A RANDOMIZED CONTROLLED TRIAL TO EVALUATE THE IMPACT OF STRUCTURED PATIENT INTERACTIONS ON PHARMACY STUDENTS' COUNSELING BELIEFS AND BEHAVIORS

by

Lisa M. Guirguis

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DEDICATION

I would like to dedicate this dissertation to my family.

Micheal, my husband, has provided unfailingly weekly support of my research.

Ella, my daughter, has showed me new ways to experience our world.

Your love provides meaning.

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ABSTRACT

Background: Community pharmacists need practical techniques to help patients with diabetes monitor their A1c, blood pressure, and cholesterol numbers (diabetes ABCs). The Diabetes Check is a brief structured interaction that was designed to facilitate patient-pharmacist conversations about monitoring their diabetes during routine prescription counseling. The Diabetes Check includes an interview guide and educational handout.

Research Questions: Did students who performed Diabetes Checks improve more in attitudes and behavior than students who performed a control activity? Secondary research questions evaluated predictors of predictors of students': (1) intentions to ask about diabetes ABCs in the future, (2) behavior in asking about the diabetes ABCs, and (3) routine behavior.

Methods: A randomized controlled trial was conducted in clerkship pharmacies in Wisconsin. In the intervention group, pharmacy students were asked to interview five to ten patients with diabetes using the Diabetes Check. In the control group, pharmacy students were asked to review profiles of two patients with diabetes and record a monitoring strategy, but were not required to interact with patients. Students were briefly trained in separate study groups. Students were asked to complete a pre- and post-clerkship survey which assessed students' self-efficacy, outcome expectancies, role beliefs, mattering, intentions to ask about diabetes ABCs, frequency of monitoring diabetes ABCs, and experiences with the Diabetes Check.

Results: Of 130 student, 119 (92%) completed surveys at both time points. Students who completed the Diabetes Check intervention had greater improvements in the frequency of monitoring patients' A1c values and in their Counseling Role Orientation and Negative Outcome Expectancies than students in the control group. Students' intentions to monitor diabetes were predicted by pharmacy site counseling, monitoring role beliefs (MRO), self-efficacy, and positive outcome expectancies. Mattering was a predictor of intentions in the control group. Students frequency of asking about A1c was predicted by pharmacy site counseling, self-efficacy, MRO, and completing the Diabetes Check assignment. Students' frequency of asking about blood pressure and cholesterol were predicted by pharmacy site counseling, self-efficacy and MRO. Routine behavior was defined as students in the intervention group who completed more than the required five Diabetes Checks and did not have any significant predictors.

Conclusions: The Diabetes Check improved pharmacy students' monitoring behavior, general counseling beliefs, and negative outcome expectancies. Monitoring intentions and behaviors were influenced by pharmacy site counseling, monitoring role beliefs, and self-efficacy. The role of mattering in predicting monitoring intentions requires further study. The Diabetes Check is a practical intervention to get patients and community pharmacists working together to monitor diabetes and potentially improve patient health.

CHAPTER 1: INTRODUCTION

Nearly 7% of the population, 20.8 million Americans, have diabetes, and one-third of those are not yet diagnosed (American Diabetes Association, 2006a). Diabetes costs an estimated $132 billion a year in the US (Centers for Disease Control and Prevention, 2005). Approximately 73% of adults with diabetes have high blood pressure and nearly all have one or more cholesterol abnormalities (American Diabetes Association, 2004b; Centers for Disease Control and Prevention, 2005). The risk of death from cardiovascular disease is two times greater for people with diabetes than for those without (Centers for Disease Control and Prevention, 2005). Improvements in glycemic control can reduce microvascular complications in both type 1 diabetes (The Diabetes Control and Complications Trial Research Group, 1993) and type 2 diabetes (UK Prospective Diabetes Study Group, 1998). As well, improvements in cholesterol and blood pressure have reduced cardiovascular complications in patients with diabetes (Pyorala et al., 1997; UK Prospective Diabetes Study Group, 1998).

For many years, the American Diabetes Association has been distributing clinical practice guidelines for the management of diabetes with the intent of improving practice (American Diabetes Association, 2006b). Yet, there is mounting evidence that a gap exists between care recommended in the guidelines and the actual care patients receive and control of diabetes that people achieve (Glasgow & Strycker, 2000; Hiss, Anderson, Hess, Stepien, & Davis, 1994; Saaddine et al., 2002). It has been reported that a wide range of patients with diabetes (14 to 87%) are above the recommended targets for blood glucose, blood pressure, and cholesterol, and have suboptimal use of recommended pharmacotherapy (Boccuzzi et al., 2001; Toth et al., 2003; Wetzler & Snyder, 2000).

Pharmacists have unique expertise in medication use and can have a role in filling these gaps. Pharmacies are highly accessible; people with diabetes see pharmacists more often than other health care professionals. Furthermore, people who frequent pharmacies are typically older than the general population and subsequently may have a higher risk of diabetes complications. Literature has shown that pharmacists can improve the quality of care and health outcomes of patients with diabetes (Beney, Bero, & Bond, 2000; Blenkinsopp & Hassey, 2005; Cranor & Christensen, 2003; Cranor, Bunting, & Christensen, 2003; Guirguis & Johnson, 2004). For example, certified community pharmacists, when provided with willing patients, time apart from dispensing, and legitimacy in a research study, were able to provide a consistently high level of care to patients with type 2 diabetes. This care included education, support in monitoring therapeutic goals, and drug therapy management (Guirguis, Johnson, Farris, Tsuyuki, & Toth, 2001; Schapansky, 2000). In addition, a diabetes outreach service that included a pharmacist, titled the DOVE Study, improved the quality of diabetes care for rural patients in Northern Alberta (Klinke et al., 2004; Maddigan et al., 2004; Majumdar et al., 2001; Majumdar et al., 2003; Supina et al., 2004; Toth et al., 2003).

Although research has established pharmacists' abilities to provide care in diabetes, such care may not be widespread in community practice, in no small part because pharmacists do not always counsel patients. Community pharmacists generally report a lack of time to spend with patients as the primary barrier to counseling patients and providing increased care (Jones, MacKinnon, & Tsuyuki, 2005; R. P. McDonough et al., 1998; Miller & Ortmeier, 1995; Raisch, 1993; Rossing, Hansen, & Krass, 2002; M. P. Tully, Seston, & Cantrill, 2000; van Mil, De Boer, & Tromp, 2001). In reviewing the literature on the efficacy of pharmacists'

care in diabetes, pharmacists in all but one intervention were given time specifically to carry out the intervention to a lack of time (Guirguis & Johnson, 2004).

Pharmacists have been encouraged to ask their patients about the diabetes monitoring their diabetes in their routine practice (Centers for Disease Control and Prevention, 2004; Guthrie, 2004). However, in a set of focus groups, pharmacists reported that they were uncomfortable talking about laboratory numbers with patients and asking patients to recall their diabetes ABCs routine practice (see Table 1 for definition of ABCs) (Guirguis, Schindel, & Uminski, 2003). These findings were corroborated in interviews with 12 US pharmacists. Few reported they monitored clinical outcomes such as blood glucose, blood pressure, and cholesterol; instead, pharmacists asked routine questions about whether patients had any concerns about their drug therapy (Guirguis & Chewning, 2004). In addition, if pharmacists are not comfortable talking about diabetes goals and numbers with patients, it is likely they are not modeling nor reinforcing these skills with students during clerkships.

Table 1 Definitions of Clinical Terms

Term	**Working Definition**
diabetes ABCs	The diabetes ABCs refers to A1c, blood pressure, and cholesterol.
A1c	The A1c is a measure of blood sugar levels that assesses the patient's control over the previous three months.
diabetes goals	Diabetes goals refer to the desired levels for clinical values. For example, 140/90 is a common blood pressure goal. In this dissertation, the relevant clinical values include the diabetes ABCs.
diabetes numbers	Diabetes numbers refer the most recent readings for clinical values. For example, 145/87 may be a patient's most recent blood pressure level. In this dissertation, the relevant clinical values include the diabetes ABCs.
student	A pharmacy student

Practical tools and techniques are needed for community pharmacists to help patients to monitor their diabetes numbers. The National Institute of Health National Diabetes Education Program and the American Diabetes Association have developed tools that could be useful for pharmacists. "Take Care of Your Heart. Manage Your Diabetes." is one such tool (National Diabetes Education Program, 2005). This tool or "flyer" educates people with diabetes about the link between diabetes and heart disease and encourages them to manage their blood glucose, blood pressure, and cholesterol levels. Each flyer has a record form to enable people with diabetes to keep track of their numbers and work with their health care providers to reach their target goals. The flyer is printer-ready and available on the World Wide Web (http://www.ndep.nih.gov/diabetes/pubs/TCH_AsAm_flyer_Eng.pdf) (Appendix 1) (National Diabetes Education Program, 2005). This tool was incorporated into a structured intervention, called the Diabetes Check, to help students and pharmacists learn to monitor patients' diabetes therapy within a limited time. The Diabetes Check is a process where students use an interview guide and educational tool to talk with patients with the diabetes ABCs. Talking to patients about diabetes goals is a crucial first step for pharmacists to help patients improve the use of diabetes medications in the community setting.

When we designed the Diabetes Check method to help pharmacists and students learn to monitor diabetes, several issues were considered. First, community pharmacists have little time to provide extra services. Pharmacists have struggled in implementing new programs and interventions (Grainger-Rousseau, Miralles, Hepler, Segal, & Ben-Joseph, 1997; R. P. McDonough et al., 1998; Raisch, 1993; Rossing et al., 2002; Simpson et al., 2001; M. P. Tully et al., 2000; van Mil et al., 2001; Weinberger et al., 2002). While the Diabetes Check

does not provide additional time to pharmacists, it was designed to take only one to two minutes.

Second, the Diabetes Check was designed to be integrated within the workflow of current pharmacy. A pharmacist could perform a Diabetes Check during routine pharmacy refill counseling and not need to have a separate work space or to renovate the pharmacy.

Third, the Diabetes Check was designed to be non-threatening. The Diabetes Check incrementally improves on existing pharmacy strengths. It does not require pharmacists to change other existing practices. The Diabetes Check includes a tool or interview guide. This provides an example of how to conduct the patient interview and a patient handout from the American Diabetes Association. Both help provide credibility as well as additional knowledge for both the patient and pharmacist. Pharmacists would not need to advertise the program or recruit new patients. Instead, they could just ask a question when they felt it was appropriate in the midst of an average encounter.

Fourth, building on Social Cognitive Theory constructs, the Diabetes Check was easy to model and practice so pharmacists could observe and gain confidence in this new technique. As few pharmacists are monitoring diabetes ABCs in the community pharmacy, a video of a Diabetes Check could be used to show the feasibility of this technique. The tool or interview guide also provides a model of the Diabetes Check's interaction. Pharmacists or students could then practice this technique in both controlled situations and in the "real world" pharmacy environment. By first observing, then practicing the technique, pharmacists would have a greater chance at successfully performing a Diabetes Check.

Finally, the Diabetes Check was designed to help pharmacists perform a new activity and experience success. Pilot work has shown that by using the Diabetes Check with ten

patients 99% of student pharmacists would have at least one positive experience and most would have six or more positive experiences. It was important for students to try the Diabetes Check more than once, so they would not be intimidated by one negative experience. By experiencing this success, students would be reinforced to continue the activities. It was hoped this would heighten their confidence monitoring diabetes and their belief that this is an importance activity for pharmacists. As much of community pharmacy practice is highly routine, this experience was intended to help to form new habits during a patient encounter.

By ensuring the Diabetes Check was brief, fit into existing workflow, appeared non-threatening, was easy to model and practice, and provided opportunities for success, we created a new way to learn how to monitor diabetes. Realizing both the need to provide opportunities for quality patient interaction and the limitations of current community practice, the Diabetes Check provides a structured experience in diabetes monitoring for pharmacists and students regardless of their skill, attitudes, and the level of care provided at the pharmacy site.

To help all students learn and apply the Diabetes Check technique in community practice, theory was used to design and evaluate an intervention to promote students' adoption of the Diabetes Check: social cognitive theory, role theory, and mattering (see Chapter 2). Each theory or concept was used to assess the impact of the Diabetes Check on students' attitudes about counseling. First, social cognitive theory suggests that students who have the skills and confidence to ask patients about their diabetes goals and expect positive outcomes would be more likely to perform a Diabetes Check in the future. Second, role theory suggests that students with more positive role beliefs toward monitoring after experience with the Diabetes Check would have greater intentions to monitor patients in the future. Finally,

mattering posits that students who feel they make a difference to patients may be more likely to conduct a Diabetes Check.

There are two examples of others who have used tools to improve routine practice Berringer et al. (1999) had patients complete a survey or "tool" about diabetes symptoms while prescriptions were being filled. Similarly, a diabetes management program was implemented at Marshland Pharmacy in rural Wisconsin (Richter, Williams, Sutter, & Sutter, 2005). At new and refill prescriptions, the computer software prompted pharmacists to educate patients monthly on a diabetes topic such as A1c monitoring and to provide a patient handout. Both programs encouraged integration of regular monitoring into the dispensing process; however both programs were small and only focused on a small number of motivated pharmacists. Other pharmacists could develop other tools or identify existing tools to replicate this study in other practice scenarios (Abbate, 2003; R. K. Campbell & Bennett, 2001; Guthrie, 2004). Furthermore, both programs were not rigorously evaluated and further evaluation of the impact of tools in community practice is required.

The overarching goal for this dissertation study was to develop and evaluate methods that will promote students talking with patients about their diabetes to help patients reach their drug therapy goals. Specifically, this research evaluates how a structured patient interaction, the Diabetes Check, altered students' counseling beliefs and behaviors. We hypothesized that students who experience the Diabetes Check will have greater improvements in their monitoring behavior and their sense of self-efficacy, outcome expectations, role beliefs, and mattering. These questions helped to investigate the real world effectiveness of the Diabetes Check in shaping interactions between students and patients.

CHAPTER 2: LITERATURE REVIEW

This chapter is divided into three main sections that form the foundation for this randomized controlled trial to evaluate the impact of structured patient interactions (i.e., Diabetes Check) on pharmacy students' beliefs about counseling and counseling behavior. The first section reviews both diabetes management and the patient's role in the management of diabetes. The second section presents literature relating to the community pharmacist's role in diabetes care, including research on the pharmacist's role, routine interactions between patients with diabetes and pharmacists, patient and pharmacist perceptions, and students' training and experience in community pharmacy. Finally, the last section presents literature supporting the theoretical framework used to design and evaluate this dissertation research. This includes elements of Social Cognitive Theory (i.e., self-efficacy, outcome expectancies, observational learning, and mastery experiences), Role Theory, and Mattering.

Diabetes

Diabetes is a worldwide epidemic (World Health Organization, 2006a). Diabetes affects 171 million people worldwide and this is expected to double by 2030 (World Health Organization). Diabetes was traditionally understood as a "sugar" disease and is diagnosed by detecting an excess of glucose in the blood stream. In type 1 diabetes, the pancreas no longer produces insulin, the hormone required for the body to store glucose. Type 1 diabetes generally appears in people under the age of 30 and accounts for 10% of the prevalence of diabetes. In type 2 diabetes, the body has a reduced capacity to uptake insulin into storage, leading to high insulin and glucose levels in the blood. This can lead to a diminished

pancreatic capacity to produce insulin. Type 2 diabetes accounts for 90% of the prevalence of diabetes. Although type 2 diabetes is more common in people over 45 years of age, it is appearing in children as young as 10 years of age.

Diabetes is a chronic disease. The US health care system was originally designed to respond to acute health care needs, such as treating infection and injuries. The patient was expected to follow the physician's orders to return to health. In the past few decades, the focus of the health care system has changed toward dealing with chronic diseases. Chronic diseases are "the major cause of death and disability worldwide" (World Health Organization. 2006b). Unfortunately, common clinical features of chronic diseases include reduced quality of life, fatigue, and depression (Marks, Allegrante, & Lorig, 2005). The management of chronic disease is quite different from that of acute health care needs. Chronic disease is not cured, patients must engage in a variety of behaviors to manage the disease, and patients and health care providers must partner to manage the disease (Lorig et al., 2001).

Diabetes Management

Diabetes is a complex disease that puts patients at greater risk for cardiovascular disease. Like hypertension and dyslipidemia, diabetes is considered an independent risk factor for cardiovascular disease (American, 2006). While two-thirds of diabetes mortality is due to cardiovascular disease, 60% of people with diabetes do not consider themselves at risk for high blood pressure or LDL cholesterol and 68% of people with diabetes do not consider cardiovascular disease a serious complication (American Diabetes Association, 2004b). A multinational study of 417 patients with diabetes found that 39% had silent myocardial

ischemia; 14% of those patients developed a major cardiovascular event within 3 to 89 months of follow-up (American Diabetes Association, 2004a).

The American Diabetes Association (2006b) suggests emphasis should be placed on reducing cardiovascular risk factors such as hypertension, dyslipidemia, obesity, and smoking to prevent and manage cardiovascular disease. Still, despite some improvements in the management of diabetes care in the last decade, "2 in 5 persons with diabetes still have poor LDL cholesterol control, 1 in 3 persons still have poor blood pressure control, and 1 in 5 still has poor glycemic control" (Saaddine J. et al., 2006). Additional research has found that less than 10% of patients were within target levels for A1c, blood pressure, and LDL cholesterol (Saydah, Fradkin, & Cowie, 2004; Toth et al., 2003).

There are multiple reasons that patients are not reaching the goals outlined by the ADA. Patients may not be adequately monitored for their disease. In a Canadian study, only half of patients received appropriate A1c testing to monitor their diabetes (Woodward, van Walraven, & Hux J., 2006). Kennedy, Magboo, Ruby, and Twersky (2002) found an underutilization of recommended medication for secondary cardiac prevention in elderly outpatients with diabetes. Sometimes clinical inertia or failure of providers to change care when presented with evidence of need may contribute to suboptimal diabetes care (A. G. Kennedy & MacLean, 2004; Perlin & Pogach, 2006; Shah, Hux, Laupacis, Zinman, & van Walraven, 2005). In a recent study, between 30 to 50% of patients did not have modifications in therapy after lab results demonstrated poor control of blood pressure, cholesterol, or A1c (Rodondi et al., 2006). It may also be difficult for patients to reach current clinical targets. Approximately 25% of diabetes and cardiovascular disease patients will require more than two lipid-lowering drugs at maximal doses to attain an LDL goal of <70 mg/dL (A. G.

Kennedy, MacLean, Littenberg, Ades, & Pinckney, 2005). Overall, complex regimes with multiple medications are needed to minimize cardiovascular risk (Stamm, Kelley, & Donaldson, 2005).

The patients' role is particularly important in management of chronic diseases such as diabetes (PCOPR, 2001). Patients may have preferences about the level of risk, the number of medications, and the lifestyle changes they consider acceptable. The sharing of expertise and power between patients and providers has been described by the term concordance. "The concept of concordance productively reflects the partnership and mutual respect needed for ongoing medication regimen selection, calibration and management for a long-term condition (PCOPR, 2001)." Ideally, management of chronic diseases should place the patients at the center of the management strategy (Clark, 2003).

Patient Management of Diabetes

Diabetes management involves substantial lifestyle modification. People with diabetes are expected to exercise, eat in a healthy manner, take medications, monitor their blood sugar, check their feet, and inject insulin. There are many terms used to describe patients' management of their own disease, including self-care, self-management, self-management support, expert patient, and self-regulation. Each term will be discussed briefly. More common terms from pharmacy literature such as compliance or adherence to therapy do not apply, as patients make the decisions on how to manage diabetes day-to-day, often without the input of health care providers (Glasgow & Anderson, 1999).

The terms self-care and self-management overlap, as both refer to the activities needed to treat chronic disease. The expert patient movement in the United Kingdom describes how

patients have expertise in their experience of the disease, values, life circumstances, and attitudes, while health care professionals have expertise in diagnosis, disease progression, and treatment options (Fox, 2005; Mayor, 2006; Wilson & Mayor, 2006). The term self-regulation "conceptualizes the patient as an 'active problem solver' whose behavior in response to an illness (e.g. taking or not taking prescribed medications) reflects an attempt to manage the illness in a way which makes common sense to them" (Gard, 2000). "Self-regulation will refer to ways in which a patient derives the management strategies he or she uses" (Clark, 2003). Individuals with diabetes engage in self-regulatory activities such as monitoring blood sugars, checking blood pressure, and tracking cholesterol levels. Interventions based on self-regulation improve patients' outcomes (Clark, 2003; Polonsky, Zee, Yee, Crosson, & Jackson, 2005).

Of these terms, self-regulation is the best expression to describe the patient intervention proposed in the Diabetes Check. First, the Diabetes Check uses the involvement of pharmacists and health care professionals, and therefore does not fit the spirit of self-care or the expert patient, where patient-directed care is the focus. Second, the Diabetes Check does not provide information that will help patients learn self-management activities such as how to measure blood pressure at home or fit a complex diabetes medication regime into the patients' lifestyles. Instead, it provides information on how to monitor diabetes to evaluate the requirement for self-management or medication changes. The Diabetes Check has the potential to increase patients' understanding and management of diabetes through increased awareness and self-monitoring of diabetes goals and numbers. The Diabetes Check could provide patients with sufficient information to determine the need to make changes in their

management strategies. Thus, these aspects of monitoring disease are best captured by the theory of self-regulation.

The theory of self-regulation can help to discern the pharmacist's role in helping patients monitor chronic disease. Community pharmacists can briefly assess patients' goals in addition to suggesting that patients monitor their own clinical targets such as the diabetes ABCs. This has health benefits. For example, home monitoring of blood pressure has been shown to result in lower blood pressure levels (Cappuccio, Kerry, Forbes, & Donald, 2004). By explicitly using the theory of self-regulation, pharmacists can recognize and work with patients who are monitoring and modifying their own medication regimes. In a sample of patients with hypertension, about a third of patients were self-regulators who monitored their condition and adjusted their own medications (Wallenius, Vainio, Korhonen, Hartzema, & Enlund, 1995). Some may have benefited from partnerships with respectful health care providers. The theory of self-regulation may remind pharmacists that patients are the ultimate decision makers about medication use. Pharmacists can then use their specialized training to assist these patients in monitoring their disease and managing their medications.

Community Pharmacists' Role in Diabetes Care

Research on Pharmacists' Role in Diabetes Care

Pharmacy practice research has been examining the role of the pharmacist for over four decades. A recent review of published studies evaluating pharmaceutical care services found improvement in medication use and surrogate endpoints such as blood pressure and blood glucose, but changes in mortality and morbidity are less certain (Roughead, Semple, &

Vitry, 2005). Specifically, there is a growing body of literature examining the role of pharmacists in caring for patients with diabetes.

Three review articles have examined the research on pharmacists' role in diabetes care (Blenkinsopp & Hassey, 2005; Guirguis et al., 2003; Nichols English, Provost, Koompalum, Chen, & Athar, 2002). These covered overlapping time periods and had slightly different inclusion criteria. Guirguis and Johnson (2003) used the widest criteria by focusing on diabetes intervention by pharmacists in all settings, including studies up to 2001 (17 studies). Nichols-English (2002) examined 10 studies in community or ambulatory pharmacies from 1970 to 2001. Blenkinsopp and Hassey (2005) reviewed seven studies in community pharmacies from 1990 to 2003. Pharmacists' activities were briefly described and generally consisted of patient education, drug therapy monitoring, and partnering with other health care providers (Blenkinsopp & Hassey, 2005; Guirguis et al., 2003). In most research studies, pharmacists met with patients outside regular dispensing activities, limiting the applicability of these findings to all pharmacy practice models (Guirguis et al., 2003). All reviews found a mixed impact of community pharmacists' on patients' outcomes. Overall, recent studies found improvement in glycemic control after pharmacists' intervention, but were less likely to include a control group to establish causation. Studies using a randomized controlled design were less likely to show improvement in glycemic control after pharmacists' interventions (Guirguis et al., 2003). Multiple studies demonstrated potential financial savings (Nichols English et al., 2002). Blenkinsopp and Hassey (2005) found six studies that presented positive patient outcomes, but only two were statistically significant. Due to these mixed findings, all

three review articles stressed the need for additional rigorous practice research on the role of pharmacists in caring for patients with diabetes.

Seven studies examining the community pharmacists' role in diabetes care have been published between 2004 to March 2006 (Table 2) (Armour, Taylor, Hourihan, Smith, & Krass, 2004; Garrett & Bluml, 2005; Haggerty, Cerulli, Zeolla, Cottrell, & Faragon, 2005; I. Krass, Taylor, McInman, & Armour, 2006; I. Krass, Taylor, Smith, & Armour, 2005; Sarkadi & Rosenqvist, 2004; Simpson, Johnson, Biggs, Tsuyuki, & SCRIP Investigators, 2004; S. J. Taylor et al., 2005; Wermeille, Bennie, Brown, & McKnight, 2004). These studies had many similarities in the delivery of care. All implemented diabetes programs in multiple pharmacy sites and provided additional consultation time for pharmacists. One study provided care to groups of patients where pharmacists acted as facilitators and did not provide patient education or care (Sarkadi & Rosenqvist, 2004). The other interventions involved a community pharmacist reviewing an aspect of a patient's diabetes in a one-on-one format, assessing patient information, and identifying real or potential issues. In all studies, documentation and care protocols were partly developed by the research team. Drug problems were resolved by contacting the physician and/or educating the patient.

