nih.gov/medlineplus/print/news/fullstory\\_48686.html](http://www.nlm.nih.gov/medlineplus/print/news/fullstory_48686.html).
- Reynolds, F. (2003). Initial experiences of interprofessional problem-based learning: A comparison of male and female students' views. *Journal of Interprofessional Care*, 17(1), 35-44.
- Richards, P.S., & Inglehart, M.R. (2006). An interdisciplinary approach to case-based teaching: Does it create patient-centered and culturally sensitive providers?. *Journal of Dental Education*, 70(3), 284-291.
- Ridner, S.H. (2004). Psychological distress: concept analysis. *Journal of Advanced Nursing*, 45 (5), 536-545.
- Roberts, V., & Perryman, M.M. (2007). Creating a culture for health care quality and safety. *The Health Care Manager*, 26(2), 155-158.
- Rohs, F.R., Langone, C.A., & Coleman, R.K. (2001). Response shift bias: A problem in evaluating nutrition training using self-report measures. *Society for Nutrition Education*, 33, 165-170.

- Rothschild, J.M., Landrigan, C.P., Cronin, J.W., Kaushal, R., Lockley, S.W., Burdick, E., et al. (2005). The critical care safety study: The incidence and nature of adverse events and serious medical errors in intensive care. *Critical Care Medicine*, 33(8), 1694-1700.
- Sandars, J., Bax, N., Mayer, D., Wass, V., & Vickers, R. (2007). Educating undergraduate medical students about patient safety: Priority areas for curriculum development. *Medical Teacher*, 29, 60-61.
- Schmalenberg, C., Kramer, M., King, C.R., Krugman, M., Lund, C., Poduska, D., & Rapp, D. (2005). Excellence through evidence – Securing collegial/collaborative nurse-physician relationships, part I. *Journal of Nursing Administration*, 35(10), 450-458.
- Seaward, B. L. (2006). Managing stress – *Principles and strategies for health and well-being* (5<sup>th</sup> ed.). Boston, MA: Jones and Bartlett Publishers.
- Smith, T., Stone, N., Bull, R., Chesters, J., Waller, S., Playford, D., & Fuller, J. (2007). Australian Rural Health Education Network's position on interprofessional education and practice in health care. *Rural and Remote Health*, 7, 866-870.
- Stalmeijer, R.E., Gijsselaers, W.H., Wolfhagen, I.H.A.P., Harendza, S., & Scherpbier, A.J.J.A. (2007). How interdisciplinary teams can create multi-disciplinary education: The interplay between team processes and educational quality. *Medical Education*, 41(11), 1059-1066.

- Stith, J.S., Butterfield, W.H., Strube, M.J., Deusinger, S.S., & Gillespie, D.F. (1998). Personal, interpersonal, and organization influences on student satisfaction with clinical education. *Physical Therapy, 78*(6), 635-645.
- Street, K.N., Eaton, N., Clarke, B., Ellis, M., Young, P.M., Hunt, L., & Emond, A. (2007). Child disability case studies: An interprofessional learning opportunity for medical students and paediatric nursing students. *Medical Education, 41*, 771-780.
- The Joint Commission. (2007, May). Communicating during patient hand-overs. *Patient Safety Solutions, 1*(3). Retrieved May 7, 2007 from <http://www.jcipatientsafety.org/fpdf/presskit/PS-Solution3.pdf>
- The Joint Commission International Safety Center for Patient Safety. (2007). Patient safety solutions. Retrieved, May 7, 2007 from <http://www.jcipatientsafety.org/24725/>.
- Timmerman, A.A., Anteunis, L.J.C., & Meesters, C.M.G. (2003). Response-shift bias and parent- reported quality of life in children with otitis media. *Archives of Otolaryngology - Head and Neck Surgery, 129*, 987-991.
- Townsend, M., Lai, M.K., Lavery, L., Sutherland, C., and Wilton, K. (1999). *Mathematics anxiety and self-concept: Evaluating change using the "then-now" procedure*. Paper presented at the Joint Conference of the Australian Association for Research in Education and the New Zealand Association for Research in Education, Melbourne, Australia. Retrieved February 4, 2008 from <http://www.aare.edu.au/99pap/tow99213.htm>.

- Walrath, J.M., et al. (2007). Interdisciplinary medical, nursing, and administrator education in practice: The John Hopkins experience. *Academic Medicine*, 81(8), 744-748.
- Webster's Encyclopedic Unabridged dictionary of the English Language*. (1994). New York: Random House, Inc.
- Whitehead, C. (2007). The doctor dilemma in interprofessional education and care: How and why will physicians collaborate? *Medical Education*, 41, 1010-1016.
- World Health Organization. (2007a). Communication during patient hand-overs. *Patient Safety Solutions*, 1(3).
- World Health Organization. (2007b). Launch of nine Patient Safety Solutions. Retrieved May 7, 2007, from [http://www.who.int/patientsafety/events/07/02\\_05\\_2007/en/index.html](http://www.who.int/patientsafety/events/07/02_05_2007/en/index.html)
- World Health Organization. (1988). *Learning together to work together – Report of a WHO study group on multiprofessional education of health personnel: A team approach*. Geneva: World Health Organization. Retrieved February 8, 2008 from [http://whqlibdoc.who.int/trs/WHO\\_TRS\\_769.pdf](http://whqlibdoc.who.int/trs/WHO_TRS_769.pdf).
- Xyrichis, A. & Lowton, K. (2007). What fosters or prevents interprofessional teamworking in primary and community care? A literature review. *International Journal of Nursing Studies*, doi: 10.1016/j.ijurstu.2007.02.015.

- Zwarenstein, M., Reeves, S., Barr, H., Hammick, M., Koppel, I. & Atkins, J. (2000).  
Interprofessional education: Effects on professional practice and health care  
outcomes. *Cochrane Database of Systematic Reviews*, 3, Art. No.: CD00213. DOI:  
10.1002/14651858.CD002213.
- Zwarenstein, M., Reeves, S., Russell, A., Kenaszchuk, C., Gotlib Conn, L., Miller, K.-L.,  
Lingard, L., & Thorpe, K.E. (2007). Structuring communication relationships for  
interprofessional teamwork (SCRIPT): A cluster randomized controlled trial.  
*Trials*, 8(23).