Table 2 The Impact of Community Pharmacists in Diabetes (2004 to March 2006)

Authors	Study Design	Structures	Process	Outcome Types	Findings
Simpson, Johnson, Biggs, Tsuyuki, & SCRIP Team, 2004 Canada	• RCT • 294 pts with type 2 DM (675 total) recruited from pharmacy • 4 month duration	• In 54 pharmacies, RPh were trained & provided with point of care cholesterol testing supplies & care protocols.	• Intervention (156 pts): RPh led structured interviews, measured serum cholesterol & BP, & provided education. • Control (134 pts): general advice. • All pts had 4 follow-ups.	Clinical	• Intervention pts had improvements in cholesterol management. • Cholesterol management was a composite outcome of performing a fasting lipid profile or adding or increasing the dose of a cholesterol-lowering drug.
Wermeille, Bennie, Brown, & McKnight, 2004 UK	• Pre/post single group • 62 pts type 2 DM (59 pts analyzed) recruited from pharmacy • 6 to 7 month duration	• Four pharmacies, supported by research & academic RPh, met with physicians. Care protocols were provided. • Pt interviews held in physicians' clinics.	• RPh performed structured interviews & reviewed pharmacy /clinic charts. • RPh identified PC issues with other RPh support & contact physicians.	Clinical Humanistic	• Significant improvements in A1c, BP, lipid profile. • Medicine compliance was high & did not improve. • Pt medicine knowledge improved; 88% of 178 PC issues were resolved.
Sarkadi & Rosenqvist, 2004 Sweden	• RCT • 77 pts type 2 DM, self-referred from ads. • 24 month duration	• RPh trained in diabetes care/blood glucose awareness encouraged pts to monitor DM & referred pts for medical care.	• RPh led monthly group discussion of participants' experiences of glucose regulation. • RPh did not provide education /care.	Clinical	• Intervention significantly decreased A1c by 0.4% at 24 months. • The intervention group had significantly lower A1c than the control group at 24 months.
Armour, Taylor, Hourihan, Smith, & Krass, 2004; Krass, Taylor, Smith, & Armour, 2005; Taylor et al., 2005 Australia	• Parallel interventio n / control groups • 188 pts type 2 DM (99 pts analyzed) recruited from pharmacy • 9 month duration	• Nine intervention RPh were trained & supported with research staff visits. Care protocols were provided. • Twenty control RPh were only trained in data collection.	• Intervention (53 pts): initial visit with medicine review, goal setting, & blood glucose monitoring; 6 follow-ups. • Control (46 pts): usual care.	Clinical Humanistic Economic	• Significant increases in well-being & decreases non-adherence in intervention group. • Significant improvement in A1c for intervention group cost $383 (Australian) per pt. • Difference in A1c not statistically different between study groups.

Authors	Study Design	Structures	Process	Outcome Types	Findings
Haggerty, Cerulli, Zeolla, Cottrell, & Faragon, 2005 USA	• Pre/post single group • 322 pts type 2 DM (79 pts analyzed) recruited from pharmacy • Single interventio n	• Eight advanced practice sites for students. Care protocols were provided.	• students identified pts, screened for aspirin use, & contacted physician to recommend aspirin therapy if necessary.	Clinical	• Of the 322 pts screened, 79 required aspirin & physician was contacted. Sixty-five (82%) of physicians responded & aspirin was initiated in 53 pts (67%).
Garrett & Bluml, 2005 USA	• Pre/post single group • 256 pts type 2 DM, recruited by payer • 12 month duration	• Eighty RPh with Diabetes Certificate Program training were reimbursed. Care protocols were provided.	• RPh scheduled consultations, clinical goal setting, monitoring, & collaborative drug therapy management with physicians & referrals to diabetes educators.	Clinical Humanistic Economic	• Significant improvements in A1c, BP, & lipid profile. • Increases in pt satisfaction, goal setting, influenza vaccination, & eye/foot examination. • Mean health care costs were $918 lower per pt than projections.
Krass, Taylor, McInman, & Armour, 2006 Australia	• Parallel interventio n / control groups • 118 pts type 2 DM, recruited from clinic • 6 month duration	• Twenty intervention RPh were trained & paid $120+ per pt. Care protocols were provided.	• Intervention (39): RPh provided goal setting & blood glucose monitoring; 4 follow-ups. • Control (79 pts): RPh provided usual care.	Clinical Humanistic	• In the intervention group, A1c & systolic BP significantly improved with a trend for between-group differences. • Intervention group had increase in positive attitudes toward diabetes; no significant differences between groups.

BP=Blood Pressure.
DM=Diabetes.
A1c=Hemoglobin A1.
PC=Pharmaceutical care.
RPh=Pharmacist.
pts=patients
RC=Randomized Controlled Trial

There were also differences in the study designs and findings. Three studies had a single group, and four studies used control groups (Table 2). The impact of pharmacists' interventions on the clinical outcomes of diabetes patients remained unclear. Pharmacists improved medication management in two studies, although the impact on patient outcomes was not established (Haggerty et al., 2005; Simpson et al., 2004). Four studies demonstrated improvement in patients' clinical and humanistic outcomes when they were managed by trained pharmacists, but improvements were not different from control patients who received usual pharmacy care (Armour et al., 2004; I. Krass et al., 2006; I. Krass et al., 2005; S. J. Taylor et al., 2005) or a control group was not used (Garrett & Bluml, 2005; Wermeille et al., 2004). One randomized controlled trial that used pharmacists as group facilitators found improvements in patients' clinical outcomes over a 24-month period. Recent literature used larger samples with multiple pharmacy sites and robust designs. Consistent with prior reviews, the evidence for the impact of pharmacists' on clinical outcomes had a positive trend, but was inconsistent.

As the majority of pharmacists spend the largest portion of their time dispensing, pharmacists may not be able to translate these findings to their work sites (Schommer, Pedersen, Doucette, Gaither, & Mott, 2002). Unfortunately, structured diabetes programs are not readily apparent in the landscape of community pharmacy practice. Two surveys found a few pharmacies in California (Law, Okamoto, & Chang, 2005) and North Carolina (McDermott & Christensen, 2002) with disease management/pharmaceutical care services. Even more promising is the Diabetes Ten City Challenge in which employers in ten cities established a health benefit program which uses pharmacists to help manage diabetes (APhA Foundation, 2006). These pioneers are moving the practice of community pharmacy forward.

Pharmacists could consider undertaking brief diabetes interventions that are designed to complement the dispensing workflow. Two of the seven studies (Table 2) integrated parts of the pharmacists' interventions into the dispensing workflow (Haggerty et al., 2005; Simpson et al., 2004). To understand how diabetes care may be integrated with dispensing workflow, the next section will review the care pharmacists currently provide during routine interactions with patients.

Routine Interactions between Patients with Diabetes and Pharmacists

Routine interactions refer to interactions at the time of dispensing, where the vast majority of pharmacists spend the greater part of their time. These interactions may also be referred to as pharmacists' counseling or consultations. Preparing and dispensing medications is an integral part of pharmacy practice (Bonfiglio, Lewis, Nesbit, & Krinsky, 1997; Galt & Narducci, 1997). Patients encounter pharmacists most often through dispensing (M. E. Brown & Bellaby, 2002). Building services into dispensing allows pharmacists to build on existing strengths. These routine interactions provide a wealth of opportunities for pharmacists to interact with patients. At new prescription fills, pharmacists have the potential to assess patients' understanding of their disease, provide information to patients about new medications, and help patients prepare strategies to tailor medications to their lifestyles (Chandra, Malcolm, & Fetters, 2003). Pharmacists have been encouraged to use interactive techniques to assess patients and involve patients in decision making (Anonymous, 2002; Berger, 2002b; Tindall, Beardsley, & Kimberlin, 2002). Refills provide another opportunity for pharmacists to routinely interact with patients about their diabetes medications. Pharmacists have the opportunity to assess patients' experience with medications, determine

if medications are working, explore potential side effects, and answers patients' questions. In addition, pharmacists can use the patients' experience to help patients monitor disease, negotiate goals, and make informed decisions about medication use (Janke & Tobin, 1997b).

In the care of diabetes patients, Campbell (2001; 2002) has identified five primary roles for pharmacists: (1) identification of people with diabetes, (2) assessing patient needs, (3) education, (4) monitoring, and (5) patient referral to other health care professionals for eye, foot, dietary, and other care. Pharmacists can incorporate one or more of these roles into routine patient interactions. For example, community pharmacists have integrated education (Richter et al., 2005) and monitoring for patients with diabetes (Berringer et al., 1999; Janke & Tobin, 1997a) into the dispensing workflow. These services are different from the more common pharmacy program, where a screening or education services are set up outside routine dispensing (Cheung, 2002; Grace, Olney, & Morse, 2003).

Limited research has described interactions between patients with diabetes and pharmacists at routine encounters at community pharmacies. A developmental survey with 12 US pharmacists found that few pharmacists monitored clinical outcomes such as blood glucose, blood pressure, and cholesterol; instead, pharmacists asked routine questions such as whether patients had any concerns about their drug therapy (Guirguis & Chewning, 2004). Abduelkarem et al. (2003) found that while pharmacists often encountered diabetes patients, the majority of pharmacists did not advise patients about what to expect from their medications, promote lifestyle, or provide information about diabetes. This research suggests pharmacists are not fully implementing Campbell's five roles of care for patients with diabetes, but insufficient research is available to draw definite conclusions.

Research in general community pharmacy practice has found a wide variety of patient counseling rates (22 to 74%) (Assa-Eley & Kimberlin, 2005; Carroll & Gagnon, 1983; Eng et al., 1991; Lamsam & Kropff, 1998; Sleath, 1995; Svarstad et al., 2004; M. P. Tully, Hassell, & Noyce, 1997; M. P. Tully & Seston, 2000). Counseling extent and rate vary based on who transfers the prescription to the patient, patients' attitudes, pharmacists' attitudes, pharmacists' expectations of patient outcomes and adherence, governing regulations, busyness of pharmacy, perceived importance of information, and age of the pharmacist (Paluck, Green, Frankish, Fielding, & Haverkamp, 2003; Schommer & Wiederholt, 1995; Svarstad et al., 2004).

Much current pharmacy practice is focused on providing a product (Schommer et al., 2002). Researchers have found pharmacists' counseling consisted of providing only two items of information, typically information listed on the prescription bottle (i.e., name of the drug and the directions for use) (Svarstad et al., 2004). Others have described pharmacists providing more complete information, though pharmacists tend to spend little time on assessing patients, asking questions or educating patients on disease prevention or healthy living (Eng et al., 1991; Hargie, Morrow, & Woodman, 2000; Lamsam & Kropff, 1998; O'Loughlin, Masson, Dery, & Fagnan, 1999; Sleath, 1995; M. P. Tully et al., 1997). The information pharmacists provide focuses on side effects, with less focus on medication benefits (Deschamps, Dyck, & Taylor, 2003). Pilnick has even suggested the term "instruction" may be more suitable to describe these patient pharmacist interactions, given the low level of patient involvement (Pilnick, 1999). Overall, pharmacists' routine interactions with patients are brief and product-focused.

Patients' and Pharmacists' Perceptions

Patient and pharmacist interactions are driven by perceptions, including expectations, satisfaction, attitudes, and role beliefs. This section reviews the literature on patients' and pharmacists' perceptions of patient pharmacist interactions.

The available research suggests that patients with diabetes have low expectations for their interactions with pharmacists. Patients with diabetes expect pharmacists to counsel them about their diabetes medications, but do not expect pharmacists to assess or monitor their medication use (C. M. Brown & Green, 2000). Similarly, in a recent nationwide survey, people with diabetes only expected pharmacists to counsel them about medication side effects, ways to reduce side effects, and ways to reduce medication cost (Hermansen-Kobulnicky & Worley, 2005). Patients' expectations may be higher after receiving services from pharmacists who specialize in diabetes (Guirguis et al., 2001). Patients with diabetes were satisfied with the technical aspects of pharmacist care (Abduelkarem, Sackville, Morgan, & Hildreth, 2003), but were also satisfied with a higher level of care after experiencing it (Garrett & Martin, 2003; Guirguis et al., 2001).

These satisfaction findings are similar to those found in the general pharmacy literature. Patients are very satisfied when community pharmacists' provide additional services (Briesacher & Corey, 1997; Pronk, Blom, Jonkers, & Bakker, 2003; Ried, Wang, Young, & Awiphan, 1999; Tice & Phillips, 2002). Patients tend to be most satisfied with the technical aspects of medication preparation, location of the pharmacy, and the "friendliness" of pharmacists (Briesacher & Corey, 1997; Larson, Rovers, & MacKeigan, 2002; Ried et al., 1999). Patients are less likely to be satisfied with elements of patient care such as managing medications (Larson et al., 2002).

Despite this overall low level of care provided in practice, pharmacists have indicated positive attitudes toward their role in diabetes care (Schapansky & Johnson, 2000; Younis, Campbell, & Slack, 2001) and interest in providing increased diabetes care (Blenkinsopp & Hassey, 2005; Hartnell, MacKinnon, Sketris, & Gass, 2005; Schapansky & Johnson, 2000; Younis et al., 2001) and health prevention in general (O'Loughlin et al., 1999). Interestingly, pharmacists may also overestimate the level of information they provide to patients with diabetes (Blenkinsopp & Hassey, 2005).

No literature was identified that assessed the concurrent perceptions of patients with diabetes and their pharmacists. The general literature on pharmacy counseling has shown pharmacists provide more counseling when patient and pharmacist beliefs about counseling roles are congruent (Schommer, 1994). Unfortunately, the pharmacist and patient may misunderstand each other's beliefs about the benefits of pharmacists' care (Assa-Eley & Kimberlin, 2005) and disagree on each other's role in the patient-pharmacist relationship (Worley et al., 2005). Pharmacists tend to overestimate patients beliefs about benefits, while patients tend to underestimate pharmacists' beliefs (Assa-Eley & Kimberlin, 2005).

Patient and pharmacist perceptions shape their interactions. Patients expect pharmacists to efficiently deliver medications and are satisfied with the status quo in pharmacy. If pharmacists were able to start providing more care to patients with diabetes, these patients might start to expect or even demand more from pharmacists and more clearly understand the benefits of pharmacists' care. However, even though pharmacists have positive attitudes toward care, they provide very limited care during routine interactions. Pharmacists will either need to find ways to overcome the barriers to providing care in the community pharmacy (e.g., limited time, corporate policies, and lack of reimbursement), or find new

ways of delivering diabetes care within the context of a busy community pharmacy. To see how these barriers are currently addressed, students' training and experience in community pharmacies will be discussed.

Students' Training and Experience in Community Pharmacy

Students are frequently called on to carry the pharmacy profession forward and provide patient-centered care (AACP, 2000). More specifically, students are taught the importance of monitoring diabetes goals and numbers in their coursework. While most students understand the importance of monitoring, many have no experience with this behavior.

Innovative ways to teach students how to monitor diabetes are demonstrated by three examples: (1) arranging for students to make home visits with patients with diabetes (Stroup, Kane, Busch, Bakst, & Hamilton, 2003), (2) offering an interactive course that includes interviews with patients (Johnson, Chesnut, & Tice, 2003), and (3) having students attend camp to help children manage their diabetes (Condren, 2003). While these innovative educational programs offer students the opportunities to ask real patients about diabetes goals and numbers, two things are lacking in these programs. The first is transferability to the community practice setting. The skills developed in these studies may not be the same skills needed to monitor patients with diabetes in a busy community pharmacy. Second, these programs are electives, and are therefore focused on sub-groups of students who are the most motivated or interested. Because of the high prevalence of diabetes, most students will require skills to help patients monitor their diabetes goal attainment and drug therapy.

Students' training and experiences in community pharmacies shape their understanding of "real world" patient care. The Accreditation Council for Pharmacy Education (1997) provides standards that require students to have pharmacy practice experiences early in the curriculum and advanced pharmacy practice experiences focusing on patient care in their final year. The American Association of Colleges of Pharmacy has outlined educational outcomes which include the provision of pharmaceutical care, system management, and public health and were designed to "tell the story' to external audiences about the role of the pharmacist" (CAPE Advisory Panel on Educational Outcomes, 2004). Together, these documents provide standards that guide the education of future pharmacists. The challenge is in implementing these standards in a busy community pharmacy (Cerulli , 2006).

Zarembski, Boyer, and Vlassess (2005) surveyed 227 community pharmacy preceptors representing 44 schools of pharmacy and found that students' primary activities involved dispensing medications, not patient care activities. Still, approximately one-third of pharmacists provided students with some experience in diabetes screening, education, or a formal disease management program. It appears that while schools of pharmacy have identified pharmacy sites that provide advanced care, not all students in the US have access to these experiences.

Students also gain valuable experience at pharmacy worksites independent of those affiliated with their formal education. One survey of eight Midwestern schools of pharmacy found students spent most of their time (70%) in distribution, dispensing, or compounding activities during their pharmacy employment (Siracuse, Schondelmeyer, Hadsall, & Schommer, 2004). Only 10% of their time was spent in direct patient care. Interestingly,

despite the lack of experience interacting with patients, over three-quarters of students agreed this work experience was positive. Students may no longer consider patient care feasible in the community pharmacy setting, and may be learning to accept the importance of drug distribution over that of patient care.

While schools of pharmacy are striving to provide students with the best possible community pharmacy experience, the training students receive at school is not routinely transferred to community practice. If students reach environments where they are supported and find role models, they have the potential to thrive and provide exceptional care. Unfortunately, students who are placed in high-volume, fast-paced community pharmacies may struggle to transfer many of their skills from the classroom to the pharmacy.

Pharmacy students may also not be providing patient care because they are not seeing mentor pharmacists provide such care in the community setting. Ideally, students could observe community pharmacists performing a Diabetes Check. These role models may be more influential than university pharmacy educators, as they work in "real world" environments (AACP, 2000; Hammer, Berger, Beardsley, & Easton, 2003). Pharmacy educators strive to provide the best community sites for students (Kassam & Volume-Smith, 2003; Kieser, 2003). Some students are fortunate enough to find pharmacist role models who demonstrate caring patient interactions, sound clinical skills, and productive teamwork. However, while there is a growing number of community pharmacists who engage patients and provide positive role models for students, some students may not be exposed to these types of practice sites. In community pharmacy today, "many pharmacists estimate their 'professional worth' by the number of prescriptions they have filled versus the number of patients for which they have cared" (Hammer et al., 2003). Some community pharmacists

may be unable to model and supervise many patient care activities, such as an in-depth medication history, goal setting, and monitoring. "Without real world examples of the application of pharmaceutical care concepts, [students] may find it difficult to adopt this model in [the] future and this could stifle further expansion of pharmaceutical care practice" (Dugan, 2006). Furthermore, some pharmacists discourage students from counseling patients, and relay to students that techniques learned in the classroom are not practical in the "real world" (AACP, 2000). This may contribute to the disillusionment of students and new practitioners (Lai, 1996; Schwirian & Facchinetti, 1975).

Until pharmacy practice has evolved to the point where students can find pharmacists modeling direct patient care and talking to patients about their disease states, the Diabetes Check will allow students to gain experience in real world disease monitoring. To help all students efficiently learn and apply the Diabetes Check technique in community practice, we turn to theory to guide our teaching and assessment.

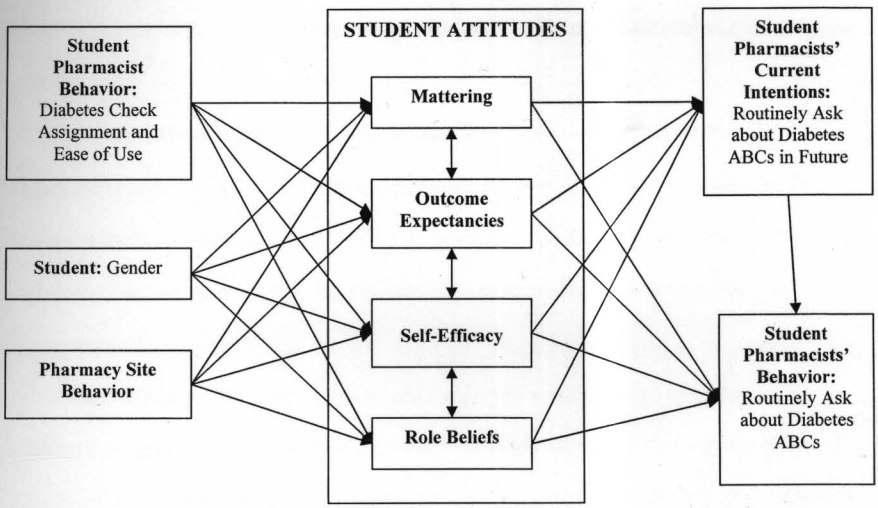
Theoretical Framework

Three theories were used to inform the conceptual model (Figure 1) for the design and assessment of the Diabetes Check intervention: Social Cognitive Theory, Role Theory, and Mattering.

Figure 1 summarizes the potential relationships between elements of these three theories and students' intent and behavior relative to asking about diabetes. Social Cognitive Theory explains how people learn from observation and cognition and has been widely used to shape learning of new behaviors (Bandura, 1986). Role Theory describes the expectations

that actors have for each other when they interact, and encompasses a diverse, multidisciplinary field of research that addresses the sociological problems of human interaction. Mattering is a relatively new theory that addresses whether people believe they make a difference to others. Each theory contributes to the examination of the research problem in this proposal. Examples relevant to pharmacy are offered in the discussion of each theory.

Figure 1 Conceptual Model



Social Cognitive Theory

Social Cognitive Theory was posited by Albert Bandura (1986) and was built on ideas from behaviorism, learning theory, and understanding that cognitive processes are important in human behavior. Behaviorism assumed that learning ensued directly from consequences.

However, social progress would be much slower if people had to learn everything from trial and error. Social Learning Theory thus recognized that people can learn from watching others. Social Cognitive Theory was built on the social learning theories of the day that recognized people learn from others, and added social cognition, a key component (Pajares, 2002). Learning is viewed as the bidirectional interaction of personal factors (i.e., cognitive, affective, and biological events), behavior, and the environment; this is called reciprocal determinism (Bandura, 1986). Based on Social Cognitive Theory, three factors (i.e., person, behavior, and environment) influence each other. For example, when carrying out a Diabetes Check, a pharmacy student influences the environment just as the environment influences the student.

Figure 1 summarizes the potential relationships between these elements of Social Cognitive Theory and students' intent and behavior relative to asking about diabetes. The following section discusses how self-efficacy, outcome expectancies, observational learning, and mastery experiences relate to the students' proposed learning experience with the Diabetes Check.

Self-Efficacy. Self-efficacy is defined "as people's beliefs about their capabilities to produce a designated level of performance that exercise[s] influence over the events that affect their lives" (Bandura, 1998). People with a strong sense of self-efficacy are more likely to approach difficult tasks as challenges, view failure as a result of a lack of obtainable skill or knowledge, and recover from setbacks (Bandura, 1998). Self-efficacy is specific to a behavior under a set of conditions and involves an evaluation of a person's skill and confidence in a skill. People undertake activities where they have strong self-efficacy and avoid behaviors where they lack self-efficacy (Bandura, 1986). For example, pharmacy students who believe

they have the skills and confidence to ask patients about their diabetes goals will be more likely to attempt this behavior. Pharmacy researchers have recognized the importance of measuring self-efficacy in pharmacy students and have encouraged the use of these measurements (Plaza, Draugalis, Retterer, & Herrier, 2002; Wongwiwatthananukit, Newton, & Popovich, 2002).

The main sources of self-efficacy are mastery experiences, vicarious experiences, and social persuasion (Bandura, 1998). Mastery experiences are among the most effective ways of building self-efficacy. Successful experiences teach people that they are capable and able to do more. In ideal pharmacy school clerkships, students are given the chance to apply skills and may experience success. Vicarious experiences allow people to compare their experiences with those of others. Watching similar people succeed can increase one's self-efficacy; conversely, watching others fail can decrease one's self-efficacy. It may be difficult for students to learn about quality patient interactions through vicarious experiences, because few community pharmacists regularly monitor diabetes goals during routine patient interactions. Social persuasion can strengthen peoples' beliefs that they have the capability to undertake new behavior. Pharmacy educators rely on social persuasion to encourage students to attempt innovative practices. The "danger" of persuasion is that unrealistic expectations can lead to poor performance, discredit the persuader, and lower a person's self-efficacy.

Outcome Expectancies. Behavior is influenced by the expected outcome of that behavior and the value of that outcome (Bandura, 1997). Outcome expectancies have either positive or negative physical, social, or self-evaluative effects. The majority of pharmacy employers pay pharmacists to dispense medications and pharmacists will not receive

additional payment or promotion for asking patients about diabetes goals and numbers; thus, we will not focus on physical outcome expectancies.

In typical community practice, the social and self-evaluative expectancies are more applicable. If pharmacists expect other social actors such as patients, physicians, or their co-workers to disapprove of a behavior, pharmacists will have negative social outcome expectations and may be less likely to perform the behavior. The converse is true about positive outcome expectancies. Self-evaluative expectancies are one's own judgments about behavior. It might be assumed that pharmacists attempt to maximize positive self-evaluative expectations and provide themselves with a sense of satisfaction and pride. However, pharmacists may not have enough real or perceived control over their work environment to practice pharmacy in a manner that allows for positive self-evaluations. Thus, the challenge is to design an intervention that is brief, allows pharmacy students or pharmacists to integrate it into practice, and provides opportunities for positive evaluations by others and by students themselves.

When differences in self-efficacy are controlled and performance determines the outcome, Bandura (1997) reported outcomes expectancies may have no independent contribution to the prediction of behavior. More recent research has found outcome expectancies can independently predict behavior when the performance of the behavior is not linked to the outcome, when extrinsic outcomes are fixed, or when people do not believe the outcome is worthwhile (Resnick, 1998; Resnick, Zimmerman, Orwig, Furstenberg, & Magaziner, 2000; Resnick, 2002). Pharmacists are remunerated for a product and most do not receive raises or promotion for clinical services such as asking patients about diabetes goals and numbers; consequently, extrinsic outcomes are fixed. Furthermore, some pharmacists

may not see the benefit in asking about diabetes goals if they believe that patients do not want this service and will respond unfavorably to the pharmacists' inquiries about diabetes goals and numbers. For these reasons, pharmacists' outcome expectancies may predict behavior independently of self-efficacy. Finally, by describing pharmacists' outcome expectancies, it may be possible to gain a greater understanding of how pharmacists develop self-efficacy.

Observational Learning and Mastery Experiences. A key component of the Social Cognitive Theory is learning through observation or modeling. Mastery modeling is one method of observational learning proposed by Bandura (1997). Mastery modeling facilitates a mastery experience. Mastery modeling has three components (Bandura, 1997) (see Figure 1). First, the skill is modeled to "convey the basic rules and strategies". Second, the learners practice the skill in a controlled environment and receive specific feedback. Finally, learners apply the skill in work situations that are expected to bring success. This third component has also been called enactive learning or learning from experience. The outcomes from enactive learning shape performers' ideas about the behavior, serve as motivators, and increase self-efficacy and the automatic nature of the response (Bandura, 1986). Mastery modeling helps pharmacy students learn specific skills, for example, how to ask patients with diabetes about clinical goals. Mastery experiences based on Social Cognitive Theory may also help pharmacy students shape ideas about their role as pharmacists. Next, I will define Role Theory, and review its use in the pharmacy practice literature and its application to the implementation and evaluation of the Diabetes Check.

Role Theory

Role Theory describes the expectations that actors have for themselves and each other when they interact. Role Theory encompasses a diverse, multidisciplinary field of research that addresses the sociological issues of human interaction. Roles are "a set of expectations in the sense that it is what one should do" (Heiss, 1990). Roles may be "generated by norms, beliefs, and preferences" (Biddle, 1986).

Cognitive Role Theory, a subset of Role Theory, examines the connection between expectations and behavior. In this approach, pharmacists' beliefs about their roles can be related to their behavior. The more pharmacists internalize patient-centered roles, the greater their motivation for applying these roles. The Cognitive Role Theory literature in pharmacy has accumulated evidence demonstrating how pharmacists' role orientations or beliefs influence patient-pharmacist interactions (Desselle, 1998; Mason, 1979; Mason & Svarstad, 1984; Pendergast, Kimberlin, Berardo, & McKenzie, 1995; Schommer & Wiederholt, 1994a; Schommer & Wiederholt, 1994b; Schommer, 1994; Schommer & Wiederholt, 1995; Schommer & Wiederholt, 1997). This literature makes use of the Counseling Role Orientation (CRO) as a survey instrument (Mason, 1979). This descriptive work uses observational methods and has not established whether role beliefs can be altered in an intervention study. It is unknown how general role beliefs about counseling relate to more specific behaviors, such as asking about diabetes goals and numbers. This dissertation intervention study tested whether having students perform a behavior, such as the Diabetes Check, could alter their role beliefs about counseling patients about diabetes goals or their more general role belief regarding counseling, such as those assessed by the CRO.

Role Theory can also be used in other ways. In marketing, Role Theory has been used to shape service interactions by the use of written service scripts (Alford, 1998). Service scripts are sample dialogue used to manage customer interactions via learned, scripted behavior (Holdford, 2006; Ramundo, 1997). Service scripts may be well-suited to community pharmacy practice, where some interactions have common patterns (e.g., medication not covered by insurance, an early refill, or a new asthma inhaler). Scripts would be most effective as samples or models that complement pharmacists' professional judgment. Communication textbooks in pharmacy already use dialogue samples to demonstrate techniques (Berger, 2002a; Tindall et al., 2002). Recently, the concept of service scripts has appeared in pharmacy practice literature, where students created service scripts to manage critical incidents (Holdford, 2006).

Scripts may be useful for new pharmacy practitioners who may not have experience with handling challenging questions or may not have a role model. Learning a script and adapting it to a situation may be more efficient than learning through trial and error. The interview guide developed for the Diabetes Check is a sample of a service script. The interview guide provides sample dialogue for students to use when approaching patients about the diabetes ABCs (Appendix 1). Scripts may help nascent pharmacists develop their confidence and the belief that they can make a difference to patients. This sense of making a difference has been described as Mattering. The next section defines Mattering and its application to the implementation and evaluation of the Diabetes Check.

Mattering

The concept of Mattering was first introduced by Rosenburg and McCullough (1981). They described Mattering by asking the following questions; "Do we believe that we count in other's lives, loom large in their thoughts, make a difference to them? Are we an object of another's concern, interest, or attention?"(Rosenberg & McCullough, 1981 , page 163). Schiement and Taylor (2001) added that "individuals with a sense of mattering perceive they are acknowledged and relevant in the lives of others" (page 469). Mattering shapes individuals' perspectives on life and their sense of well-being (Amundson, 1993; DeForge & Barclay, 1997; Mak & Marshall, 2004; Marshall, 2004; Owens, 2003; Rosenberg & McCullough, 1981; Schieman & Taylor, 2001; Segraves, 2004; J. Taylor & Turner, 2001).

Rosenburg and McCullough (1981) proposed three dimensions of Mattering: attention, importance, and dependence. Each dimension illustrates how Mattering is pertinent to student-patient dyads. Attention is the most basic dimension of Mattering and is "the feeling that one commands the interest or notice of another person" (Rosenberg & McCullough, 1981). For example, pharmacy students may feel they matter and choose to provide longer consultations to patients who are "interested" in talking to them. The dimension of importance refers to the belief "that the other person cares about what we want, think, and do" (Rosenberg & McCullough, 1981). Students may obtain a sense of importance when patients accept students' advice and/or thank students for "taking time" to help. The final dimension is dependence. Pharmacy students may experience dependence when a patient needs the student to provide information or a service in order to take a medication safely.

The theoretical concept of Mattering has not been used in pharmacy research; nonetheless, Mattering has been indirectly addressed by several authors in pharmacy.

Schommer and Wiederholt (1997) found that questions from a patient, a signal that a patient is attentive to the pharmacist and dependent on them for information, was associated with increased pharmacist counseling. Similarly, De Young (1995) found that pharmacists were more likely to talk with patients perceived to be attentive. Pharmacists were thus looking for patients who provided them with a sense of Mattering in its most basic form—attention and its impact on behavior.

Thus, pharmacists may use elements of patient interactions to determine if they matter and subsequently adjust their behavior (De Young, 1995; Schommer & Wiederholt, 1997). But how does Mattering apply to pharmacy students? In a recent study, students who had a sense of accomplishment and achievement, concepts somewhat similar to Mattering, more often described their pharmacy clerkship sites as "good" (Joshi, 2004). Although this study does not directly address student evaluation of patient interactions and mattering, it describes the importance of making a difference to pharmacy students in clerkships. For the first time, this proposed research will examine the relevance of Mattering to pharmacy students' behavioral intervention.

Summary of Theoretical Framework

In summary, this dissertation study used a model that integrates elements of three theoretical frameworks (i.e., Social Cognitive Theory, Role Theory, and Mattering). This model provided a framework for designing and evaluating the Diabetes Check. This model was intended to acknowledge how shaping learners' behavior may influence their future behavioral intentions. Furthermore, behavioral intentions may be shaped by the learners' self-efficacy, role expectations, and Mattering, which in turn may influence subsequent behavior.

This model recognizes interactions among the environment, learner, and behavior. Finally, Mattering, a new concept in pharmacy practice, may capture the impact of patient reinforcement on inexperienced practitioners such as pharmacy students.

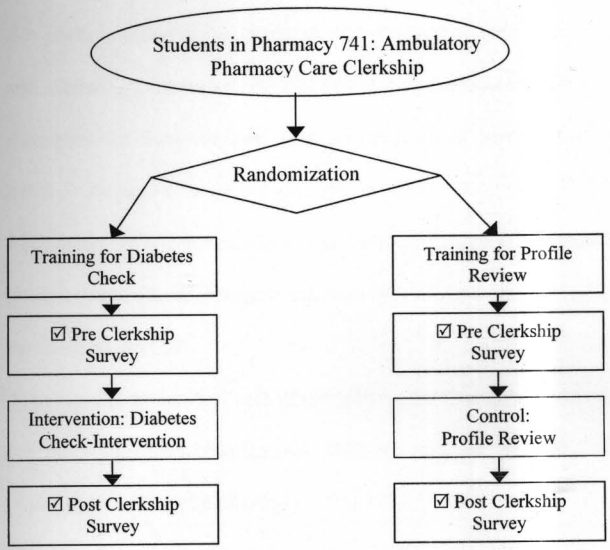
CHAPTER 3: METHODS

The impact of the Diabetes Check on pharmacy students was evaluated in a randomized controlled trial (Figure 2) in the Pharmacy Practice 741: Ambulatory Pharmaceutical Care Clerkship for fourth year pharmacy students. This assignment fit into the category called Disease Check in the students' course manual. Since this Disease Check assignment was focused on diabetes, it was called the Diabetes Check.

In brief, pharmacy students in the intervention group were asked to interview 5 to 10 patients with diabetes using the Diabetes Check and to record their reactions to the experience on an interview guide. The intervention assignment was referred to as the "Diabetes Check-Interview" in the course materials. Pharmacy students in the control group were asked to review profiles of two patients with diabetes, indicate what further information they would like to monitor the patients' diabetes control, make recommendations, and indicate how they would monitor and counsel the patient. The control assignment was referred to as the "Diabetes Check –Profile Review" in the course materials. While both groups completed an assignment on how to monitor diabetes in a community pharmacy, students in the control group were not required to interact with patients. All students completed a pre-clerkship and post-clerkship survey. A brief training session was provided separately to study groups.

This chapter details the randomized controlled trial research questions, pilot research, study design including intervention, control assignments, and training, survey measures, and analysis plan.

Figure 2 Study Design



Research Questions

Research questions were divided into primary and secondary inquiries as follows.

Primary Research Question

1. Will students who perform Diabetes Checks improve more in posttest attitudes (i.e., sense of self-efficacy, outcome expectations, role beliefs, and mattering) and behavior (i.e., asking about A1c, blood pressure, and cholesterol) than students who perform a control activity when controlling for pharmacy site characteristics and gender?

Secondary Research Questions

1. Are posttest attitudes (i.e., sense of Self-efficacy, Outcome Expectations, Role Beliefs, and Mattering), intentions, ease of completing the Diabetes Check, gender, and pharmacy site characteristics *predictors of students' intentions to ask about diabetes ABCs in the future*?
2. Are posttest attitudes, intentions, ease of completing the Diabetes Check, gender, and pharmacy site characteristics *predictors of pharmacy student behavior in asking about the diabetes ABCs*?
3. Are attitudes, intentions, ease of completing the Diabetes Check, gender, and pharmacy site characteristics *predictors of which students will perform more than the required five Diabetes Checks*?

Pilot Research

Two pilot studies, the ABC Tool and the Blood Pressure Check, were undertaken to develop dissertation hypotheses and to assess the feasibility of implementing a project where students asked patients a series of questions about clinical goals and numbers. These projects featured an assignment designed to provide all pharmacy students in the Ambulatory Pharmaceutical Care Clerkship with an expanded patient monitoring role, regardless of a pharmacy's practice norms or students' abilities (Kieser, Guirguis, Kanous, & Chewning, 2004).

The ABC Tool project was started in May 2003 and completed in May 2004. Students were encouraged to use a pamphlet from the American Diabetes Association with patients to

promote the Diabetes ABCs (A1c, Blood Pressure, and Cholesterol) in conjunction with a series of monitoring questions (National Diabetes Education Program, 2005). Pharmacy students were required to briefly interview 10 patients with diabetes, use the ABC Tool, and ask patients if the ABC information could be used for research. This intervention was assessed in a post-intervention survey for both students and pharmacist preceptors.

This project demonstrated the feasibility of pharmacy students using the ABC Tool. Students gained experience in an expanded clinical role. Clinical instructors were receptive to the program. They stated that the ABC Tool fit into their workflow, and they did not need any additional training. The most common concern for clinical instructors was difficulty in finding patients. However, 130 students asked 1115 patients about their diabetes ABCs and 817 patients consented to share ABC information with researchers. While almost three quarters of the patients identified in the ABC Tool pilot knew their blood pressure numbers, half or fewer knew their A1c or cholesterol numbers (Guirguis, Kieser, Kanous, & Chewning, 2005a). Patients were less likely to report an ABC goal, and more than half of the patients were unable to name even one goal.

Overall, 56% of students reported that they were encouraged by patients' reactions, 37% were unaffected, and 2% were discouraged (Guirguis, Chewning, Kieser, & Kanous, 2006). Students reported they felt it was more important for physicians than pharmacists to ask about clinical targets. Students' perceptions of patients' reactions, ease of the intervention, and the students' own role beliefs about the importance of monitoring the Diabetes ABCs predicted their reported intention to use the ABC Tool in the future.

The second pilot study, the Blood Pressure Check, started in 2004 and was completed in May 2005. This pilot included a limited pre-intervention survey in addition to the post-

intervention survey. Students were also required to write a narrative describing one positive or negative patient interaction.

After the Blood Pressure Check, preliminary analysis of survey data demonstrated improvements in students' self-efficacy and outcome expectancies (Table 3). Outcome expectancies are the expected outcome of that behavior and the value of that outcome (Bandura, 1997). Analysis of student narratives found that the presence of mattering or the feeling that the students were making a difference for the patients coincided with students' positive perceptions of patient interactions and was absent in interactions they perceived as negative.

Table 3 Preliminary Blood Pressure Pilot Analysis

Measure	Pre-Intervention Survey Mean (Std Dev)	Post-Intervention Survey Mean (Std Dev)	P-Value
Self-Efficacy*	3.9 (0.5)	4.6 (0.5)	$p<0.01^{\dagger}$
Outcome Expectations**	4.9 (1.0)	5.3 (0.8)	$p<0.01^{\dagger}$
Role Beliefs – Monitoring*	4.0 (0.5)	4.0 (0.6)	p=0.76

*Five-point scale where higher number represent more positive attitudes
**Seven-point scale where higher number represent more positive attitudes
†Statistically significant ($p<0.05$)

In summary, the pilot studies have shown that the majority of patients do not know their diabetes goals and numbers; thus, there is a need for interventions such as the Diabetes Check (Guirguis, Kieser, Kanous, & Chewning, 2005a). The Diabetes Check model was feasible to implement and may have the potential to change pharmacy students' behavior (Guirguis, Kieser, Kanous, & Chewning, 2005b; M. A. Kieser, Guirguis, Kanous, & Chewning, 2004). In addition, students' experience of positive patient reinforcement from patients was fundamental to intervention success. This reinforcement suggested the relevance

of the theoretical construct—mattering. Finally, the pilot studies helped refine the Diabetes Check, improve procedures for implementing the Diabetes Check in the clerkship program, improve the student training programs, develop a survey instrument, and uncover future research hypotheses.

An unanswered causal question is whether the Diabetes Check impacts the beliefs, attitudes, intentions, and behaviors of pharmacy students. The pilot work suggests an association between students' beliefs and their intention to perform the Diabetes Check behaviors in the future; however, the pilot study's single group design limited the ability to make valid causal conclusions about the impact of the intervention itself. Thus, in this dissertation study, I explored the impact of the Diabetes Check with a randomized controlled design (D. T. Campbell, Stanley, & Gage, 1969).

Study Design of Randomized Controlled Trial

Study Sample

The study sample consisted of the entire population of fourth year professional pharmacy students at University of Wisconsin-Madison School of Pharmacy. It was anticipated that this study would consist of 130 students. In the ABC pilot with 132 students, the majority of pharmacy students was female (68%) and had a pharmacy mentor (57%). These final year pharmacy students successfully completed their coursework including therapeutics, pharmacology, and practical casework. The Diabetes Check project was incorporated into a required course. Pharmacy Practice 741: Ambulatory Pharmaceutical Care Clerkship. In this clerkship, students spent approximately six to eight weeks in a community pharmacy. This is one of at least five clerkships that students complete. The overall goals of

the Ambulatory Pharmaceutical Care Clerkship were to develop skills in transferring scientific knowledge to patient specific medication problems, implement patient centered care, and communicate effectively with patients and health care professionals. The Diabetes Check was designed to helped students meet all of these goals.

Randomization

The students were randomized by clerkship block into either the intervention or control group using the following procedures. Clerkship blocks refer to the eight week time period between May 2005 and May 2006 when the student completed the clerkship. This may be referred to as a "rotation" in other fields. An impartial person drew slips of paper from a bowl containing a known number of intervention and control labels on the slips of paper.

First, students placed at two sites that were known to have strong role models who monitored the diabetes ABCs (i.e., Target Pharmacy and Marshland Pharmacy) were separately randomized (Table 4). Two students were randomized into the intervention group and three students were randomized into the control group at Target Pharmacy. Five students were randomized into the intervention group and four students were randomized into the control group at Marshland Pharmacy. When two students were at Marshland Pharmacy during the same time period, they were randomized together.

Next, all remaining students in each clerkship block were randomized (Table 4). For example, there were 23 students in clerkship block Three. Two students in this clerkship block were randomized within either Target or Marshland pharmacy, leaving 21 students for the general randomization. If students changed clerkship blocks during the course of the year, they retained their original study group assignment as they received training in their new assignment.

Table 4 Student Randomization

Clerk-ship Block	Total	students Assigned to Sites With Strong Role Models*		Remaining students	
		Intervention	Control	Intervention	Control
1	23	---	3	10	10
2	21	2	1	9	9
3	23	---	2	10	11
4	24	3	---	11	10
5	21	2	---	10	9
6	18	---	1	8	9
Total	130	7	7	58	58

*Randomized separately from other students.

Power Calculation

Using data from the pilot studies, power was estimated at 97% based on a sample size of 60 students per group and α=0.05 with a two sided t-test to detect a difference of 0.5 (e.g., a change from 5.5 to 6.0 on a seven-point response scale) between measures in the intervention and control group (UCLA Department of Statistics, 2004). As the primary hypothesis were tested with a one-sided test, this power was considered adequate. When the estimated difference between groups dropped to 0.25 or 0.40, the power decreased to 49 or 87%, respectively. When the standard deviation increased to 1.0, the power decreased to 78% from the original estimate.

Intervention Group

The intervention assignment was titled, the Diabetes Check-Interview. The interview guide directed students in the intervention group how to perform this assignment. For at least five different patients, students approached a patient with diabetes who were over the age of 18 and did not have gestational diabetes during a routine interaction in the community

pharmacy. They were to open the encounter with a statement such as, "I would like to take a few minutes to go over some information about diabetes and make sure that you are getting the most benefit from your medications. Do you have time?" Pharmacy students then asked the patient to share their A1c, blood pressure, and cholesterol goals and numbers. If the patient did not know or understand the A1c, blood pressure, and cholesterol goals or numbers, the pharmacy student was to review a copy of a pamphlet from the National Diabetes Education Foundation and American Diabetes Association to help the patient understand and gather their diabetes goals and numbers (Appendix 1) (Guirguis, Kieser, Kanous, & Chewning, 2005a). If desired, pharmacy students could use the remainder of their clerkship to follow-up with patients and determine their diabetes numbers. Students were encouraged to make recommendations to the patients and their health care providers, with patients' permission, if the numbers were sub-optimal. However, this was not a required part of the assignment.

Students in the intervention group answered four questions per patient about their experiences with the Diabetes Check. These questions are found at the end of the interview guide (Appendix 1: questions 12-15). Students were asked to transcribe these answers from the interview guide to the course evaluation (Appendix 4). Students were NOT to enter any patient information. The secure website for the ambulatory clerkship was used for general communication, to submit assignments, and to discuss practice issues.

Control Group

The control assignment was titled, the Diabetes Check-Profile Review. Pharmacy students in the control group were asked to review profiles of two patients with diabetes,

indicate what further information they would like from either the patient or physician, make recommendations, and indicate how they would monitor the patients. In the control group, pharmacy students were not required to interact with patients. Students were provided with directions and materials for the control assignment (Appendix 2).

Students in both the intervention and control groups were required to complete additional profile reviews that were unrelated to the Diabetes Check assignment. In general a profile review, involves a student reviewing the patient profile and detecting drug related problems without the use of drug-use-evaluation software.

There were several reasons for selecting the profile review as the control activity. First, it was important to have an assignment for the control group, so that students in the intervention group were not required to complete an additional assignment. It would not be fair to the intervention students and had the potential to create negative feelings about the Diabetes Check. Second, students were already performing other profile reviews just as they were already performing other counseling assignments. Thus, both assignments were an extension of current course activities. Third, both assignments met the same objective of helping students to monitor diabetes. The control assignment may have made salient some of the same diabetes monitoring concepts as the intervention assignment. This may have lessened the intervention effect and only strengthened the importance of any significant findings. Based on these reasons, the profile review was selected for the control assignment.

Training

On May 16, 2005, students were trained in either the intervention assignment (Diabetes Check Interview) or control assignment (Diabetes Check Profile Review). Training

was performed in a 45-minute session during the General Clerkship Orientation hosted by the School of Pharmacy. At this orientation students received information on the three Clerkships (Acute Care, Ambulatory Care, and Specialty Care), policies and procedures, and professional conduct. The training for the Diabetes Check took place during half of the time allotted for the Ambulatory Care Clerkship training.

The training had two parts. All slides, cases, and training materials are presented in Appendices 1 and 2. The first part was a general session for all students that introduced the Disease Check and its focus on Diabetes, then provided an explanation of why diabetes was chosen, why pharmacists should play a role in diabetes care, and why the Diabetes Check is important for students. Grading and the assignment timeline were also presented. The suggested timeline covered completion of the following parts of the assignment: (1) the Learning Assessment, (2) the Diabetes Check Assignment and Discussion, and (3) the Diabetes Check Evaluation. Students were told they were assigned to one of two equivalent assignments that met the goals for the Diabetes Check. Students removed a colored cue card labeled with their name and group assignment from their clerkship package. Students in the intervention group received a red card and students in the control group received a blue card. Based on their group assignment, students either remained in the room to receive training on the intervention assignment or moved to an adjacent room to receive training on the control assignment. Students raised no concerns about the group assignment or training procedures.

Training in both groups had three elements: (1) an explanation of the assignment, (2) an example of the assignment, and (3) rehearsal time. Explanations of each training session follow. All training materials for each group were posted online on the course website called

Learn@UW. Students were only allowed to view online training materials for their assignment.

Intervention Group Training. Two of the three elements of mastery modeling were explicitly used to teach students in the intervention group at the training session. The third element of mastery modeling, role rehearsal in a realistic work setting, was performed during the clerkship assignment. First, the Diabetes Check was modeled for students in an orientation session before their clerkship. Ideally, pharmacy students would observe pharmacists asking patients with diabetes in a community pharmacy about their diabetes goals and numbers, but there are a limited number of pharmacists who currently practice this way. Second, students were asked to use the Diabetes Check with 5 to 10 patients in their Ambulatory Pharmaceutical Care Clerkship, so that students should be expected to receive positive feedback from at least one patient. In the first pilot study where 133 students had been required to complete ten patient encounters, only 0.8% had no positive experience and over 85% of students had 6 to 10 positive experiences. In pilot work, students reported that the earliest attempts at asking patients about the diabetes goals and numbers helped them learn the processes and build confidence. In subsequent interviews, they were able to focus more attention on interacting with the patient.

Lisa Guirguis led the training session for the intervention group. First, the students were introduced to the diabetes ABCs (A1c, blood pressure, and cholesterol), the patient handout (Take Care of your Heart Manage Your Diabetes [Appendix 1]), and the Interview Guide. They were also provided with tips on how to use the Interview Guide and when to do a Diabetes Check Interview. Students were provided with hard copies of the patient handout and the Interview Guide.

Next, to model the behavior, the students watched a video of a current final year pharmacy student performing a Diabetes Check Interview. This video was recorded at Target Pharmacy and a willing patient, with the permission of the pharmacy manager, Charlie Lee. In the video, the student introduced the Diabetes Check, comfortably asked the patient about the diabetes ABCs, educated the patient, and encouraged follow-up. This student's technique was good but not exceptional, and provided an achievable model. The video included sounds of the pharmacy, providing realism. After playing the video, the interaction was discussed, providing additional findings that were not on the video but demonstrated the value of the Diabetes Check Interview. Namely, the patient became more aware of his high blood pressure and asked the student for help in finding an additional medication to control his hypertension. The unstructured nature of the interview, which covered key points and used introduction and closing, was highlighted.

The next step of the intervention training was role rehearsal. Students had two to three minutes to find a partner and practice the Diabetes Check Interview. One student was to choose the role of the pharmacist and the other the patient. Brief instructions on patient characteristics were provided. The majority of the students willingly participated in this brief exercise and talked about diabetes with their partners. Two students who did not willingly find partners were encouraged to consider introducing this exercise in a real pharmacy.

Finally, the students were further informed about the discussion component of the assignment and were encouraged to complete the Diabetes Check evaluations. Students were asked to post one or more messages describing an interesting patient interaction with the Diabetes Check and one reply to a colleague's message. Lisa Guirguis moderated this

discussion board. The students were then provided with brief information about the Diabetes Check evaluation and how previous evaluations had substantially shaped the assignment.

Control Group Training. In the control group, students were trained on the Diabetes Check Profile Assignment. Mara Kiser led the training session. This session included the three training elements of instruction, modeling, and rehearsal. First, the students were introduced to the Diabetes Check Profile Assignment, Diabetes Check Profile Review Document, Drug Therapy Assessment Work Sheet tools, and online resources such as the ADA 2005 Guidelines (American Diabetes Association, 2006a) and the Wisconsin Essential Diabetes Mellitus Guidelines (Department of Health and Family Services, Division of Public Health, Wisconsin Diabetes Advisory Group, 2004). Students were provided hard copies of the Diabetes Check Profile Review and the one page summary of the Wisconsin Essential Diabetes Mellitus Guidelines.

Next, a case was modeled for the students. Mara Kieser walked the students through a case example (Appendix 2) with a profile of a patient with diabetes. Examples of data uncovered in the Drug Therapy Assessment Worksheet eleven steps and answers to the five questions listed in the Diabetes Check Profile Review Document were modeled.

Next, role rehearsal was performed. Students were provided with a second straightforward case (Appendix 2) and encouraged to work in groups to determine answers to the five questions in the Diabetes Check Profile Review Document. This case included points that might be available in a community pharmacy setting, such as allergies, diagnosis, brief social history, and medication. Laboratory values were not included, as they are not typically available in most sites in the Ambulatory Care Clerkship and most community pharmacies. Using these tools, students were willing to participate, and were successful at answering the

five questions in the Diabetes Check Profile and reporting answers to the larger group. As time was insufficient, this group was not reminded about the Diabetes Check Evaluations and discussion. However, these had been highlighted in the initial full group training.

Material on Course Website

All training materials were posted on the course website at Learn@UW. Because students can take the 741 Clerkships in one of six different times over a one-year period, the training for the 741 Clerkship can occur up to 10 months before the students perform the assignment. The course website provides information on the course and serves as a discussion forum and repository for electronic copies of materials and links to resources. Materials for both the intervention and control groups were posted online; however, members of each group were only able to access materials for their assignment and discussion group. Materials for both groups were organized similarly, with the Learning Assessment, Diabetes Check Evaluation, and Directions followed by files organized under the headings of Tools, Resources, and Case Example (Table 5). Hard copies of the course website materials for the intervention and control groups are presented in Appendices 1 and 2, respectively. Resources included links to the National Diabetes Education Foundation (http://www.diabetes.org/for-health-professionals-and-scientists/cpr.jsp), ADA 2005 Guidelines (http://www.diabetes.org/for-health-professionals-and-scientists/cpr.jsp), and the Wisconsin Essential Diabetes Mellitus Guidelines (http://www.dhfs.state.wi.us/health/diabetes/DBMCGuidelns.htm). The Diabetes Check Evaluation was available to the students at Week Six to prevent students from completing the evaluation before they had sufficient experience with their assignment.

Table 5 Diabetes Check Content on Course Website

Heading	Intervention Group Content: Diabetes Check—Interview	Control Group Content: Diabetes Check—Profile Review
Not applicable	▪ Learning Assessment ▪ Diabetes Check Evaluation* ▪ Directions	
Tools	▪ Patient Handout: Take Care of Your Heart Manage Your Diabetes ▪ Interview guide	▪ Disease Check Profile Review Document ▪ Drug Therapy Assessment Work Sheet
Resources	▪ ADA 2005 Guidelines ▪ Wisconsin Essential Diabetes Mellitus Guidelines ▪ National Diabetes Education Foundation	▪ ADA 2005 Guidelines ▪ Wisconsin Essential Diabetes Mellitus Guidelines
Case Example	▪ Video of a Diabetes Check Interview ▪ Message about Availability of CD if Needed.	▪ Paper Case With Patient Information and Answers

*Available to students during Week Six.

Survey Reminders

Reminders were posted on the homepage of the course web site (i.e., Learn@UW) reminding students in both groups them to complete the pre and post survey. In addition, students who did not complete the survey by the due date were send individual e-mail encouraging them to complete the survey (Figure 3).

Figure 3 Individual Student Survey Reminder

Dear "Student Name",

I noticed you have not yet completed the Diabetes Check Evaluation. I hope you are able to do so. The evaluation is a required part of the Diabetes Check Assignment. You can find it on Learn@UW under content.

If you have any questions or concerns, please do not hesitate to contact me!

Lisa G

Comparison of Intervention and Control Assignments

Both the intervention and control group preformed an assignment for the Diabetes Check that allowed the students the opportunity to learn about monitoring diabetes therapy in the community pharmacy setting. Training, all three steps of mastery modeling, and tools were provided to both study groups (Table 6). The primary difference was that students in the intervention group were required to interact with five to ten patients and focus on monitoring the diabetes ABCs whereas students in the control group were not required to interact with a patient and were encouraged to monitor all aspects of diabetes.

Table 6 Comparison of Intervention and Control Groups

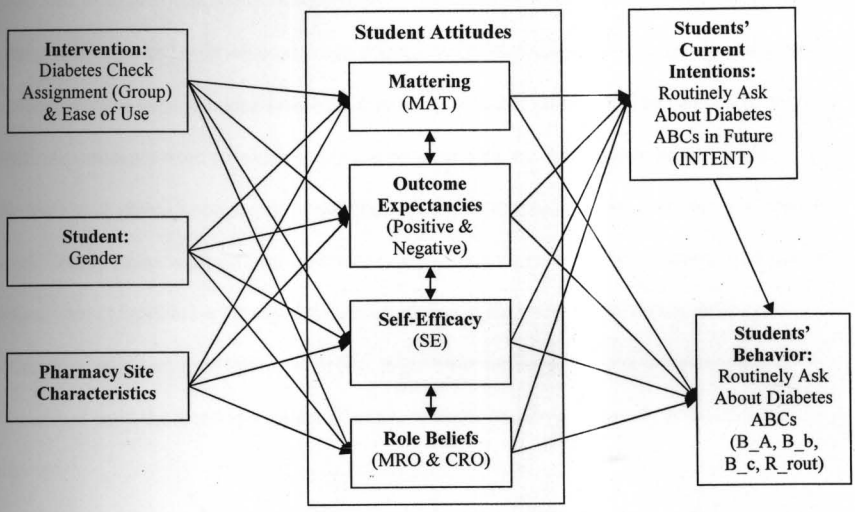
	Intervention	**Control**
Name of assignment	▪ Diabetes Check –Interview	▪ Diabetes Check –Control
Modeling	▪ Video of a Diabetes Check Interview	▪ Paper Case With Patient Information and Answers
Role rehearsal in controlled environment	▪ Performed Diabetes Check with classmate and gave feedback	▪ As a group, solved a case and received instructor feedback.
Role rehearsal in pharmacy	▪ Approached 5-10 patients with diabetes during routine interactions ▪ Asked patients to share diabetes ABCs	▪ Reviewed profiles of 2 patients with diabetes ▪ Made a patient monitoring plan & made recommendations ▪ Were not required to interact with patients
Tools	▪ Patient Handout: Take Care of Your Heart Manage Your Diabetes ▪ Interview guide	▪ Disease Check Profile Review Document ▪ Drug Therapy Assessment Work Sheet
Patient interaction	▪ Required	▪ Not required

Measures

Students completed pre-clerkship (Appendix 3) and post-clerkship surveys (Appendix 4). These surveys assessed self-efficacy, outcome expectancies, role beliefs, mattering, and intentions to ask about diabetes goals and numbers. In addition, the post-clerkship survey also assessed students' experiences with the Diabetes Check and routinely asking patients about diabetes goals and numbers. Appendix 5 summarizes the relationship between the survey questions and theoretical constructs, and provides study variable names.

The self-efficacy scale assesses how sure pharmacy students are that they could ask patients about the diabetes ABC in various conditions. The outcome expectancies scale assesses the frequency of the expected outcome of asking patient about the diabetes ABCs (Bandura, 1997). The role belief scales measure the strength of the beliefs that pharmacy students have about the role as counseling patients or more specifically asking about the Diabetes ABCs. The mattering scale assessed the degree to which students felt that they were acknowledged and relevant to patients. Figure 4 incorporates the variables into the conceptual model. It was proposed that the intervention, student and pharmacy site characteristics would influence student change in attitudes which would in turn influence intentions to ask about the Diabetes ABCs in the future and ultimately students' behavior asking patients about the Diabetes ABCs. Survey measures were developed in pilot research with pharmacists and pharmacies. Versions of all survey measures, except for mattering, were piloted. The original survey instrument was piloted in the ABC Tools project, with five focus groups that used cognitive interview techniques to explore survey items. A revised survey instrument was piloted in the Blood Pressure Check, with eight focus groups that used cognitive interview techniques.

Figure 4 Conceptual Model



Preliminary *reliability, content validity,* and *responsiveness* estimates are available for most measures. *Reliability* was assessed with Chronbach's alpha. Reliability for all available scales was acceptable and ranged from 0.77 to 0.89 (Table 7).

Table 7 Internal Consistency Reliability Estimates from Pilot Study

Measure	Number of Questions	Chronbach's Alpha
Self-Efficacy	13	0.86
Outcome Expectations	13	0.87
Role Beliefs–CRO	8	0.82
Role Beliefs–MRO	4	0.77
Intentions	5	0.89

In the pilot studies, *content validity* was established in a two ways. Some items were generated from previous scales developed by experts. New items were modeled closely on previous surveys and only adapted when necessary. In ten focus groups, cognitive interview techniques were used to understand how pharmacy students understood and answered items. Pharmacy students were considered experts because they are the ultimate survey users. Students used global impressions of patients and preceptors to provide an estimate of activity level. Certain items were difficult to answer due to the temporary nature of clerkships (i.e., all patients are unfamiliar) and were thus modified. Some students had difficulty making estimations based on interactions with five to ten patients; thus, some constructs were transcribed from the interview guide. Overall, students had little difficulty constructing answers.

Responsiveness refers to "the ability of a measure to reflect underlying change" (Hays, Anderson, & Revicki, 1993). Responsiveness was established by using a paired t-test to assess change in measures taken before and after the Blood Pressure Check. There are several limitations to this assessment of responsiveness. First, the efficacy of the Blood Pressure Check is not clearly established. Still, findings from focus groups suggested change in student beliefs were occurring. Second, the length of time between the baseline and endpoint surveys varied from one to eight months. Third, comparisons were made on single items, not scales, because the baseline survey had fewer items. Finally, for several questions, the response scale had fewer options than the baseline survey; thus, the response scales on the endpoint scale were collapsed to match the baseline. Despite these hurdles, the measures of Self-Efficacy and Outcome Expectancies were found to be *responsive* as a change was detected (Table 8).

There was no change in the role theory measure, suggesting either the measure was not responsive to change or there was no change in role beliefs about monitoring. The use of a seven-point scale may have helped detect a smaller change in role beliefs.

Table 8 Blood Pressure Check Pilot Analysis

Measure	Pre Mean (Std Dev)	Post Mean (Std Dev)	P-Value
Self-efficacy*	3.9 (0.5)	4.6 (0.5)	p<0.01
Outcome Expectations**	4.9 (1.0)	5.3 (0.8)	p<0.01
Role Beliefs–MRO*	4.0 (0.5)	4.0 (0.6)	p=0.76

* Five-point scale with higher scores representing more positive attitudes.
**Seven-point scale with higher scores representing more positive attitudes.

The following section describes each measure. Other relevant findings from the pilot work are also presented.

Experience with the Diabetes Check

The Diabetes Check was designed to allow for at least one mastery experience. For this research, a mastery experience was represented as a positive experience with use of the Diabetes Check with a patient. To determine if students had a mastery experience, they were asked on the interview guide to rate their experience with each patient from extremely negative to extremely positive (Appendix 1, Question 15). Students transcribed this rating to the course evaluation (Appendix 4, intervention group Questions 31/32). A student's average across all patients was calculated to estimate the student's overall experience (ST_EXP).

The survey (Appendix 5) section "Experience with the Diabetes Check" had a series of questions that evaluated the use of the Diabetes Check. Questions addressed ease of use,

time to complete, patient reactions, effect of patient reactions, talking to other students about the Diabetes Check, and student's follow-up action as appropriate for the intervention and control groups. These questions were used to describe students' implementation of the Diabetes Check. Question labeled ST_EXP1 (Appendix 5) requested students' overall impressions of the Diabetes Check and gathered information similar to Question 31/32. The relationships between these questions were examined to determine if a single question would be sufficient in the future.

Self-efficacy

Previously, two self-efficacy scales had been developed to assess pharmacy students' self-efficacy in a variety of pharmacy clerkship activities (Plaza et al., 2002; Wongwiwatthananukit et al., 2002). However, self-efficacy is relative to a task; thus, general self-efficacy scales may have lacked predictive ability about the Diabetes Check experience (Bandura, 1997). Consequently, a new instrument was developed.

An effective self-efficacy scale should capture people's beliefs in varying levels of the behavior, under different task demands, and in different situational contexts (Bandura, 1997). Therefore, students self-reported their self-efficacy for asking about diabetes goals and numbers in various contexts on a 12-item scale (Table 9). Students rated their self-efficacy about asking about blood sugars, A1c, blood pressure, cholesterol, as well as these items in combination. Pilot work suggests students found it easiest to ask about blood pressure, followed by asking about blood sugars, A1c, and cholesterol. The mean of these self-efficacy items (SE) represents student self-efficacy for asking about the goals and numbers.

Table 9 Self-Efficacy Questions

Question:	
The following set of questions refers to your interactions with patients with diabetes. How sure are you that you could:	
SE_a	a) routinely ask patients about A1c?
SE_b	b) routinely ask patients about blood pressure?
SE_c	c) routinely ask patients about cholesterol?
SE_d	d) routinely ask patients about A1c, blood pressure, and cholesterol?
SE_e	e) routinely ask all patients with prescriptions for a new medication about their A1c, blood pressure, and cholesterol?
SE_f	f) routinely ask patients at medication refills about A1c, blood pressure, and cholesterol?
SE_g	g) routinely ask patients who are in a hurry about A1c, blood pressure, and cholesterol?
SE_h	h) routinely ask patients who do not appear interested about A1c, blood pressure, and cholesterol?
SE_i	i) routinely ask unfamiliar patients about A1c, blood pressure, and cholesterol?
SE_j	j) routinely ask patients who regularly come into your pharmacy about A1c, blood pressure, and cholesterol?
SE_k	k) routinely ask patients about A1c, blood pressure, and cholesterol when it is busy?
SE_l	l) routinely ask patients about A1c, blood pressure, and cholesterol when you have time?
Response Options:	
	Extremely sure, Very sure, Quite sure, Rather sure, Somewhat sure, Slightly sure Not sure at all

Outcome Expectancies

One global question asked students if they expected a positive or negative experience when asking about diabetes goals and numbers (Appendices 3, 4, and 5). An additional 10 items asked students about expected social and self-evaluative outcomes after questioning patients with diabetes about goals and numbers (Appendices 3, 4, and 5). These questions were previously piloted in the Blood Pressure Check. Social outcomes are based on students' assessments of others' approvals. For example, one item (Table 10) states, "If you ask patients routinely about diabetes goals and numbers, how often do you think this practice frustrates

pharmacy staff because it slows workflow?" Self-evaluative items assess students' judgments about their behaviors. For example, one item (Table 10) asks how often asking about diabetes goals and numbers will give students a sense of personal accomplishment. These questions were examined for variance and relationships to other variables. Questions d, g, and j were reverse coded. Questions were combined into one measure of outcome expectancies (OE).

Table 10 Outcome Expectancies Questions

Questions:	
OE_o	In the future, if you routinely asked patients about A1c, blood pressure, and cholesterol, overall what type of experience would you expect with most patients? (PICK ONE)
Response Options:	
	Extremely negative, Negative , Somewhat negative, Neutral, Somewhat positive, Positive, Extremely positive
Questions:	
If you ask patients with diabetes routinely about their A1c, blood pressure and cholesterol how often do you think this practice will:	
OE_a	a) help patients take charge of their A1c, blood pressure, and cholesterol?
OE_b	b) give me a sense of personal accomplishment?
OE_c	c) help create a professional image of pharmacy?
OE_d	d) embarrass patients?*
OE_e	e) increase my satisfaction with pharmacy as a career choice?
OE_f	f) help me build relationships with my patients?
OE_g	g) take too much time for community practice?*
OE_h	h) open up opportunities to talk with patients?
OE_i	i) allow me to monitor drug therapy?
OE_j	j) frustrate pharmacy staff because it will slow workflow?*
Response Options:	
	Never, Almost never, Less than half the time, Half the time, More than half the time Almost always, Always

*Reverse Coded

Role Theory

Role theory was assessed with a previously established scale, the Counselor Role Orientation (Appendices 3, 4, and 5) (Mason, 1979; Schommer & Wiederholt, 1994a;

Schommer & Wiederholt, 1994b). The CRO has a reliability of 0.71 in a sample of 486 pharmacists in the state of Wisconsin (Schommer, 1992). The CRO has been positively correlated to pharmacists' counseling behavior, providing evidence for construct validity (Mason & Svarstad, 1984; Schommer, 1992; Schommer & Wiederholt, 1995).

Table 11 Monitoring Role Orientation Questions

Questions:	
MRO_doc	1. How important is it that physicians talk about A1c, blood pressure, and cholesterol with patients with diabetes?
MRO_Rx	2. How important is it that community pharmacists talk about A1c, blood pressure, and cholesterol with patients with diabetes?
MRO_s	3. How important is it that you, in your 741 Clerkship, talk about A1c, blood pressure, and cholesterol with patients with diabetes?
Response Options:	
	Not important at all, Slightly important, Somewhat important, Rather Important, Quite Important, Very important, Extremely important
Questions:	
MRO_f	4. Community pharmacists should routinely talk to patients with diabetes about A1c, blood pressure, and cholesterol.
MRO_rf	5. Community pharmacists should talk to patients with diabetes about A1c, blood pressure, and cholesterol at every prescription refill.
MRO_j	6. It is the community pharmacists' job to routinely talk to patients with diabetes about A1c, blood pressure, and cholesterol.
Response Options:	
	Very strongly disagree, Strongly disagree, Disagree, Neutral, Agree, Strongly agree, Very strongly agree,

The CRO was used, as were six questions that specifically addressed pharmacy students' beliefs about asking patients about diabetes goals and numbers (Table 11). The first three questions ask how important it is for the physician, community pharmacists, and students to ask these questions. The first two questions anchor the score of the third question. In pilot studies, the third item appeared to have a near normal distribution. The final three questions ask if the respondent agrees to statements about the community pharmacists' role in monitoring diabetes (Table 11). These three items were combined with the item on students' role relative to physicians and pharmacists into the Monitoring Role Orientation scale (MRO).

In the first pilot, role items predicted the intention of students to perform monitoring behaviors in the future (Guirguis, Kieser, Kanous, & Chewning, 2005a). In the second pilot study, the MRO correlated significantly with the CRO, providing evidence for criterion validity of this scale (0.43; $p<0.001$). The moderate correlation suggests these items are related but may be measuring separate constructs. Retaining the CRO in the final evaluation may contribute additional evidence for the presence or lack of change in role beliefs after the Diabetes Check intervention.

Mattering

Mattering was assessed in two ways. First, for each patient, students in the intervention group were asked to record answers to the following questions on the interview guide: (1) how interested did the patient appear in talking to them, and (2) how helpful was the Diabetes Check for the patient (Appendix 1). A student's overall experience was estimated by calculating a mean of the answers for all patients. This mean was used to determine if students in the intervention group experienced a sense of mattering.

An adapted version of the General Mattering Scale (GMS) was used to assess differences in mattering between the intervention and control groups (Appendices 3, 4, and 5). Marcus and Rosenberg (1987) developed the GMS. It has five items that address dimensions of mattering to other people and have four response options (not at all, a little, somewhat, and a lot). The reliability of the scale has been established with Chronbach's Alpha of 0.85 in homeless men (DeForge & Barclay, 1997), 0.78 in a representative sample of adults (Schieman & Taylor, 2001), 0.85 in Russian army officers (Rohall, 2003), and 0.87 in a sample of employees (Connolly & Myers, 2003). Two studies found that one item ("How

much did other people depend on you?") had a lower factor loading on the GMS scale (Connolly & Myers, 2003; Schieman & Taylor, 2001) and one study removed it from their analysis (Connolly & Myers, 2003). For this pilot study, this item was retained; however, a confirmatory factor analysis was performed. The scale was modified for this study by changing the term "other people or people" to patients, expanding the response options to five items, and adding two items that asked if students "made a difference" to patients and if students were helpful to patients (Table 12). These items were added to measure mattering using students' phrases determined from pilot research. All questions were combined into one measure of mattering (MATT). The questions asking if students "make a difference to patients" was used in a pilot study with four response options (not at all, a little, somewhat, a great deal). The vast majority of students selected somewhat (54%) and a little (39%) suggesting that additional response options may be desirable to expand the answer distribution.

Table 12 Mattering Questions

Questions:	
MAT_a	1. To what extent do you "make a difference" to patients?
MAT_b	2. How helpful are you to patients?
MAT_c	3. How important do you feel you are to patients?
MAT_d	4. How much do you feel patients pay attention to you?
MAT_e	5. How much would patients miss you if you went away?
MAT_f	6. How interested are patients generally in what you have to say?
MAT_g	7. How much do patients depend on you?
Response Options:	
	Not at all, Almost none at all, A little, Somewhat, A great deal

Intention to Ask about Diabetes Goals and Numbers

These items asked about students' intent to ask about diabetes goals and numbers during busy and slow times, in their next clerkship, and in their first pharmacy job

(Appendices 3, 4, and 5). Intention items differ from self-efficacy items in that intention items ask about what students "will do" as opposed to self-efficacy items that ask about what students "can do" (Bandura, 1997). As with other constructs, questions were examined for variance and relationships to other variables. Questions were combined into one measure of intention (INTENT). In pilot data, students' perceptions of patient reactions, ease of the intervention, and students' own role beliefs about the importance of monitoring patients' diabetes goals and numbers predicted their reported intention to ask about diabetes goals and numbers in the future(Guirguis, Kieser, Kanous, & Chewning, 2005a). The combined scale had a mean of 4.5 (SD=0.68) and a range from 3.2 to 6.0. The distribution was bimodal without an apparent ceiling or floor effect.

Routinely Asking about Diabetes Goals and Numbers

The study design had two features to assess whether students made asking about diabetes A1c, blood pressure and cholesterol part of their routine. In the intervention group, students were required to interview five patients for the assignment; although they could have interviewed and documented up to ten patients. Any data gathered over five patients may indicate students mastered asking about the diabetes goals and numbers and incorporated it into their routine. A new variable, Routine Behavior (B_ROUT), represented the number of patients a student approached over the required five patients (1=asked greater than five patients, 0=asked five or less patients). In addition, three questions in the evaluation addressed how often students asked patients with diabetes about their A1c, blood pressure, or cholesterol numbers (Appendix 5). These were used to describe current behavior and assess change in behavior in both study groups.

Analysis

Data were analyzed using SPSS (Version 11.5, Sept 2002) and LISREL (Version 8.7, 2005). A one-sided *a priori* α=0.10 was used to evaluate the primary hypotheses. A two-sided *a priori* α=0.05 was used for all other hypotheses tested. Measures were scored as described above. For each measure, items reflecting negative attributes were re-coded with the appropriate scale conversions. When items were missing from a scale, the mean of the available items was inserted for the missing data (Curran, Fayers, Molenberghs, & Machin, 1998). If more than half of the items in a scale were missing for a participant, that scale score was treated as missing data in the analysis.

Descriptive analyses were used to describe students' experiences with the Diabetes Check, the pharmacy site, and the student. Comments were examined to help interpret results and describe group differences. Descriptive analyses were used to calculate the means, frequencies, and standard deviations, where appropriate, for experiences with the Diabetes Check, self-efficacy, outcome expectations, role beliefs, mattering, intentions, routinely asking about diabetes goals and numbers, and demographics. To assess normality, variables were plotted and examined for normal distributions. Measures were assessed for reliability using the baseline data. Internal consistency reliability assessed if items "hang together" or are measuring the same construct and was established by calculating Chronbach's alpha. Scales with Chronbach's alpha values greater than 0.7 were considered to have sufficient reliability (Smith, 1997). Construct and criterion validity of items was examined in pilot studies.

Confirmatory Factor Analysis

A confirmatory factor analysis was performed to reduce items and ensure constructs measured items as intended. Confirmatory factor analysis (CFA) was used to provide evidence for the factor structure of the scales. The structure of the self-efficacy, outcome expectancies, MRO, and mattering scales was assessed. The CRO was not assessed, as it was previously validated. Descriptions of theoretical constructs and scale development were presented in Chapters 2 and 3.

Ideally, a CFA analysis would have greater than 200 cases (Garson, 2006c). This is not possible with the fixed sample size of this study. Another criteria is having 5-10 cases per item in CFA (DiStefano & Hess, 2005). The same size for this analysis is fixed at 119 students and subsequently 23 questions could be included in this analysis. There are 33 questions in the self-efficacy, outcome expectancies, MRO, and mattering scales. In order to reduce the number of indicators, parceling was used. Parceling is a mean score across a set of homogenous subset of items (Bandalos, 2001; Kline, 2005).

Many criteria rules are used to judge the "goodness" of fit statistics for CFA. These may appear arbitrary, and the goal of any model confirmation is to find the best fit possible in a field (DiStefano & Hess, 2005; Garson, 2006c; Hu & Bentler, 1999). The goodness of fit criteria were examined for model fit, model parsimony, relative fit, and model comparison. Model fit indices examined the fit of the entire model to the data. These included the standardized root mean square residual (SRMR; measures the absolute mean of the covariance residuals), the goodness of fit index (GFI; analogous to the regression R^2 as the level of error explained in reproducing the model), and the root mean square error of approximation (RMSEA; "badness of fit" indicator) (Kline, 2005). The model adjusted

goodness of fit index (AGFI), a model parsimony index, evaluated the fit of the model versus the number of estimated coefficients needed to achieve that level of fit (Garson, 2006c). Relative fit indices included the non-normed fit index (NNFI), which used degrees of freedom and comparative fit index (CFI) to examine how well the model fit compared to a null model that assumed all variables were uncorrelated, using different methods of calculation. Finally, the model comparison indexes allowed for comparisons between non-hierarchical models. These included the model AIC, which is a chi-square, corrected to penalize for model complexity (Garson, 2006c). These goodness of fit indicators were used to evaluate the proposed factors and competing models.

Primary Hypothesis

It is hypothesized that there were differences between the intervention and control group in the endpoint scores of the students' attitudes, intentions, and behaviors (Table 13).

The primary hypothesis was assessed using bivariate and multiple linear regression. In the bivariate analyses, group differences in endpoint scores were examined while controlling for baseline scores. If variables were non-normally distributed, non-parametric statistical tests were used for the bivariate analysis to increase power. Using multiple linear regression, group differences in endpoint scales were examined while controlling for baseline scores, site counseling, and gender.

Table 13 Research Hypothesis

Hypothesis arising from the **primary research question** is:	
	1. Ho: There were no differences in the posttest *Dependent Variable* in the intervention and control groups while controlling for the *Dependent Variable* at pretest and controlling for pharmacy site characteristics and gender. The *Dependent Variables* included the following: (1) behavior, (2) mattering, (3) self-efficacy, (4) outcome expectations, (5) role beliefs, and (6) intentions (no baseline data). Ha: The intervention group will have improved scores on the posttest *Dependent Variable* while controlling for the *Dependent Variable* at pretest and controlling for pharmacy site characteristics and gender.
Hypotheses arising from the **secondary research questions** are:	
	2. Ho: Attitudes (i.e., sense of self-efficacy, outcome expectations, role beliefs, and mattering), ease of completing the Diabetes Check, gender, and pharmacy site characteristics will *not predict students' intentions to ask about the diabetes ABC in the future.* Ha: Attitudes, ease of completing the Diabetes Check, gender, and pharmacy site characteristics will *predict students' intentions to ask about the diabetes ABC in the future.*
	3. Ho: Attitudes (i.e., sense of self-efficacy, outcome expectations, role beliefs, and mattering), intentions, ease of completing the Diabetes Check, gender, and pharmacy site characteristics will *not predict pharmacy student behavior in asking about the diabetes ABCs.* Ha: Attitudes, intentions, ease of completing the Diabetes Check, gender, and pharmacy site characteristics will *predict pharmacy student behavior in asking about the diabetes ABCs.*
	4. Ho: Attitudes (i.e., sense of self-efficacy, outcome expectations, role beliefs, and mattering), intentions, ease of completing the Diabetes Check, gender, and pharmacy site characteristics will *not predict which students will perform more than the required five Diabetes Checks.* Ha: Attitudes, intentions, ease of completing the Diabetes Check, gender, and pharmacy site characteristics will *predict which students will perform more than the required five Diabetes Checks.*

Secondary Hypothesis

There were three secondary hypotheses that determined predictors of intention to use a Diabetes Check in the future, behavior in asking about the diabetes ABCs, and the use of over

five Diabetes Checks (Table 13). Stepwise hierarchical multiple linear regression was used to test Hypotheses Two and Three, while hierarchical logistic regression was used to test Hypothesis Four.

Stepwise regression allows the computer program to sequence which variables are selected based on their semi-partial correlation with the dependent variable and contribution to R^2 (Cohen, Cohen, West, & Aiken, 2003). In SPSS, stepwise regression forwards load variables and also removes variables which are no longer significant after the addition of subsequent variables. Concern has been raised about the indiscriminate use of stepwise regression as it capitalizes on chance and may over fit the model to the sample with a disregard for theory which may be underlying the model (Cohen et al., 2003; Garson, 2006b). Stepwise regression should be reserved for exploratory work with a limited number of independent variables (Cohen et al., 2003). Cohen et al. (2003) support the use of the stepwise regression when the order of functional sets of variables are logically ordered, but do not have a basis for ordering variables within groups such as the case in this dissertation research. Finally, as with all exploratory research, findings should be confirmed with cross-validation (Cohen et al., 2003; Garson, 2006b).

Hypothesis Two was tested with two blocks of variables using a stepwise hierarchical multiple linear regression. Order of entry reflected the conceptual model; ease of use, pharmacy characteristics, group, and gender were entered in variable block one, and posttest attitude variables (i.e., sense of self-efficacy, outcome expectations, role beliefs, and mattering) in variable block two. Hypothesis Three was tested with three blocks of variables. Variable blocks one and two were the same as the model in Hypothesis Two, and the third variable block had intentions as per the conceptual model.

As the most parsimonious model is best, a correlation matrix consisting of the independent variables was examined and factors with correlations greater than 0.8 were eliminated from the analysis. Other more moderate correlations (approximately 0.5) were eliminated if they were consistent with relevant theory. Further, a data reduction method (principal components analysis) was used to examine the variable which described the pharmacy site for component groupings.

Regression assumptions were examined and outliers with significant influence on the model were removed. A single point in a data set that is markedly different from other observations can make a substantial difference in the results of a regression model (Cohen et al., 2003; UCLA Academic Technology Services, 2006). Thus, data were checked for any observation that had influence. Influence can be caused by points that are outliers or have leverage. Outliers are observations with large residuals. An observation with high leverage has an extreme value on the predictor variable. Observations with influence were identified in several ways. First, scatterplots of dependent and independent variables were examined for extreme values. Next, extreme standardized residuals were identified. Residuals with a large Cook's D value (either greater than one or greater than 4/n) and residuals with leverage greater than (2k+2)/n (where k is the number of independent variables) were identified. Observations that were consistently identified were removed from the analysis to determine if they made a significance difference.

Data for a robust regression model should meet the assumptions of linearity, independence, normality, and heteroscedasticity (i.e., the variance of the residuals is homogenous across levels of the predicted values) of error terms (Cohen et al., 2003; UCLA Academic Technology Services, 2006). These assumptions were substantiated in several

ways. Linearity was checked for each model by examining a scatter plot of the independent and dependent variables. Variables with non-linear relationships were transformed as required. Independence was determined by examining residuals scatterplot for patterns that indicate unexplained relationships. The study was designed so that students were randomly assigned to study groups and thus group differences were independent of the measurement of the independent variables. Normality assumptions are robust except when samples are quite small or the departures from normality are marked (Myers & Well, 1995). Normality of the residuals was checked by examining a histogram and checking skewness and kurtosis statistics. Ratios of skewness and kurtosis statistics divide by their standard errors should be within +2 to -2 when the data are normally distributed. To ensure the assumption of heteroscedasticity was met, the standardized regression residuals were plotted against the predicted values and the distribution was examined.

Hypothesis Four was tested with a hierarchical logistical regression model. Use of five or more Diabetes Checks was only available for the intervention group, which restricted the sample size to 61 students. Consequently, the size of the regression model should to be reduced to approximately five variables. Scatter plots of the independent and dependent variables were examined for significant relationships to include in the analysis. Findings from the linear regression and pilot analysis were also used to decide which variables to include. Planned order of entry reflected the conceptual model; ease of use, pharmacy site characteristics, group, and gender were entered in variable block one, posttest attitude variables (i.e., sense of self-efficacy, outcome expectations, role beliefs, and mattering) in variable block two, and intentions in variable block three.

Logistic regression assumptions were also checked (Garson, 2006a). The study design ensured the following four assumptions were met: (1) data were meaningfully coded, (2) all available relevant variables were included, (3) independent sampling was performed, and (4) there was low error measurement. The sample met the minimum requirements of 10 cases per independent variable. The assumption of linearity of the independent variables and the log odds of the dependent variables was examined by using the Box-Tidwall Transformation (Garson, 2006a). The chance of multicolinearity was reduced by using a reduced model and by examining correlation matrices. Data were examined for outliers by determining if any of the standardized residuals were greater than 2.58. The value 2.58 indicated a cut of at the 0.01 probability level.

CHAPTER 4: RESULTS

This chapter describes the data and analyses of the Diabetes Check randomized controlled trial. First, the chapter describes the sample and survey measures. Next, the pharmacy site and students' experience are presented. Finally, findings from the primary and secondary analyses are presented.

Sample Description

There were 39 pharmacies in the Ambulatory Pharmaceutical Care Clerkship. Each site hosted from one to seven students (mean of 3.4 [SD=1.4] and mode of 3). All sites were located in Wisconsin with 13 (33%) in Madison, 3 (8%) in Milwaukee, and 23 (59%) in other centers throughout the state. Most sites (19, 49%) were in a clinic setting, with seven (18%) independent pharmacies, eight (21%) chains, and five (13%) mass merchandisers.

In May 2005, 130 students were registered for the Ambulatory Pharmaceutical Care Clerkship at UW-Madison. Three students dropped out of the course in clerkship blocks two, three, and six. Clerkship blocks refer to the eight week time period between May 2005 and May 2006 when students completed the Ambulatory Pharmaceutical Care Clerkship. They were originally randomized into the control group. One student in the intervention group moved from clerkship block four to five and a student in the control group moved from clerkship block five to six. A total of 127 students completed the Diabetes Check assignment by May 2006.

Table 14 represents the number of students who participated in the study (n=127) and completed surveys at pretest, posttest, and both time periods. Students were included in the

final analysis if they completed both the pre- and posttest. As presented in Table 14, eight students were missing a complete pre- and/or posttest. These eight students were removed from analysis. Thus, 61 students in the intervention group (95%) and 58 students (95%) in the control group had surveys for both periods. The final response rate was 94% (119 of 127 students) and the final participation rate is 92% (119/130).

Table 14 Number of Students' Participating and Completing Surveys by Clerkship Block and Study Group

Clerk-ship Block	Intervention (number of students)				Control (number of students)			
	Partcip-ating	Complete Pretest	Complete Posttest	Both Surveys	Partcip-ating	Complete Pretest	Complete Posttest	Both Surveys
1	10	10	10	10	13	12	12	12*
2	11	11	11	11	9	9	9	9
3	10	8	10	8	12	11	11	10
4	13	13	13	13	10	10	10	10
5	13	12	12	11	8	8	8	8
6	8	8	8	8	10	9	10	9
Total	**65**	**62**	**64**	**61**	**62**	**59**	**60**	**58**

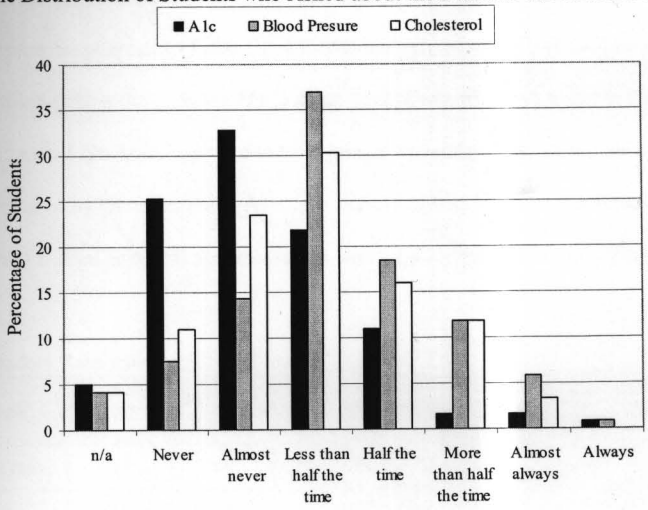
Note: This chart represents the response rate after removing the three students who dropped the course.
*Same student missing pre- and posttest data.

The sample was 71% female, with no differences in the proportion of females per study group (p=0.32). The majority of students (83%) had not worked with a pharmacist who routinely asks patients with diabetes about their ABCs; this did not differ between study groups (p=0.27; chi-squared test).

At the pretest students were least likely to have asked patients with diabetes about the A1c in the last month and more likely to ask about blood pressure and cholesterol in the last month (Figure 5). At the pretest, students were not working at their present clerkship site for the entire last month. About 5% of students felt that asking about the diabetes ABCs was non-

applicable in the last month. It is possible their last clerkship did not involved direct patient contact. These students were not included in and pre and post survey comparisons. At the pretest, there were no statistically significant differences between study groups in the proportion of students who asked about A1c (p=0.96), blood pressure (p=0.78), or cholesterol (p=0.61) as assessed with a chi-squared test.

Figure 5 The Distribution of Students who Asked about the Diabetes ABCs at Pretest



Survey Measures

This section presents the pretest measure results, a confirmatory factor analysis for the attitudinal measures (i.e., self-efficacy, outcome expectancies, counseling role orientation, monitoring role orientation, and mattering), validity checks and the reliabilities for the scales refined after the confirmatory factor analysis.

Scale Descriptions

Overall, students had positive attitudes related to asking about the diabetes ABCs. Students' responses to the scales were summarized inTable 15. On the Self-efficacy Scale, students had a mean score of 4.1 (SD=1.2;Table 15), indicating that on average they were "rather sure" they could routinely ask patients about the Diabetes ABCs under differing conditions. When reviewing the individual questions, students had the greatest self-efficacy in asking about the Diabetes ABCs when they had time or were talking with patients who regularly visited the pharmacy (Table 16). Correspondingly, students had the lowest self-efficacy in asking about the diabetes ABCs when the patients were in a hurry or did not appeared interested. Students appeared to have greater self-efficacy in asking about blood pressure, followed by cholesterol and A1c, respectively (Table 16). The distribution of the scale appeared normal and used the entire scale without a ceiling or floor effect (Appendix 6).

Table 15 Student Responses to Attitude Scales

Scale Name‡	Number of Questions	Response Scale**	N†	Min	Max	Mean	Std. Deviation	Reliability
Self-efficacy (SE)	12	1-7	119	1.00	7.00	4.07	1.20	0.96
Outcome Expectancies (EO)	11	1-7	119	3.00	6.45	4.99	0.64	0.84
Counselor Role Orientation (CRO)	7*	1-7	118	4.14	6.71	5.59	0.61	0.58
Monitoring Role Orientation (MRO)	4	1-7	118	2.25	7.00	5.09	0.87	0.84
Mattering (MAT)	7	1-5	119	2.57	5.00	3.72	0.51	0.82

*One item of the CRO was lost in translation between the paper and web survey: "The physician is better qualified than the pharmacist to advise patients about their medications."
** All scales are scored so higher scores represent more positive attitudes.
†Two scales have fewer respondents because of one student did not respond to the CRO and MRO scale.
‡Scales were calculated by taking the average across each set of questions.

Table 16 Students Responses to Questions on the Self-Efficacy Scale

Variable	Questions	N	Min	Max	Mean	Std. Deviation
The following set of questions refers to your interactions with patients with diabetes. How sure are you that you could:						
SE_a	a) routinely ask patients about A1c?	119	1	7	4.18	1.58
SE_b	b) routinely ask patients about blood pressure?	119	1	7	4.79	1.38
SE_c	c) routinely ask patients about cholesterol?	119	1	7	4.54	1.39
SE_d	d) routinely ask patients about A1c, blood pressure, and cholesterol?	119	1	7	4.03	1.48
SE_e	e) routinely ask all patients with prescriptions for a new medication about their A1c, blood pressure, and cholesterol?	119	1	7	4.67	1.46
SE_f	f) routinely ask patients at medication refills about A1c, blood pressure, and cholesterol?	119	1	7	4.11	1.46
SE_g	g) routinely ask patients who are in a hurry about A1c, blood pressure, and cholesterol?	119	1	7	2.53	1.36
SE_h	h) routinely ask patients who do not appear interested about A1c, blood pressure, and cholesterol?	119	1	7	2.70	1.31
SE_i	i) routinely ask unfamiliar patients about A1c, blood pressure, and cholesterol?	119	1	7	4.22	1.39
SE_j	j) routinely ask patients who regularly come into your pharmacy about A1c, blood pressure, and cholesterol?	119	1	7	4.83	1.47
SE_k	k) routinely ask patients about A1c, blood pressure, and cholesterol when it is busy?	119	1	7	3.15	1.52
SE_l	l) routinely ask patients about A1c, blood pressure, and cholesterol when you have time?	119	1	7	5.04	1.50

The outcome expectancies scale had a mean of 5.0 (SD=0.6;Table 15). On average, students responded that "more than half of the time" they expected a positive response when asking about the diabetes ABCs. Students reported that asking about the Diabetes ABCs most frequently allowed the students to monitor drug therapy, help students' build relationships

with patients, and open opportunities to talk with patients (Table 17). The outcome expectancy scores ranged from 3.0 to 6.5 (Appendix 6).

Table 17 Students Responses to Questions on the Outcome Expectancies Scale

Variable	Questions	N	Min	Max	Mean	Std. Deviation
If you ask patients with diabetes routinely about their ABCs, how often do you think this practice will:						
OE_a	a) help patients take charge of their A1c, blood pressure, and cholesterol?	119	3	6	4.19	0.81
OE_b	b) give me a sense of personal accomplishment?	119	2	7	5.07	1.0
OE_c	c) help create a professional image of pharmacy?	119	3	7	5.49	0.96
OE_d	d) embarrass patients?*	119	2	6	4.49	0.96
OE_e	e) increase my satisfaction with pharmacy as a career choice?	119	1	7	5.26	1.27
OE_f	f) help me build relationships with my patients?	119	3	7	5.59	0.95
OE_g	g) take too much of time for community practice?*	119	2	7	4.73	1.10
OE_h	h) open up opportunities to talk with patients?	119	3	7	5.52	0.99
OE_i	i) allow me to monitor drug therapy?	119	3	7	5.53	1.04
OE_j	j) frustrate pharmacy staff because it will slow workflow?*	119	1	7	4.32	1.13

*Items were reverse coded.

Role Orientation was measured using the CRO and the Monitoring Role Orientation Scales (MRO; Table 18). One CRO item, "The physician is better qualified than the pharmacist to advise patients about their medications," was lost between the paper and web surveys. This limited the comparison of CRO scores from this study to other published research.

Table 18 Students Responses to Questions on the Role Orientation Scale

Variable	Questions	N	Min	Max	Mean	Std. Deviation
CRO_a	It takes too much time to counsel patients on the medications they receive.*	118	3	7	5.63	1.07
CRO_b	Most patients are more interested in receiving quick and inexpensive service from their pharmacist rather than advice.*	118	1	6	3.78	1.17
CRO_c	It is essential for the pharmacist to advise patients about potential side effects that their drugs may cause.	118	1	7	6.13	1.00
CRO_d	An affixed prescription and applicable auxiliary contain all the information about the prescribed drug that the patient should receive from the pharmacist. *	118	1	7	5.35	1.54
CRO_e	There should be legal restrictions on what the pharmacist is allowed to tell patients about their medications. *	118	4	7	6.21	0.95
CRO_f	It is unethical to discuss with a patient the therapeutic purpose of his or her prescriptions.*	118	1	7	6.39	0.97
CRO_g	Patients receive the necessary information about their medications from their physician.*	118	1	7	5.64	1.18
MRO_doc	How important is it that physicians talk about A1c, blood pressure, and cholesterol with patients with diabetes?	118	4	7	6.32	0.89
MRO_Rx	How important is it that community pharmacists talk about A1c, blood pressure, and cholesterol with patients with diabetes?	118	2	7	5.72	1.14
MRO_s	How important is it that you, in your 741 Clerkship, talk about A1c, blood pressure, and cholesterol with patients with diabetes?	118	2	7	5.46	1.25
MRO_r	Community pharmacists should routinely talk to patients with diabetes about A1c, blood pressure, and cholesterol.	118	3	7	5.58	0.92
MRO_rf	Community pharmacists should talk to patients with diabetes about A1c, blood pressure, and cholesterol at every prescription refill.	118	1	7	4.25	1.1
MRO_j	It is the community pharmacist's job to routinely talk to patients with diabetes about A1c, blood pressure, and cholesterol	118	2	7	5.07	0.90

*Items were reverse coded.

Students reported a mean score of 5.6 (SD=0.6) on the CRO (Table 15). Students "agreed" to "strongly agreed" that it was part of their role to counsel patients. When regarding individual items, students felt most it was not unethical to discuss the therapeutic purpose of patients' prescriptions and there should be no legal restrictions on what a pharmacist can tell patients about their medications (Table 18). Students' CRO scores ranged from 4.0 to 6.7 without an apparent ceiling or floor effect (Appendix 6).

Students were positive about the MRO, with a mean score of 5.0 (SD=0.87), but this was less positive than their CRO score (Table 15). Students' MRO scores ranged from 2.0 to 7.0 without an apparent ceiling or floor effect (Appendix 6. Table 18). Students thought it was most important for physicians, followed by community pharmacists and themselves, respectively, to ask patients about the diabetes ABCs (Table 18). Students reported stronger agreement with statements that pharmacists should routinely talk to patients about the diabetes ABCs than a statement that this should be done at every refill (Table 18).

On the mattering scale which measured if patients felt they made a difference to patients, student had a mean score of 3.7 (SD=0.5) with 5 response options (Table 15). Students' mattering scale scores ranged from 2.6 to 5.0 without an apparent ceiling or floor effect (Appendix 6). An interpretation could be that students feel they "somewhat" matter to patients. When reviewing the individual items, students reported a greater extent of helpfulness and importance over other facets of mattering (Table 19).

Table 19 Students Responses to Questions on the Mattering Scale

Variable	Questions	N	Min	Max	Mean	Std. Deviation
MAT_a	To what extent, do you "make a difference" to patients?	119	2	5	3.68	0.64
MAT_b	How helpful are you to patients?	119	3	5	4.11	0.64
MAT_c	How important do you feel you are to patients?	119	2	5	3.92	0.68
MAT_d	How much do you feel patients pay attention to you?	119	2	5	3.76	0.74
MAT_e	How much would patients miss you if you went away?	119	1	5	3.29	0.98
MAT_f	How interested are patients generally in what you have to say?	119	2	5	3.78	0.68
MAT_g	How much do patients depend on you?	119	2	5	3.47	0.73

Confirmatory Factor Analysis

A confirmatory factor analysis was performed to reduce items, ensure constructs measured items as intended, and provide evidence for the factor structure of the scales. Individual items and scales were examined for normality. Details of the confirmatory factor analysis are provided in Appendix 7.

A five-factor model of the survey measures for the Diabetes Check was a better fitting model than the originally-proposed four-factor model. The structure of the survey instrument supports the conceptual model with each attitudinal measure assessing different attitudes, despite two changes to the original model. The outcome expectancies scale had two different subscales: positive and negative outcome expectancies. This is congruent with Social Cognitive Theory, which delineates these two domains separately (Bandura, 1997).

A second change was the elimination of two questions. One self-efficacy item asking about talking with patients who regularly patronize a pharmacy was eliminated because of poor model fit; in addition, pilot findings suggested students new to a site might not know if

patients regularly use that pharmacy. One positive outcome expectancies item was dropped; it queried if asking about the diabetes ABCs could empower patients. This item had poor loading and poor model fit. On closer inspection, other questions focused on students' outcomes, whereas this question was on patients' outcomes.

The confirmatory factor analysis provided evidence that, despite correlations among scales ($r<0.65$), scales measured separate constructs (Appendix 7). The final model with the revised scales with positive and negative outcome expectancies scales and the elimination of two questions was used for all subsequent analyses.

Scale Reliability

The reliability of the revised scales was assessed with Chronbach's alpha. This provided an assessment of internal consistency (i.e., how well the items "hang together"). Reliability was "good" and ranged from 0.82 to 0.96 for four scales (i.e., self-efficacy, positive outcome expectancies, monitoring role orientation, and mattering; Table 20).

Table 20 Scale Reliabilities

Scale Name	Number of Questions	Response Options	Reliability
Self-Efficacy	11	1-7	0.96
Positive Outcome Expectancies	6	1-7	0.91
Negative Outcome Expectancies	3	1-7	0.59
Counselor Role Orientation	7	1-7	0.58
Monitoring Role Orientation	4	1-7	0.84
Mattering	7	1-5	0.82

The CRO scale had a lower Chronbach's alpha at 0.58. This may have been due to the inadvertent loss of one item in translation to the online survey. Despite its lower reliability, this scale was retained in the final analysis because it had been used in prior research. The

negative role orientation also had a lower Chronbach's alpha at 0.59. This scale was retained while recognizing it may require a greater number of items to reach a good reliability in future.

Validity

Validity checks were built into the survey to assess the mattering scale and the effect of patient reaction. Students in the intervention group rated the "interest" and "helpfulness" of the Diabetes Check for each patient. These concepts overlap with concepts of mattering. A grand mean was calculated for each student across all patients. The mattering scale was significantly correlated with both mean patient interest ($r=0.31$, $p<0.05$) and mean patient helpfulness ($r=0.43$, $p<0.05$). This provided evidence for the validity of the mattering scale.

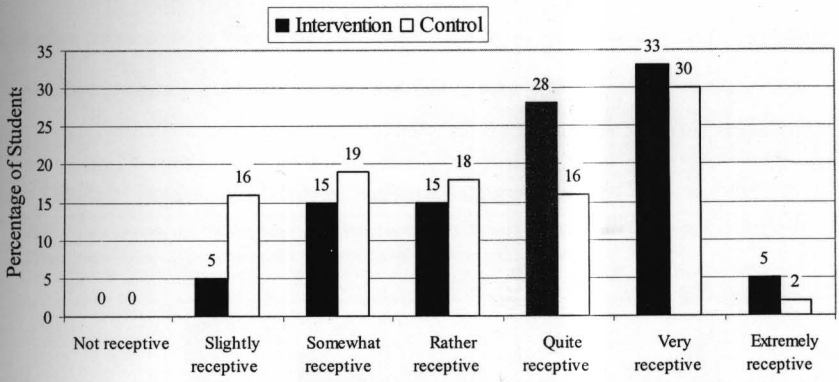
All students were asked about their overall experience with the Diabetes Check assignment. Students in the intervention group also rated their experience with each patient which was combined into a grand mean for each student. The grand mean of students' experience with each patient was correlated with the students' overall experience, ($r=0.66$, $p<0.05$). This provided evidence for the validity of the measure of students' overall experience with the Diabetes Check.

Pharmacy Site Description

A series of questions in the posttest asked for impressions of the pharmacy sites from students in both groups. This timing was chosen over the pretest, because students had not yet spent sufficient time in a pharmacy at pretest. However, student impressions of the Diabetes Check assignment might also have shaped their site descriptions. These impressions might not be accurate descriptions of the actual activities in the pharmacy, but the impressions are

informative for research on student perspectives. Students in the intervention group felt patients were more receptive to pharmacist counseling than students in the control group (p=0.04 using a chi-squared test; Figure 6). The intervention group had a mean score of 4.8 (SD=1.7). The control group was 4.4 (SD=2.2).

Figure 6 Patients Receptiveness to Pharmacist Counseling

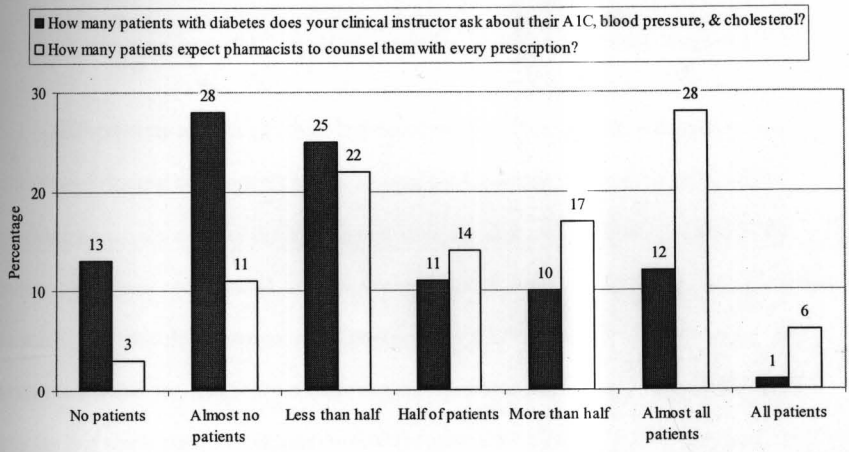


At your 741 clerkship site, how receptive were patients to pharmacist counseling?

Figure 7 describes the students' perceptions of the interactions between their patients and pharmacists at their clerkship pharmacy. A majority of students (66%) felt their clinical instructor, who is a pharmacist at their pharmacy site, asked about the diabetes ABCs with "less than half" or fewer patients with diabetes (Figure 7; mean score 3.2 [SD=1.6]). A timeframe was not specified for this question. Only 13% of students indicated their clinical instructor asked "no patients" about the diabetes ABCs. There were no differences between study groups (p=0.80; chi-squared test). One-third of students reported that all to almost all

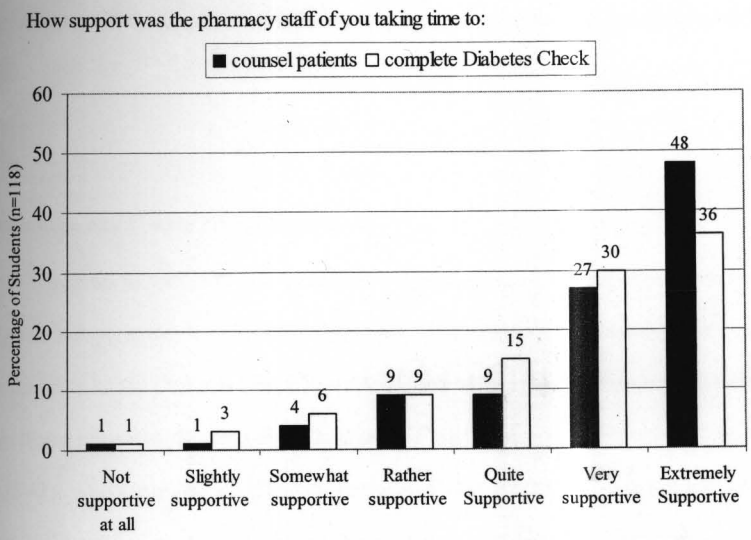
patients at their clerkship site expected to be counseled with every prescription (Figure 7; mean score 4.4 [SD=1.6]). There were no differences between study groups (p=0.35). Counseling was not defined in the question. Counseling can have different meanings which in turn may impact frequency of counseling. For example, if a pharmacist asks a patient if they have any questions at a refill and the patient replies no, has the patient been counseled? This should not be interpreted to mean two-thirds of patients were not counseled at every prescription (as required in Wisconsin). However, patients' expectations are shaped by routine behaviors in a pharmacy and lower patient expectations may suggest lower counseling rates.

Figure 7 Students Perceptions of Patient-Pharmacist Interactions at the Clerkship Pharmacy



The pharmacy staff was very supportive of the students taking time to counsel patients (mean score of 6.0 [SD=1.3]) and completing the appropriate Diabetes Check assignment (mean score of 5.7 [SD=1.4];Figure 8). There were no differences in the level of support between study groups (p=0.20; p=0.784; chi-squared test).

Figure 8 Pharmacy Students' Perceptions of Pharmacy Staff Support



As there were several variables that described the pharmacy site, a data reduction technique—principal components analysis—was used to reduce the number of variables describing pharmacy sites for the multivariate analysis. Data on the supportiveness of the pharmacy staff was not included, as it appeared staff was overwhelmingly supportive and thus this would add little descriptive power. Questions on patients' receptiveness to counseling, pharmacists' behavior, and patients' expectations for counseling were examined. All three variables had significant correlations ($p<0.001$) between 0.33 and 0.49. The principal component analysis reported that 61% of the variance could be explained by combining all variables into one component. The component loadings for receptiveness to counseling, pharmacists' behavior, and patients' expectations for counseling were 0.83, 0.74, and 0.78, respectively. Thus, these three variables were combined into one variable—site counseling—

for future multivariate analysis. Again, these variables were all measured at the posttest. There were no differences between the study groups on site counseling variable (p=0.18).

Experience with the Diabetes Check

Intervention and Control Group Experiences

Students in both intervention and control groups answered a set of common questions about their experiences with the Diabetes Check assignments. Students rated their overall experience with the Diabetes Check on a seven-point scale, ranging from extremely negative to extremely positive. Students in the intervention groups rated their experience more positively, with a score of 5.6 (SD=0.83) compared with 4.8 (SD=1.14) in the control group ($p<0.001$; t-test). There was a difference between intervention and control groups, however, because the question was worded slightly differently between groups. The questions read "Overall, how was your experience with patients during the Diabetes Check?" for the intervention group. The words "with patients" were dropped for the control group. While the answers may be comparable, the term "with patients" may have highlighted different elements of the assignment and altered the response. Thus, this question was not included in the final multivariate analysis.

Ease of use was assessed by asking students, on a scale from one to five, how easy it was to do a Diabetes Check. Students in the intervention group felt it was easier to do a Diabetes Check (mean of 3.9 [SD=0.7]) than students in the control group (mean of 3.4 [SD=0.7]) with a significance of $p<0.001$ on a t-test.

The number of students who reported working with a pharmacist who asked about the diabetes ABCs increased from 17% at baseline to 28% at the posttest survey at the end of the clerkship, with no difference between study groups at each time point (p=27; p=.74) or in change over time (p=0.31). Students were more likely to report having a role model than not (77% in the intervention group and 91% in the control group [p=0.04]). The question was, "Have you worked with a community pharmacist(s) who you consider to be a role model?" The term "role model" was not defined for the student.

Students reported a variety of follow-up activities after the Diabetes Check. Although follow-up activities were not a required part of the either assignment, students could spontaneously follow-up on issues that were uncovered. There were no group differences in the proportion of students (81%) who wrote a documentation note (Figure 9; p=0.17; chi-square test) and talked to clinical instructors as follow-up to the Diabetes Check (p=0.09; chi-square test). Students reported talking to clinical instructors for "some" patients (Figure 9).

Figure 10 summarizes the follow-up activities with group differences. Students in the intervention group were more likely to provide education and address concerns for a greater proportion of patients regarding ABCs. Students in the control group were more likely to make medication changes and contact other health care professionals related to ABCs.

Figure 9 Follow-Up Activities with No Differences between Study Groups

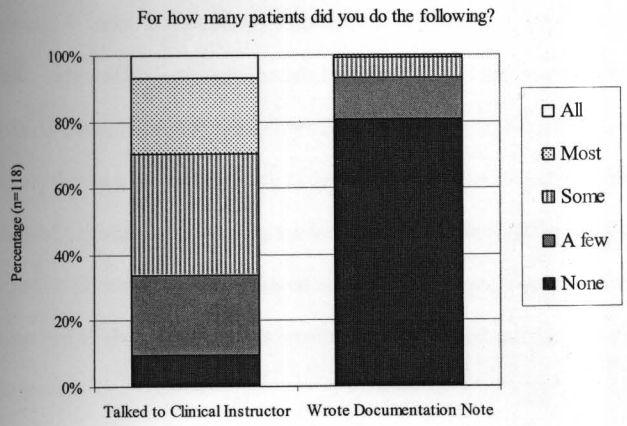
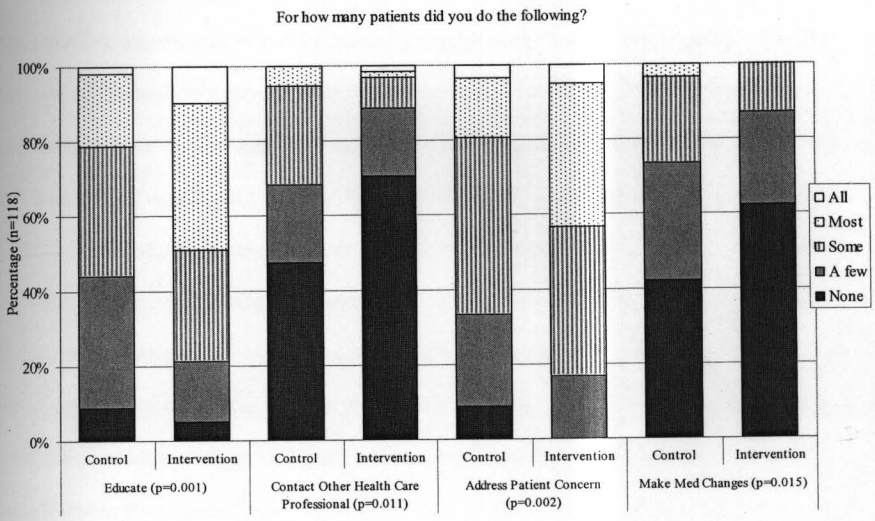


Figure 10 Follow-up Activities with Differences between Study Groups



Students were also asked to briefly describe their assignment. This question was intended to check that students completed the assignment to which they were randomized. However, most students described their impressions of the assignment instead of providing information on the actual tasks they completed. For example, a student in the control group report, "It was a good experience to apply the guidelines to real patients." The question was intended to gather the following answer, "I reviewed the profiles of two patients with diabetes and made recommendations." Based on these comments, it appears five students in the control group and all students in the intervention group reported talking with patients during their assignment.

The comments provided noteworthy information on students' impressions of the assignment. To understand the nature of students' responses, comments were coded as positive, neutral, and negative, and were examined by group. The intervention group had more positive experiences, while the control group had more neutral experiences (Table 21). Samples of the positive experiences in the intervention group included "Good experience to help form routine" and "A great way to force me to have a dialogue with patients about their medications that wasn't just a standard drug consult". Positive samples from the control group include, "Very helpful in helping identify problems, and what to look for" and "It was useful to review diabetes monitoring parameters and to apply them in practice". Negative comments in the intervention group were focused on the patient response, difficulty of the assignment at the pharmacy site, or overlap with the physician's role. Negative comments in the control group covered ideas such as "difficulty completing the assignment" and "application of the assignment in the pharmacy site".

Table 21 Rating of Students' Impression of the Diabetes Check Assignment

	Group*		Total
	Control	Intervention	
Positive	27 (51%)	48 (83%)	75 (68%)
Neutral	18(34%)	3(5%)	21 (19%)
Negative	8(15%)	7 (12%)	15 (14%)
Total	53 (100%)	58 (100%)	111 (100%)

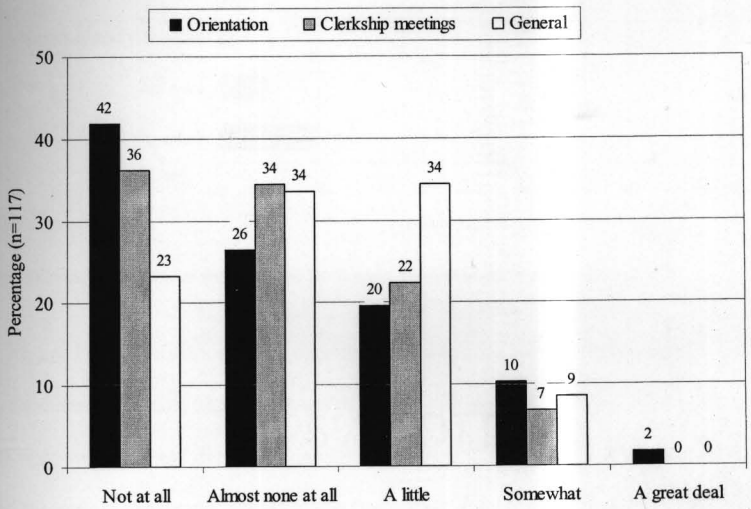
*Statistically significant $p<0.05$; chi-squared test.

Students were given the opportunity to offer additional comments on the assignment if desired. Thirteen students in the control group and 20 in the intervention group offered comments. In the control group, students commented on how to improve the Diabetes Check assignment, including more instructions, moving it to an elective clerkship block, and having more online discussion or face-to-face discussion. One student stated the intervention assignment was much more interesting. The intervention group comments were more positive. They listed possible improvements such as adding room for documentation of patient clinical targets, focusing on one of the ABCs at a time, following up with patients, suggesting house calls, or providing a pocket-sized patient handout.

A question was posed to assess students' perceptions of the effect of the pretest. Specifically, it asked students if they felt that answering the questions on the learning assessment impacted the Diabetes Check assignment. Overall, 24 (20%) of students reported that answering questions in the pretest had an effect on the Diabetes Check assignment. In an open-ended follow-up question, these students indicated the learning assessment reminded them to ask about the Diabetes ABCs, provided a chance to reflect on their skills, or helped them reflect on the pharmacists' role. There were no differences between study groups ($p=0.89$; chi-squared test), which suggested this possible bias was equally distributed among groups.

Students could freely discuss the differing assignments among themselves. Three questions were posed to uncover the extent to which students discussed the Diabetes Check assignment with their classmates at the clerkship orientation, clerkships meetings, or in general. These questions were used to assess the possibility of study group cross-contamination. Overall, most students were talking "a little" to "not at all" (Figure 11). This suggests there may have been some cross-contamination, but this did not differ by group (p=0.40, p=0.43, p=0.90; chi-squared test).

Figure 11 Proportion of Students who Talked to other Students about the Diabetes Check



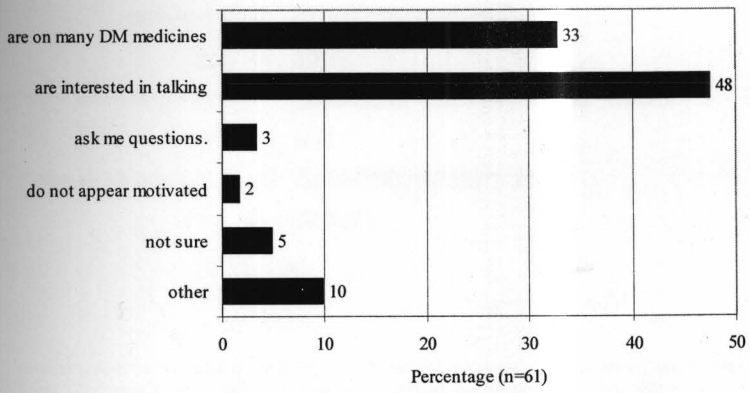
Intervention Group Experiences

The intervention group was asked eight additional questions about their experiences with the Diabetes Check assignment. Figure 12 shows which patients students were most likely to approach for a Diabetes Check. Students were most likely to approach patients who

appeared interested in talking to them and least likely to approach patients who were not motivated to manage their diabetes (Figure 12).

Figure 12 Patients Students Approach for a Diabetes Check

Students would most likely approach patients who:



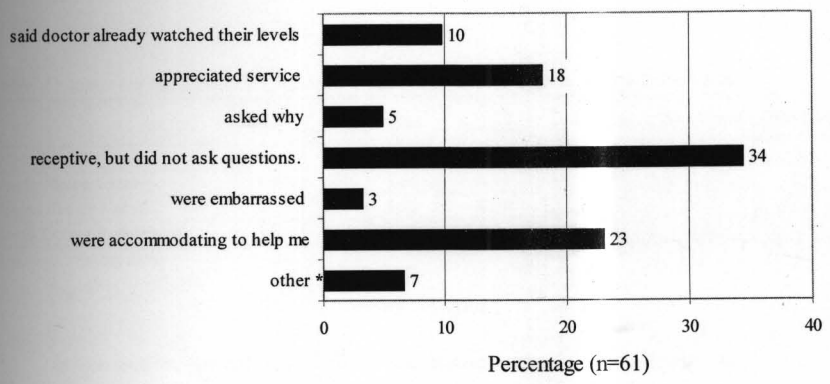
*Other (n=5) included all patients with diabetes (n=4) and a mixture of the response options.

Figure 13 presents the students reported most common patient reaction to the Diabetes Check. Students were most likely to report that the most common patient reaction was that patients were receptive and did not ask questions (Figure 13). Students responded that the affect of the patient response most often was "somewhat encouraging" them to talk to more patients about diabetes ABCs (54%), followed by "encouraging them" (18%), "unaffected" (18%), "somewhat discouraging them" (10%), and "discouraging them" (0%).

Students reported using the interview guide in different ways. Most students (35%) had the guide with them for the first few patients and later filled it in after they had talked with a patient, while 23% had it with them during the patient interactions and 23% only filled

it in after talking with the patient. Interestingly, 15% did not use it all and 3% of students used a similar program developed at the pharmacy site.

Figure 13 Most Common Patient Reaction to the Diabetes Check Reported by Students



*Other patient reactions (n=4) included the following 4 items: (1) split between accommodating and physician watched levels, (2) "hated it" or "liked it, (3) interested at first but lost interest, and (4) receptive, but unknowledgeable.

When asked how many Diabetes Checks they completed, whether or not they counted them for the assignment, 20 (33%) students reported completing the required five or less, 28 (47%) students completed six to ten, and 12 (20%) completed ten or more (12 to over 100). Students rated the time it took to complete a Diabetes Check, the patients' interest, helpfulness to the patient, and the student's experience with the Diabetes Check. For each student, the mean for all patients was calculated and then a grand mean of students' mean patient experiences was calculated (Table 22). The grand mean of students' time to complete a Diabetes Check was 6.0 minutes (SD=2.9) and a median of 2.3 minutes. When reviewing the raw data, the minimum time to complete a Diabetes Check was half a minute and the

maximum was 30 minutes. Overall, students' mean scores indicated they felt patients were between "somewhat" and "rather" interested in talking about the diabetes ABCs. Students rated the Diabetes Check between "somewhat" and "rather" helpful for patients. The students' mean experience with the Diabetes Check was somewhat positive.

Table 22 Intervention Group Experience with the Diabetes Check over All Patients

	Scale	N*	Mean	Std. Deviation	Median	Minimum	Maximum
Mean Patient Time	min	59	5.95	2.94	5.25	1.9	17
Mean Patient Interest	1-7	59	3.85	0.94	3.88	2.0	6.0
Meant Patient Helpful	1-7	59	3.78	0.88	3.80	1.0	6.0
Mean Patient Experience	1-7	59	5.32	0.73	5.40	3.8	6.5

*2 student missing data.

Primary Analysis

In this section, variable distributions and descriptions, and the bivariate and multivariate analyses, are described.

Variable Distributions

Data should be normally distributed to meet the assumptions of a proposed statistical analysis. Violation of non-normality does not inflate type 1 error but is more likely to reduce the ability of a statistical test to find differences that exist (Myers & Well, 1995). "Sample sizes of 40 should be sufficient to guarantee an honest type 1 error rate" (Myers & Well, 1995). Consequently, in this analysis, non-parametric statistics were used for bivariate tests to increase power, but parametric tests were used for multivariate analysis as statistical software is not available to perform non-parametric multivariate analyses. Skewness, kurtosis statistics, and histograms were used to examine the distribution of the scales. Skewness is a measure of the tails in the data. Kurtosis is a measure of the "peakedness" of the data. To evaluate

skewness and kurtosis statistics, these statistics were divided by their standard errors. These ratios are expected to be within ±2 when the data are normally distributed. Thus, the distribution of asking about A1c at both time points, and about blood pressure at the post-survey, were not normally distributed (Appendix 6); this was confirmed by examining the histograms and scatterplots. The distribution of the MRO scale and the CRO and positive outcome expectancies scales at post-survey (Appendix 6) were confirmed by visual examination of the histogram and scatterplots.

Data were also examined for outliers. In preliminary secondary analysis, one student had a consistent impact on the data, as assessed by regression residuals, leverage, and Cook's D statistic. This student was also marked as an outlier on scatterplots and histograms, particularly on the MRO scale and intentions (Appendix 6). This student was in the intervention group and had a low attitudes and intention for items related to asking about the diabetes ABCs, and more positive attitude scores on the CRO and the mattering scale. This indicated that this student had positive attitudes about pharmacists' counseling in general, but not about asking about the diabetes ABCs. This student wrote an exceptionally negative comment when asked to describe the assignment. It read, "Not necessary - the doctor should take care of this; unless I am a working in a clinic with the doctor". Weighing all these factors a decision was made to eliminate this students' data was eliminated from all analysis.

Scale Descriptions

Table 23 presents students' self-reported behavior in asking about the diabetes ABCs, attitudes, and intentions to ask about the diabetes ABCs in the future.

Table 23 Descriptions of Independent and Dependent Variables by Study Group

	Survey	n	Study Group	Mean	Change Score	Median	SD	Min	Max
Behavior**									
A1c	Pre	57	Control	2.37		2	1.10	1	6
		55	Intervention	2.38		2	1.35	1	7
	Post	56	Control	3.52	1.15*	4	1.37	1	6
		55	Intervention	4.15	1.77*	4	1.10	2	6
Blood Pressure	Pre	57	Control	3.32		3	1.30	1	6
		56	Intervention	3.39		3	1.36	1	7
	Post	57	Control	4.18	0.86*	4	1.23	2	6
		60	Intervention	4.35	0.96*	4	1.29	2	7
Cholesterol	Pre	57	Control	3.11		3	1.29	1	6
		56	Intervention	2.98		3	1.33	1	6
	Post	57	Control	3.82	0.72*	4	1.31	1	6
		56	Intervention	4.00	1.02*	4	1.25	2	7
Intentions									
Intention	Post Only	57	Control	4.46		4.60	0.76	3.00	6.00
		60	Intervention	4.64		4.80	0.73	3.20	6.00
Attitudes†									
Self-Efficacy	Pre	58	Control	4.03		4.00	1.19	1.75	7.00
		60	Intervention	4.13		4.08	1.21	1.00	6.83
	Post	58	Control	4.37	0.35*	4.59	1.21	1.73	6.73
		60	Intervention	4.50	0.37*	4.45	1.14	1.91	6.73
Positive Outcome Expectancies	Pre	57	Control	5.47		5.50	0.97	3.17	7.00
		60	Intervention	5.36		5.33	0.73	3.00	6.83
	Post	57	Control	5.45	-0.02	5.50	0.97	3.00	7.00
		60	Intervention	5.51	0.15	5.58	0.73	3.83	6.83
Negative Outcome Expectancies	Pre	57	Control	3.52		3.33	0.77	2.00	5.67
		60	Intervention	3.46		3.50	0.82	1.67	5.33
	Post	57	Control	3.48	-0.04	3.33	0.84	2.00	5.33
		60	Intervention	3.22	-0.24*	3.17	0.78	2.00	5.00
Monitoring Role Orientation	Pre	57	Control	5.13		5.25	0.85	2.25	6.50
		60	Intervention	5.08		5.25	0.86	3.00	7.00
	Post	57	Control	5.07	-0.06	5.25	0.89	2.50	7.00
		60	Intervention	5.07	-0.01	5.25	0.96	2.75	7.00
Counseling Role Orientation	Pre	57	Control	5.61		5.71	0.67	4.14	6.71
		60	Intervention	5.55		5.57	0.55	4.29	6.71
	Post	57	Control	5.59	-0.02	5.71	0.78	3.43	6.71
		60	Intervention	5.75	0.20*	5.77	0.54	4.43	6.86
Mattering Scale	Pre	58	Control	3.68		3.71	0.53	2.57	4.57
		60	Intervention	3.76		3.86	0.49	2.57	5.00
	Post	58	Control	3.83	0.15*	3.86	0.59	2.43	5.00
		60	Intervention	3.97	0.21*	4.00	0.45	2.71	5.00

*Significant within group change $p<0.10$.

**n is variable as student could select n/a.

†One student did not respond to post-survey questions about Intentions, Outcome Expectancies, and Role Orientation; one other student did not respond to pretest questions about Role Orientation.

In the primary hypothesis all variables in Table 23 are dependent variables. In the secondary analyses, dependent variables include behaviors in asking about the diabetes ABCs and intentions and independent variables include all attitudes.

Between the pre- and post-survey, both study groups increased the rate of asking about the diabetes ABCs. Students' mean scores on the self-efficacy scales were between "rather sure" to "quite sure" they could routinely ask about the diabetes ABCs. Students' scores ranged from the scale floor of "not sure at all" to the ceiling of "extremely sure", showing students had a wide range in levels of self-efficacy. Students were more likely to have higher scores on the positive than the negative outcomes expectancy scale. This suggests students expected positive events to happen more often than negative events when asking about the diabetes ABCs. The negative outcome expectancies were in the middle of the scale scores; the positive scale scores fell in the top two-thirds of the scale range. Students had more positive scores on the CRO than the MRO, suggesting students were more positive about their general counseling role than their role in monitoring diabetes. The MRO scale had a range from ceiling to floor, while the CRO score ranged from around the midpoint to near the ceiling.

Overall, students felt they mattered or made a difference "a little" to "somewhat" to their patients. While some students scored at the maximum, minimum scores were below the scale midpoint. On the intentions scale, students reported they were "likely" to "very likely" to routinely ask patients with diabetes about the diabetes ABCs in the future. The range was in the middle, with no scores at the extremes of the scale.

For all students, attitude changes were in the expected directions. Students' scores on self-efficacy and mattering had significant increases in both study groups over pretest, while the MRO and positive outcome expectancies scores did not change in either study group.

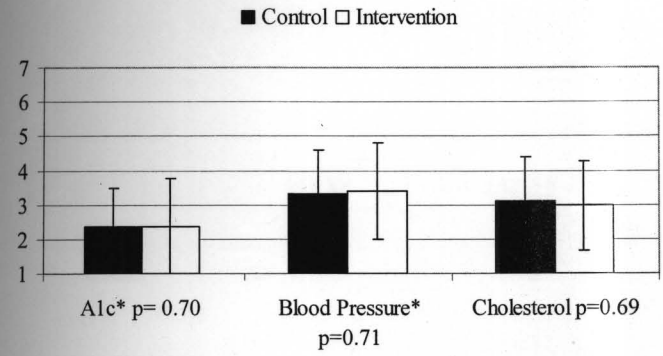
CRO scores significantly increased in the intervention group. Similarly, students' scores on the negative outcome expectancies decreased in the intervention group, indicating they expected fewer negative outcomes when asking about the diabetes ABCs. Comparisons of difference in the amount of change between groups were evaluated in the primary and secondary analyses.

Pretest and Posttest Group Comparisons

Study group differences in pretest and posttest scores for behaviors in asking about ABCs and attitudes were assessed with t-tests for independent means. If items or scales were not normally distributed (i.e., asking about A1c and blood pressure, MRO, CRO, and positive outcome expectancies), group differences were tested using the Mann Whitney-U test.

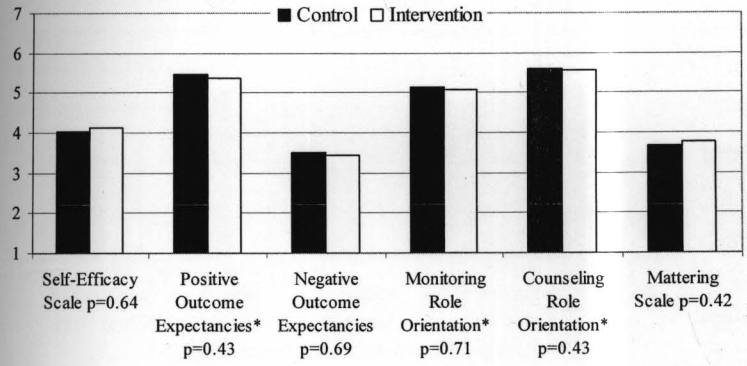
There were no differences in either pretest behavior or attitude scores relative to asking about the diabetes ABCs (Figure 14 and Figure 15). At the posttest, there was a study group difference in students' frequency of asking about A1c (Figure 16), but not asking about either blood pressure or cholesterol. Students in the intervention group asked about A1c more frequently than students in the control group. There was a significant difference between study groups in negative outcomes expectancies (Figure 17). Students in the intervention group expected fewer negative outcomes than students in the control group. There were no other differences in posttest attitude scores between the study groups (Figure 17).

Figure 14 Pretest Group Comparison of Behavior



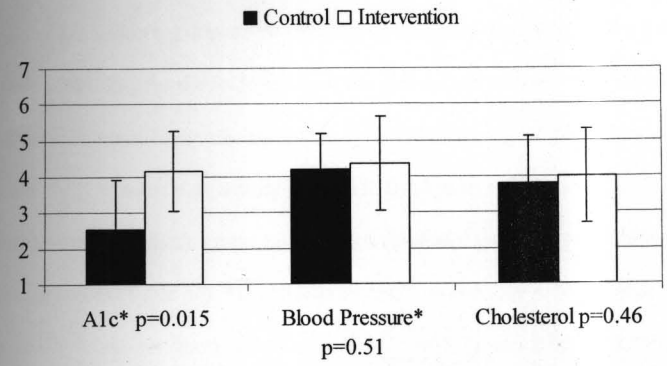
*Non-parametric Mann Whitney-U

Figure 15 Pretest Group Comparison of Attitudes



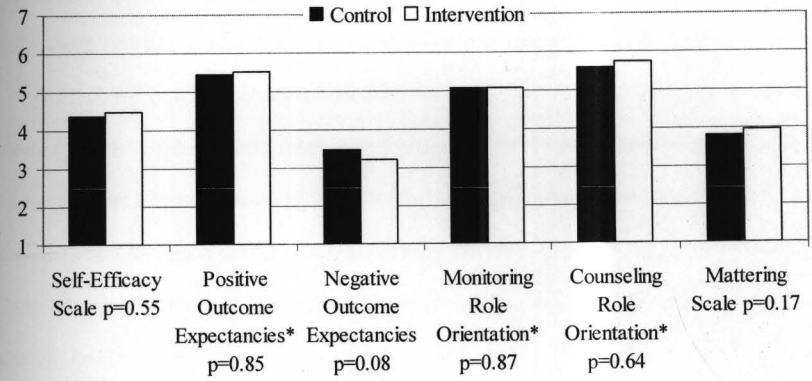
*Non-parametric Mann Whitney-U

Figure 16 Posttest Group Comparison of Behavior



*Non-parametric Mann Whitney-U

Figure 17 Posttest Group Comparison of Attitudes



*Non-parametric Mann Whitney-U

Primary Hypothesis – Bivariate

The following dependent variables at the posttest were tested for group differences while controlling for the scale scores at the pretest: asking about the diabetes ABCs, self-efficacy, outcome expectancies, role beliefs, and mattering. If items or scales were not normally distributed (i.e., asking about A1c and blood pressure, MRO, CRO, and positive outcome expectancies), group differences were tested using the Mann Whitney-U test on change scores (Table 24). This rank order test does not require assumptions about the normality of the distribution (Myers & Well, 1995). The remaining post survey variables (i.e., asking about cholesterol goals, self-efficacy, negative outcome expectancies, and mattering) were regressed on study groups and pretest scores. Data were checked and met assumptions for linearity, independence, and heteroscedasticity. Self-efficacy, negative outcome expectancies, and mattering had small deviations from normality of error; as these were not marked and the plots appeared normal, the violation had little effect on the analysis.

There were group differences between the study groups in the amount of change in asking about A1c, role beliefs as measured by the students' attitudes about Counseling Role Orientation and Negative Outcome Expectancies (Table 24). As intentions were not measured at pretest, the differences in intentions were examined with a t-test for independent means. There were no difference in intention scores between the intervention and control group ($p=0.20$, $n=116$).

Table 24 Primary Hypothesis: Non-Parametric Bivariate Analysis

Null Hypothesis: There is no difference on the DV change score between the study groups (Mann Whitney-U Test).		
DV	**N**	**Group**
Asking about A1c Goals	110	p=0.047*
Asking about Blood Pressure Goals	112	p=0.71
Monitoring Role Orientation (MRO)	116	p=0.48
Counseling Role Orientation (CRO)	116	p=0.016*
Positive Outcome Expectancies	117	p=0.25

*Statistically significant $p<0.05$.

Table 25 Primary Hypothesis: Parametric Bivariate Analysis

Null Hypothesis: There is no difference between the study groups on the dependent variables (*DV*) in the posttest when controlling for the *DV* at pretest.				
DV	**N**	**Model**	**Adjusted R^2**	**Group**
Asking about Cholesterol Goals	112	p=0.001	0.11	p=0.43
Self-Efficacy Scale	118	p<0.001	0.35	p=0.69
Negative Outcome Expectancies	117	p<0.001	0.34	p=0.068*
Mattering Scale	118	p<0.001	0.24	p=0.26

In summary, we rejected the null hypotheses that there were no differences between study groups in asking about A1c, Counseling Role Orientation, and Negative Outcome Expectancies in favor of the alternative hypothesis that the intervention group had greater improvements than the control group. The null hypotheses were not rejected for other behaviors and attitudes. Students who completed the Diabetes Check intervention had greater improvements in the frequency of monitoring patients' A1c values and in their Counseling Role Orientation than students in the control group. Students who completed the Diabetes Check intervention also expected fewer negative outcomes than students in the control group.

Primary Hypothesis – Multivariate

Multivariate linear regression analysis was conducted using dependent variable to test the null hypotheses that there is no difference between the study groups in behavior, intentions, and attitudes in the posttest when controlling pretest variables, pharmacy site counseling and gender as per the conceptual model and Hypothesis One. Data were checked and met assumptions for linearity, independence, and heteroscedasticity. The MRO had one additional case with a large residual; when reviewing the raw data, this intervention group student had an uncharacteristically decreasing MRO. When this case was removed, the pattern of significance did not change, thus the outlier was included

The multivariate analyses upheld the finding that the intervention group had greater improvements in the amount of change in 2 of the 10 dependent variables - asking patients about their A1c and the student's Counseling Role Orientation (Table 26) while controlling for pharmacy site counseling. The null hypotheses that there were no improvement in the amount of change between study groups in asking about A1c and Counseling Role Orientation was rejected, in favor of the alternative hypothesis that there were differences in the amount of change between the groups. However, it did not confirm the bivariate findings about Negative Outcome Expectancies. When controlling for pharmacy site counseling, students in the intervention group did not expect fewer negative outcomes. The null hypotheses were not rejected for other behaviors and attitudes. Students in the intervention group were significantly more likely than students in the control group to have greater improvements in the frequency of asking patients about their A1c and in their counseling role orientation while controlling for pharmacy site counseling.

Table 26 Primary Hypothesis: Multivariate Analysis

Null Hypothesis: There is no difference between the study groups on the *DV* in the posttest when controlling for the *DV* at pretest, site counseling, and gender.				
DV	**N****	**Model**	**Adjusted R^2**	**Group**
Behavior				
A1c	109	P<0.001	0.26	p=0.03*
Blood Pressure	111	p<0.001	0.20	p=0.89
Cholesterol	111	p<0.001	0.21	p=0.74
Attitudes				
Self-Efficacy Scale	117	p<0.001	0.44	p=0.99
Positive Outcome Expectancies	117	p<0.001	0.29	p=0.52
Negative Outcome Expectancies	117	p<0.001	0.44	p=0.19
MRO	116	p<0.001	0.47	p=0.68
CRO	116	p<0.001	0.48	p=0.03*
Mattering	117	p<0.001	0.31	p=0.54
Intentions				
Intentions	117	p=0.002	0.10	p=0.33

*Statically significant.
**One student was missing data on site counseling (the same student missed data from the posttest on Intentions, Outcome Expectancies, and Role Orientation), thereby reducing n from the bivariate analysis.

Secondary Analyses

Secondary analyses were conducted for two reasons. First, the secondary analyses explore the dynamics underlying students' intentions and behaviors in regards to asking about the diabetes ABCs as per the conceptual model. Second, secondary analyses replicate prior pilot research which predicted students' intentions to ask about the diabetes ABCs in future.

Four sections are presented in the secondary analysis. The first describes how the number of variables in the conceptual model and subsequent secondary analyses were reduced to accommodate the sample size. The next three sections present tests of separate models for (1) predicting students' intention to use the diabetes ABCs in the future, (2) behavior in asking about the diabetes ABCs, and (3) routine behavior in asking about the diabetes ABCs.

Reducing Variables in the Conceptual Model

The first step of the secondary analysis was to develop parsimonious models for predicting behavior and intentions. As the sample size was fixed at 118 students and the conceptual model contained ten independent variables, the independent variables were examined to determine if the number of variables in the conceptual model could be reduced. This was accomplished in four ways; (1) through the use of theory in the conceptual model, (2) through the use of research findings (3) by examination of a correlation matrix, and (4) by stepwise hierarchical linear regression.

The first step focused on the conceptual model itself. As discussed in the literature review, debate exists on whether outcome expectancies have any independent contribution to the prediction of behavior when differences in self-efficacy are controlled (Bandura, 1997; Resnick, 1998; Resnick et al., 2000; Resnick, 2002). Thus, asking about A1c, blood pressure, and cholesterol were separately regressed on self-efficacy and outcome expectancies was added in a second step. The R^2 change between the model with and without outcome expectancies was examined for statistical significance. Over all three behaviors (i.e., A1c, blood pressure, and cholesterol separately), the change in R^2 was not statistically significant ($p>0.05$), demonstrating that outcome expectancies did not explain any additional variance in behavior after controlling for self-efficacy. In addition, there was a moderate correlation of 0.5 between outcome expectancies and self-efficacy. Thus, outcome expectancy scales were dropped from the models predicting behavior changes. No other theory was identified that could be used to reduce the model.

Students completed their Ambulatory Pharmaceutical Care Clerkship in one of six separate clerkship blocks. Clerkship blocks refer the eight week time period between May

2005 and May 2006. The clerkship block in which the students participated in this research may have the potential to influence the research findings. However, there were no differences in behavior, attitudes, or intentions for asking about the diabetes ABCs between clerkship blocks; therefore clerkship block was removed from secondary analyses.

Pretest measures of behavior in asking about the diabetes ABCs were not included in the secondary models, as they were known to account for variance in the posttest measures. Furthermore by only including posttest measures, the model could be compared to model predicting pharmacists students' intentions from the ABC Tool project (2003-4) (Guirguis, Kieser, Kanous, & Chewning, 2005a).

The second regression model in the secondary analysis examined the predictors of asking about the diabetes ABCs, which was measured with three separate questions asking about A1c, blood pressure, and cholesterol separately. Predictors of asking about A1c were tested in a separate model from predictors of asking about blood pressure and cholesterol, as there was a significant study group effect for asking about A1c, but not for blood pressure and cholesterol. Asking about A1c was a behavior that had low levels at pretest and had greater improvement in the intervention group than the control group. Asking about blood pressure and cholesterol were behaviors that were relatively high at pretest and did not have differences in the amount of improvement between study groups.

Next a correlations matrix of all behaviors, intentions, and attitudes was examined to assess the risk of serious multicollinearity and describe bivariate relationships between independent and dependent variables. The majority of correlations in Table 27 were significant except those between the CRO and the three ABC asking behaviors. There were no correlations in Table 27 greater than 0.80; thus serious multicollinearity was not considered.

The correlation between the self-efficacy and MRO scale was 0.73, indicating 53% of the variances were shared between the two variables. Thus, students' beliefs about the role of pharmacists in monitoring the ABCs can explain about half of the variance in the students' self efficacy scores and vice versa. In addition, self-efficacy and MRO scales were correlated between 0.50 and 0.60, with the behavioral measures indicating a strong relationship. Both scales were retained in all secondary analyses, as the stepwise regression would identify which variables had a significant relationship with the dependent variables when controlling for other variables in the hierarchical analysis.

Table 27 Correlation Matrix

		1	2	3	4	5	6	7	8	9
Ask about A	1	1								
Ask about B	2	0.66*	1							
Ask about C	3	0.62*	0.77*	1						
Intention	4	0.52*	0.51*	0.43*	1					
Self-Efficacy	5	0.57*	0.61*	0.55*	0.66*	1				
Positive OE**	6	0.34*	0.36*	0.23*	0.56*	0.47*	1			
Negative OE**	7	-0.40*	-0.34*	-0.35*	-0.43*	-0.51*	-0.34*	1		
CRO	8	**0.12**	**0.13**	**0.03**	0.36*	0.22*	0.27*	-0.37*	1	
MRO	9	0.53*	0.58*	0.54*	0.66*	0.73*	0.54*	-0.50*	0.29*	1
Mattering	10	0.28*	0.34*	0.20*	0.33*	0.40*	0.43*	-0.31*	0.42*	0.32*

(Non-significant correlations are **bolded**)
*Correlation is significant ($p<0.05$).
**OE= Outcome Expectancies.

Next the correlations were examined to determine if there were group differences among the correlations between independent and dependent variables (Table 28). The intervention and control groups had different patterns of correlations for two variables, CRO and mattering. For the intervention group, CRO was not correlated with other all other

attitudes and intentions, while for the control group it was. Similarly in the intervention group, mattering scores were not correlated with all behaviors, intentions, and attitudes, while mattering scores were correlated with all behaviors, intentions and attitudes in the control group. The implications of these group differences for the secondary analysis are presented below.

Table 28 Correlation Matrix by Study Group

		Study Group†	1	2	3	4	5	6	7	8	9
Ask about A	1	C	1								
		I	1								
Ask about B	2	C	0.70*	1							
		I	0.63*	1							
Ask about C	3	C	0.66*	0.76*	1						
		I	0.58*	0.78*	1						
Intention	4	C	0.49*	0.52*	0.40*	1					
		I	0.55*	0.48*	0.46*	1					
Self-Efficacy	5	C	0.68*	0.72*	0.62*	0.63*	1				
		I	0.45*	0.51*	0.48*	0.69*	1				
Positive OE**	6	C	0.38*	0.36*	**0.22**	0.64*	0.50*	1			
		I	0.29*	0.37*	**0.25**	0.48*	0.43*	1			
Negative OE**	7	C	-0.35*	-0.25*	-0.27*	-0.39	-0.47*	**-0.24**	1		
		I	-0.42*	-0.42*	-0.42*	-0.45	-0.56*	-0.49*	1		
CRO	8	C	**0.15**	**0.26**	**0.08**	0.52*	0.29*	0.37*	-0.49*	1	
		I	**-0.01**	**-0.05**	**-0.06**	**0.13**	**0.12**	**0.07**	**-0.17**	1	
MRO	9	C	0.55*	0.60*	0.53*	0.66*	0.77*	0.57*	-0.44*	0.42*	1
		I	0.56*	0.56*	0.55*	0.67*	0.70*	0.53*	-0.58*	**0.15**	1
Mattering	10	C	0.45*	0.58*	0.35*	0.69*	0.63*	0.59*	-0.37*	0.60*	0.54*
		I	**-0.02**	**0.07**	**0.00**	**-0.17**	**0.09**	**0.16**	**-0.19**	**0.07**	**0.08**

(Non-significant correlations are **bolded**)
*Correlation is significant ($p<0.05$).
**OE= Outcome Expectancies
†C=Control and I=Intervention

An interaction between CRO score and group was considered for the secondary analysis predicting intentions as CRO and intentions scores were positively correlated for the control group, but not correlated in the intervention group. The CRO scale has been shown to predict pharmacists' behavior (Mason & Svarstad, 1984; Schommer & Wiederholt, 1994a;

Schommer & Wiederholt, 1994b; Schommer, 1994; Schommer & Wiederholt, 1995; Schommer & Wiederholt, 1997); thus an interaction between CRO and group (i.e., different behavior) is consistent with theory.

The interaction between mattering and group was considered for all secondary analyses because mattering was correlated with the dependent variables (asking about the diabetes ABCs and intentions) in the control group and not the intervention group. Mattering had been introduced into the conceptual model after a qualitative assessment of pilot data from 2005-6 Blood Pressure Check revealed a sense of mattering coincided with students having a positive experience with the Diabetes Check. This immediate sense of students' mattering to the patient captured a potential benefit of the Diabetes Check assignment. Thus, an interaction between mattering and group in the prediction of students' behavior and intentions is consistent with the conceptual model and prior pilot research. Interestingly, the same group differences were also present when the mattering scores from the pretest were correlated with behavior and intentions. The pretest occurred after training and before the Diabetes Check assignment. This suggests that group differences in relationship between mattering and intention were either present before the study or arose after the training session.

Intention Regression

Using the conceptual model, hierarchical multiple linear regression was used to determine students' intentions to use a Diabetes Check in the future. Order of entry for the regression analysis reflected the conceptual model. Control variables including group, gender, ease of use of the course assignment, and site counseling composite were entered in variable block one, and attitude variables were entered in variable block two. Outcome expectancies

were included in the analysis, as there is no theory to guide potential relationships between outcome expectancies and intentions. In addition, both a CRO and mattering interaction term and a mattering and group interaction term were included after the stepwise regression. The simple and interaction effects were mean centered in order to aid the interpretability of the regression coefficients (Cohen et al., 2003).

The regression model accounted for a significant amount of variance in intentions, with $F(5, 111)=29.20$, $p<0.001$, $R^2=0.57$, and adjusted $R^2=0.55$. The site counseling explained 11% of the variance in intentions ($p<0.001$), and attitudes explained 46% of the variance in intentions ($p<0.001$;Table 29). The MRO, self-efficacy, positive outcome expectancies, and CRO all significantly predicted students' intentions to ask about the Diabetes ABCs. The main effect of group was not significant.

Table 29 Model Coefficients Predicting Intentions

Variable Block	Independent Variable	Unstandardized Coefficients		Standardized Coefficients Beta	Semi-Partial r
		B	Std. Error		
One					
	Site Counseling	0.196	0.055	0.317*	0.314
	Study Group	0.120	0.132	0.081	0.080
Two					
	Mattering x group	-0.682	0.186	-0.293*	-0.220
	MRO	0.241	0.078	0.298*	0.186
	Mattering	0.279	0.130	0.197*	0.129
	Self-efficacy	0.178	0.060	0.279*	0.179
	Positive OE**	0.187	0.067	0.214*	0.167

The model used n=117. The following variables were not significant: CRO, ease of use, and negative outcome expectancies.

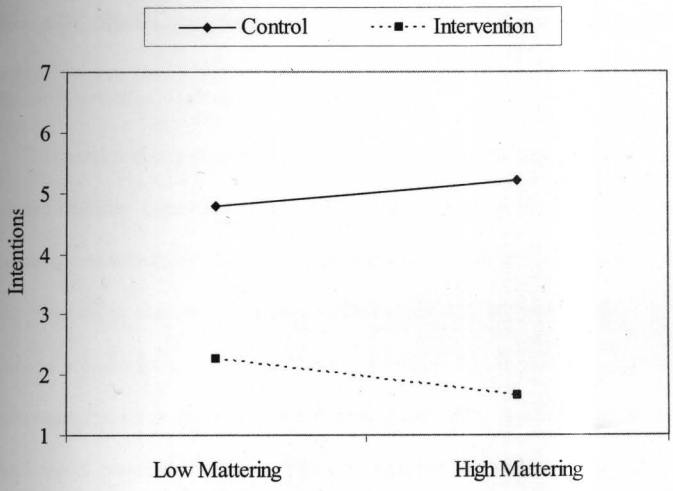
*$p<0.05$.

** OE=Outcome Expectancies.

The CRO and group interaction term was insignificant and did not change the significance of the other predictors of intention to use the ABCs in the future. The mattering and group interaction term was statistically significant. The main effect CRO term was no longer significant and was not included in the analysis. The final regression model accounted for a significant amount of variance in intentions, $F(7, 109)=21.39$, $p<0.001$, $R^2=0.60$ and adjusted $R^2=0.58$.

Site counseling explained 11% of the variance in intentions ($p<0.001$) and attitudes explained a further 49% of the variance in intentions ($p<0.001$). Attitudes which predicted intentions include: MRO, self-efficacy, positive outcome expectancies, and an interaction between mattering and group. CRO, ease of use, and negative outcome expectancies were not significant predictors of intentions to ask about diabetes ABCs. While controlling for site counseling and other attitudes, a one standard deviation change in monitoring role orientation, self-efficacy, and positive outcome expectancies would result respectively in a 0.30, 0..28, or 0.21 standard deviation change in intentions. The impact of mattering differed between the study groups (Figure 18). For students in the control group, as their sense of mattering increased, their intentions to ask about the diabetes ABCs were higher. For students in the intervention group, as their sense of mattering increased, their intentions were lower.

Figure 18 Mattering and Group Interaction



In addition, moderate suppression occurred with the mattering interaction term. "The most generally accepted definition of a suppressor variable [is] 'a variable which increases the predictive validity of another variable (or set of variables) by its inclusion in a regression equation (MacKinnon, Krull, & Lockwood, 2000).'" The mattering and group interaction has a simple correlation of -0.10, but its beta weight in the equation predicting intention is -0.29 indicating a stronger relationship. Thus other attitudes in the equation remove or suppress the unwanted variance in the mattering group interaction and enhance the relationship between the mattering and group interaction term with intentions (Cohen et al., 2003).

Data were checked and met assumptions for linearity, independence, normality of error, and heteroscedasticity. When examining residuals, leverage, and Cook's D, no other students were considered outliers.

In summary, students' intentions to ask about the diabetes ABCs were predicted by pharmacy site counseling, monitoring role beliefs, self-efficacy, and positive outcome expectancies. Mattering predicted intentions, but differently in each study group.

Behavior Regression –Asking about the ABCs

Hierarchical stepwise multiple linear regression was used to determine what items predicted students' behaviors in asking about the diabetes ABC. Behavior was assessed by three questions which asked how often students asked patients with diabetes about their A1c, blood pressure, or cholesterol numbers with a seven item response scale. Two models were created to account for group differences in behaviors. The first model assessed predictors of A1c because the intervention group had greater improvements in asking about A1c. The second model assessed predictors of blood pressure and cholesterol combined as they did not have group differences.

Order of entry for the regression analysis reflected the conceptual model. Control variables including group, gender, ease of use, and site counseling composite were entered in variable block one, attitude variables in variable block two, and intention in variable block three. In addition, the mattering and group interaction term was included as a fourth variable block.

The complete regression model accounted for a significant amount of variance in intentions, with $F(4,110)=19.8$, $p<0.001$, $R^2=0.43$ adjusted $R^2=0.40$. When controlling for group, each one standard deviation change in site counseling increased asking about A1c by 0.40 standard deviations (Table 30). When controlling for site counseling, students in the intervention group had a 0.53 higher score in behavior asking about A1c on a scale from one

to seven. Together, site and group explained 22% of the variance in behavior asking about A1c ($p<0.001$). Attitudes (i.e., self-efficacy and MRO) explained 20% of the variance in asking about A1c ($p<0.001$). For each one standard deviation change in self-efficacy or MRO, asking about A1c increased by 0.32 or 0.22 standard deviations. Gender, CRO, mattering, and intentions were not significant predictors of asking about A1c. The mattering and group interaction term was not significant and did not change the significance of the other predictors.

Table 30 Model Coefficients Predicting Asking about A1c

Variable Block	Independent Variable	Unstandardized Coefficients		Standardized Coefficients Beta	Semi-Partial r
		B	Std. Error		
One					
	Site Counseling	0.427	0.089	0.403*	0.401
	Study Group	0.526	0.214	0.206*	0.205
Two					
	Self-Efficacy	0.354	0.118	0.324*	0.218
	MRO	0.308	0.152	0.222*	0.147

The model used n=115. The following variables were not significant: gender, ease of use, CRO, mattering, and intentions.
*$p<0.05$.

When examining residuals, leverage, and Cook's D, no other students were considered outliers. Data were checked and met assumptions for linearity, independence, normality of error, and heteroscedasticity.

In summary, behavior in asking about A1c was predicted by pharmacy site counseling, self-efficacy, MRO, and completing the Diabetes Check assignment.

For blood pressure and cholesterol combined, the final regression model accounted for a significant amount of variance in behavior in asking about blood pressure and cholesterol,

with $F(3,112)=29.4$, $p<0.001$, $R^2=0.44$ adjusted $R^2=0.43$. Site explained 17% of the variance in behavior asking about blood pressure and cholesterol ($p<0.001$). Attitudes explained 27% ($p<0.001$). A one standard deviation change in the site counseling composite increased asking about blood pressure and cholesterol by 0.40 standard deviations (Table 31). Similarly, when controlling for site, one standard deviation change in either self-efficacy or MRO increased asking about blood pressure and cholesterol by 0.37 or 0.26 standard deviations, respectively. Gender, CRO, intentions, and study group were not significant predictors of asking about A1c. The mattering and group interaction term was not significance and did not change the significant of the other predictors.

Table 31 Model Coefficients Predicting Asking about Blood Pressure & Cholesterol

Variable Block	Independent Variable	Unstandardized Coefficients		Standardized Coefficients Beta	Semi-Partial r
		B	Std. Error		
One					
	Site Counseling	0.408	0.084	0.413*	0.413
Two					
	Self-Efficacy	0.376	0.107	0.368*	0.248
	MRO	0.341	0.138	0.262*	0.174

The model used n=116. The following variables were not significant: gender, ease of use, study group, CRO, mattering, and intentions.
*p<0.05.

When examining residuals, leverage, and Cook's D, no other students were considered outliers. Data were checked and met assumptions for linearity, independence, normality of error, and heteroscedasticity.

In summary, students' behavior in asking about blood pressure and cholesterol were predicted by pharmacy site counseling, self-efficacy and MRO.

Behavior Regression – Routine Behavior

Routine behavior was defined as students in the intervention group who performed more than the required five patient interactions for the Diabetes Check assignment. To assess routine behavior, students in the intervention group responded to an open-ended question asking with how many patients they completed a Diabetes Check whether or not they counted them for the assignment. Twenty (33%) students reported completing the required five or less, 28 (47%) students completed six to ten, and 12 (20%) completed ten or more (12 to over 100). Some students provided numerical answers while other provided approximations or ranges; thus, it was necessary to collapse it into a categorical variable. A dichotomous variable (1= greater than five Diabetes Check and 0=less than five Diabetes Checks) was created because this was originally proposed, it corresponded to the assignment requirements, and it facilitated the use of logistic regression.

In order to investigate the validity of the routine behavior measure, a correlation between the number of Diabetes Checks students completed in the intervention group and reports about frequency of asking about the diabetes ABCs was examined. Routine behavior was not significantly correlated with asking about A1c ($p=0.41$), blood pressure ($p=0.65$), and cholesterol ($p=0.63$). The way which students responded to these questions suggests that they consider asking about the ABCs was a different behavior from the Diabetes Checks. In addition, the patients who received Diabetes Checks were most probably subset of the patients who were asked about the diabetes ABCs.

This regression sample was restricted to the 60 intervention group students for whom there was complete data. The analysis was restricted to six or less variables, following the general suggestion that ten cases were required per independent variable. Per the conceptual

model, pharmacy site counseling, and ease of use were added in variable block one. The impact of the patients' reactions on the student was added in variable block one, as this was related to students' intentions to perform a Diabetes Check in pilot studies (Guirguis et al., 2006). In variable block two, self-efficacy and monitoring role orientation were added, as they were shown in prior analysis to be related to behavior.

The hierarchical stepwise multiple linear regression model did not have any significant independent variables. The independent variables in the order of the conceptual model did not predict any variance in the dependent variable.

CHAPTER 5: DISCUSSION

Summary and Discussion of Results

This randomized controlled trial examined the impact of an intervention designed to change students' behavior in asking about the diabetes ABCs. One hundred and nineteen students were randomized to either the Diabetes Check-interview assignment, where they assessed patients' knowledge and understanding of the diabetes ABCs or to a control assignment, where they reviewed the profiles of two patients with diabetes and identified drug recommendations and monitoring parameters. Students who completed the Diabetes Check intervention had greater improvements in the frequency of monitoring patients' A1c values and in their Counseling Role Orientation than students in the control group. Students' intentions to ask about the diabetes ABCs were predicted by pharmacy site counseling, monitoring role beliefs, self-efficacy, and positive outcome expectancies. Mattering, which measures whether students believe they make a difference to patients, was a predictor of intentions in the control group. Students' behavior in asking about blood pressure and cholesterol were predicted by pharmacy site counseling, self-efficacy and MRO. Behavior in asking about A1c was predicted by pharmacy site counseling, self-efficacy, MRO, and completing the Diabetes Check assignment.

In this chapter, the first section reviews the study findings and discusses them in light of other literature. The second section reviews the study's strengths and limitations in reference to internal and external validity, to the conceptual model, and to measurement. The third section outlines implications for future research, pharmacy education, and pharmacy practice. Finally, future directions and conclusions are presented.

Students' Experiences with the Two Assignments

Overall, it appeared that the Diabetes Check and the control assignment were well received. Students completed the assignments with the provided materials, clerkship training, and few clarification questions posed to the School of Pharmacy instructors. Pharmacy sites appeared to have little difficulty in finding opportunities for students to approach patients at regular prescription refills or review profiles.

The practice philosophy of the pharmacy site set the stage for students' encounters with patients (R. P. McDonough & Bennett, 2006). The pharmacy site counseling composite variable was a significant predictor of intention to ask about the diabetes ABCs and behavior in asking about the diabetes ABCs. Many students reported high levels of pharmacist counseling and asking about the diabetes ABCs, but all sites were not uniform. Thirteen percent of students were placed in pharmacy sites where their clinical instructor asked about the Diabetes ABCs with all or almost all of the patients with diabetes. Forty-one percent of students were at a site where no or almost no patients were asked about the Diabetes ABCs. The vast majority of pharmacy sites were "very" to "extremely supportive" of students taking time for counseling and the Diabetes Check assignment. Less than 5% of students were at sites that were "slightly supportive" or "not supportive at all"—these were five different sites, some of which had other students who indicated the site was more supportive. While one-third of students reported all or almost all patients expected to be counseled with every prescription, about one-third of students reported that less than half or fewer patients shared these expectations. Patients' expectations are shaped by routine behaviors; lower patient expectations may suggest lower counseling rates. Furthermore, when both patients and

pharmacists have lower orientations toward counseling, less counseling occurs (Schommer, 1994).

Students in the intervention group were more positive toward their assignment than students in the control assignment. Students in the intervention group rated the overall experience and ease of use with the Diabetes Check higher than students in the control group. Students in the intervention group also provided more positive remarks in the open-ended description of the assignment and comments sections.

Students in the intervention group reported patients were more receptive to counseling. This may have occurred for several reasons. Students in the intervention group may have encountered more receptive patients despite randomization. Alternatively, the Diabetes Check may have created more opportunities for students to have positive interactions and subsequently a more positive perception of patient receptiveness. Or having a structured interaction was a help to students. It may have eased their concerns and apprehensions about counseling. If either of these are the case, they could have positive implications for future patient interactions. Students who expect patients to be receptive may be more likely to approach and monitor patients in community pharmacies in their future practices. A baseline measure of perceived receptiveness would be helpful in establishing when group differences in patient receptiveness arose. Future research may consider assessing students' perceptions of patient receptiveness as an outcome.

When reviewing follow-up activities, it appears the Diabetes Check and control assignments utilized different skills. Students in the intervention group were more likely to talk with patients and educate them. Students in the control group were more likely to make a medication change and contact the health care professionals. As pharmacists cannot make

changes in prescription medications, the decision to change a prescription necessitates contacting another health care professional. The Diabetes Check was more successful at engaging patients and students in dialogue about clinical monitoring parameters and educating patients, which were the goals of the Diabetes Check assignment. Nevertheless, it would be desirable for both groups to make necessary medication changes. Students in the intervention group may not have spent as much time reviewing patients' profiles and may have missed drug-related problems. In addition, students in the intervention group may not have obtained Diabetes ABC values because many patients are not aware of these values. Instead, these students may have initiated a dialogue that could lead to regular monitoring of Diabetes ABCs values in the future. If patients were to discuss the Diabetes ABCs with pharmacists, pharmacists could make drug recommendations based on clinical outcomes as well as decisions based on the medication history available in the profile.

It is important to note that 80% of students in both groups did not document this interaction at the pharmacy site. Documentation was not a required part of the assignment. It was important to first determine if it was possible to start students talking to patients about monitoring diabetes before requiring follow-up activities. Following the adage "if you didn't document it, you didn't do it", the Diabetes Check and profile review were not retained in the pharmacy's' permanent records. Other than verbal interactions with clinical instructors, documentation most commonly happened with only "some" patients, thus other than possible spontaneous patient reports of the ABC values, the ABCs values would not be available after the students left the clerkship pharmacy. Documentation of pharmacist care is not common in routine pharmacy practice (Becker, Bjornson, & Kuhle, 2004; Janke & Kennie, 1996); though students have been encouraged to document their activities (McDonough & Bennett, 2006).

Pharmacists have meticulous medication history records and newer software programs frequently have room for some limited health history and comments. Students could have recorded Diabetes ABCs values in the comments fields, but this may not be the norm at many practice sites.

Students in the intervention group completed an additional set of questions on their experiences with the Diabetes Check. On average, students completed a Diabetes Check in about six minutes. This was longer than the intended one to three minutes, but still feasible for the community pharmacy. Students in the invention group reported the most common patient response was "receptive but did not ask questions (34%)" followed by patients were "accommodating to help me with an assignment (23%)". Yet 72% of students found that the Diabetes Check encouraged them to ask patients about the Diabetes ABCs. These results seem incongruent. It appears that students found a passive patient interaction encouraging. Students may have interpreted patients' attentiveness as listening which is usually taken as encouragement for the speaker to continue speaking.

Pilnick (1999) found that pharmacists treated most patient responses as adequate (i.e., rarely asked patients to clarify their intentions or understanding) even though patients' responses can range from the most minimal acknowledgement (i.e., patient says "mmm") to a complete repeat back of the pharmacists' directions. The fact that patients rarely provided feedback leaves the pharmacists with little actual understanding of the patients' intent to act upon advice. This appears to be an accepted practice in pharmacy and perhaps in other settings. One technique students are taught is to ask the patient to "mirror" the statements, i.e., repeat back what the speaker said, to make sure the patients understood (Berger, 2002c). The frequency that this technique is used in practice is unknown, but based on anecdotal reports, it

appears low. Handouts and follow-up phone calls are other possibilities to support and assess patients' understanding. Thus, a passive, non-interacting patient may be considered the norm in pharmacy practice. In the Diabetes Check assignment, this also appears to be the case. When patients provide little feedback, pharmacy students report this as encouraging, because this is what they expect. Students may have such low expectations for patient interactions that a passive, non-interactive patient who is listening may be considered a success.

To perform a Diabetes Check, students were most likely to approach patients who appeared interested in talking about the Diabetes Check. This is similar to findings from the pilot data (Guirguis & Chewning, 2005). Students were least likely to report approaching patients who appeared unmotivated to manage their diabetes, yet this group of patients may benefit most. Students appeared to approach the "easy" patients. In pilot research, the few students who approached patients who appeared to be unmotivated did so both to help those patients and for the challenge (Guirguis & Chewning, 2005). Other students may have avoided approaching more difficult patients, as these interactions may make the patient and student uncomfortable and jeopardize the patient-pharmacist relationship. For example, concern over the physician-patient relationship has been found to decrease the rate of anti-smoking advice that physicians provide (McEwen, West, & Preston, 2006). This should be considered in future research.

Group Differences

The Diabetes Check intervention resulted in greater increases in the intervention group for one behavior, asking about A1C, and two attitudes, Counseling Role Orientation and Negative Outcome Expectancies. These changes were significant in the bivariate. Changes in

asking about A1c and CRO were also significant in the multivariate analysis which controlled for site counseling.

The Diabetes check affected this change in several ways. First the Diabetes Check used a mastery modeling technique with modeling and controlled rehearsal before attempting the Diabetes Check in the pharmacy. The modeling of a Diabetes Check allowed students to witness the feasibility and implementation of this technique despite a lack of models in the community pharmacy. The interview guide further modeled the interaction in a practical and step-by-step manner while the patient handout from the American Diabetes Association provided credibility. The rehearsal allowed time to refine skills. The Diabetes Check behavior in the clerkship site demonstrated that monitoring may be possible in the community pharmacy and patients would for the most part, accept and encourage monitoring. Role rehearsal may also help create a habit of asking about monitoring when students counsel patients with diabetes. Furthermore, students' success in interacting with patients may have reinforced their beliefs in the importance of counseling. Together these factors helped to change students' behaviors in asking about A1c.

At the pretest, students in both groups were more likely to ask about blood pressure and cholesterol over A1c. For students in the intervention group, asking about A1c increased to the same levels as asking about blood pressure, and cholesterol (i.e., "half of the time) and this change was greater than change in the control group. Furthermore, while it was not statistically significant, students in the intervention group had greater improvements in asking about blood pressure and cholesterol than the control group.

Still, students were only asking patients with diabetes about the ABCs about half the time. Possibly, other issues superseded monitoring, such as an unsafe drug interaction or

addition of a new medication. While the optimal rate of asking about the Diabetes ABCs may not be asking all patients, it is likely greater than asking half of the patients.

The CRO measure assessed beliefs about basic functions of patient-pharmacist interactions such as time, patient interest, physicians' role, and appropriate information to discuss with patients. The Diabetes Check improved pharmacy students' counseling role beliefs, as assessed by the CRO. Interestingly, MRO scores (e.g., measure of more specific monitoring role beliefs that were lower at the pretest) did not change in either study group. Pilot research also found that monitoring role beliefs did not change after a similar assignment called the Blood Pressure Check.

It may appear counterintuitive that general counseling beliefs improved while monitoring beliefs, which are more closely related to the Diabetes Check assignment, did not. Evidence from students' descriptions of the assignment shows the patient interaction was important to the intervention, and positive experiences with the Diabetes Check may have fostered students' beliefs that counseling, not monitoring, is important. The benefits of monitoring may not have been apparent in the immediate patient interaction, as patients may not know their clinical values; thus, students could not use the ABC values to monitor patient health and observe the benefits of monitoring. Future Diabetes Check assignments may be designed so students are encouraged to follow patients over time. In fact, one student in the intervention group spontaneously suggested a follow-up component.

The CRO assessed beliefs not related to student monitoring behaviors. Unlike all other attitude measures, the CRO scores were not correlated with asking about the Diabetes ABCs. The CRO had a small but significant relationship ($r=0.29$) with more specific beliefs about asking about the Diabetes ABCs as measured by the MRO. The CRO may assess beliefs that

are prerequisites to monitoring beliefs. If a student does not believe they should counsel patients, they may not believe they should be performing more advanced types of counseling such as monitoring patient health. The CRO scale may have a useful role in screening pharmacists who may be willing to undertake interventions such as the Diabetes Check, particularly in a group with a more heterogeneous set of beliefs about counseling.

The change in Negative Outcome Expectancies was in the hypothesized direction. Students in the intervention group less frequently expected negative outcomes such as slowing workflow, taking too much time for community practice, and making patients feel uncomfortable. This provides evidence that students in the intervention group had a mastery experience (Bandura, 1997) while completing the Diabetes Check. However, this difference was not statistically significant when controlling for students' perception of pharmacy site counseling at posttest. It may be that the intervention also influenced students' posttest perceptions of the pharmacy site either accurately or inaccurately which then accounted for the lack of group differences in Negative Outcome Expectancies in the multivariate analysis. This requires further study.

There were no significant differences in the amount of change in other attitudes between study groups. Self-efficacy and mattering, which measures whether students believe they make a difference to patients, scores increased in both groups, but the amount of change was not significantly different between study groups. Expectations for positive outcomes did not significantly change in either group. As expected, negative outcomes expectancies decreased in the intervention group; however, this change was not significantly different from the amount of change in the control group. Intentions to ask about Diabetes ABCs in the future were not different between the study groups and were only measured in the posttest.

Predictors of Intentions and Behavior

While controlling for site variables, the secondary analyses demonstrated that self-efficacy and monitoring role beliefs orientation were consistent predictors of intentions and behavior. Self-efficacy has been the cornerstone of Bandura's Social Cognitive Theory and is the most widely employed construct in this theory. In a multitude of differing settings, self-efficacy has been shown to be a strong predictor of behavior (Bandura, 1986; Bandura, 1997; Bandura, 1998). This research reaffirms that finding with senior students in a community pharmacy setting. A students' self-efficacy toward asking about the Diabetes ABCs under a variety of conditions was a strong predictor of both intentions and behaviors. Self-efficacy has been found to predict pharmaceutical care behavior, though this relationship was moderated by behavioral control (Farris & Schopflocher, 1999). Self-efficacy was not a significant predictor of intention in pilot research; however, it had only been measured with a single item (Guirguis, Kieser, Kanous, & Chewning, 2005b).

This research supports the growing body of literature demonstrating how pharmacists' role beliefs influence patient-pharmacist interactions (Desselle, 1998; Mason, 1979; Mason & Svarstad, 1984; Pendergast et al., 1995; Schommer& Wiederholt, 1994a; Schommer& Wiederholt, 1994b; J. C. Schommer, 1994; Schommer& Wiederholt, 1995; Schommer& Wiederholt, 1997). This dissertation research used the more specific measure of MRO to assess that relationship between a more specific behavior, monitoring and behavior. This concurs with pilot research findings that demonstrated a link between students' own role beliefs about the importance of monitoring ABCs and intentions to do so in the future (Guirguis, Kieser, Kanous, & Chewning, 2005b).

In addition to self-efficacy and MRO, there were several other predictors of behavior and intentions. The regression models confirmed the bivariate findings—after controlling for site, self-efficacy and MRO, it was found that students in the intervention group were more likely to ask patients about their A1c levels. Intentions to ask about the diabetes ABCs in the future were also predicted by positive outcome expectancies and a mattering and group interaction term. Independent of self-efficacy, outcome expectancies predicted intention to perform a behavior in the future. Thus, when assessing which pharmacists intend to perform a given monitoring activity, it may be important to assess their expectations for outcomes.

The mattering and group interaction was not in the direction expected. Mattering was positively related with intention in the control group and not related with intention in the intervention group. This finding was confirmed in a pilot study on the Blood Pressure Check. In this single group study, all students monitored patients' blood pressure. Mattering was measured with a single item asking if students felt they made a difference to patients. Mattering was negatively correlated with both intention to monitoring blood pressure in the future ($r = -0.34$, $p<0.05$) and intention to measure other clinical targets ($r = -0.28$, $p<0.05$). Students who felt they made a difference to patients were less likely to monitor. Mattering, particularly as measured in this dissertation study, arises out of the immediate interaction with the patient, while the benefits of monitoring would occur in the long term. It appears students who are more concerned about the immediate interaction with the patients are less likely to ask patients monitoring questions that may have the potential to make the patient uncomfortable. One other potential reason may be an unmeasured interaction between mattering and another variable. Another possible explanation is measurement error. This is first use of a mattering measure in a pharmacy and although it had good reliability in this

dissertation research, evidence for measures is established with replication in multiple samples.

These differences were found with both pre- and post-measures of mattering. This may have occurred for several reasons. First, despite randomization, there were differences in how mattering related to intentions between groups at baseline due to random chance. Second, students may have completed their pretests after starting the assignments and the pretest is not a true baseline measure. Third, there may have been a training effect on the relationships between mattering and intentions. Students in the intervention group were provided with information on who could be approached for a Diabetes Check, watched a sample video, and practiced with a colleague. In addition, students in the intervention group were required to perform Diabetes Checks with at least five patients whether or not they felt they mattered to patients. Thus, different predictors of intentions could have arisen from group training. Other research has found that exposure to a video example as part of training increased markers of appropriate care in family physicians (Verhoeven, Avonts, Vermeire, Debaene, & Royen, 2005).

It is encouraging that role beliefs may be stronger predictors of who will ask about diabetes ABCs in the future than a students' sense of mattering to a patient. Professionals such as pharmacists should perform activities that will help their patients, and sometimes that entails helping people learn what they need to do. Patients' needs and concerns should take precedence, but additional care (i.e., monitoring) should not be withheld because students were driven by a sense of mattering rather than professional duty to their patients.

The regression model predicting routine behavior was not significant. There are several possible reasons. First, the subset for analysis (n=60) was small and may not have

been sufficient. Second, it appears the measure of routine behavior (i.e., the number of Diabetes Checks completed above the required five) is different than behavior in asking about the Diabetes ABCs. The correlations between the number of Diabetes Checks students completed in the intervention group and reports about frequency of asking about A1c, blood pressure, and cholesterol were not significant. The way in which students responded to these questions suggests that completing a Diabetes Check may be different to a student than the frequency of asking about the Diabetes ABCs which was measured in with a one to seven Likert scale. Completing a greater number of Diabetes Check may be related to students' propensity to excel on assignments, not monitor patients. It may also be that students who asked about the diabetes ABCs considered this separate from the Diabetes Check as they did not use the patient handout or interview guide. This question is problematic as it is not clear how students answered this question. In future, cognitive interviews with students could help to create a sound measure of routine behavior.

Conceptual Model

This research combined several theories to implement and evaluate an intervention to help students develop the skills and aptitude to talk to patients about diabetes ABCs. The conceptual model was adapted in light of findings from the secondary analysis. First, the conceptual model was spilt into two models. One predicts intentions to perform the behavior in the future (Figure 19) and the other predicts current behavior (Figure 20).

Figure 19 Conceptual Model: Predictors of Students' Future Intentions to Ask about the Diabetes ABCs in the Future

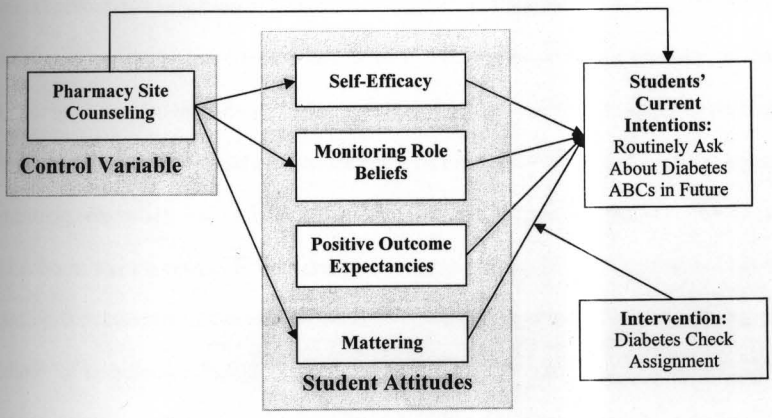
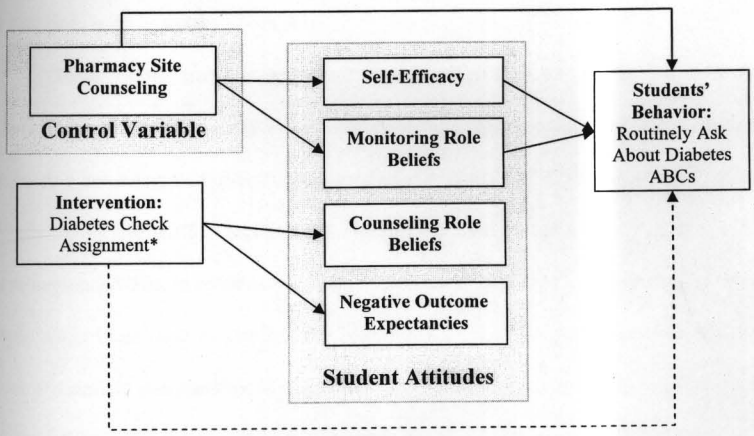


Figure 20 Conceptual Model: Predictors of Students' Current Behavior



* Intervention effect is present when behavior is low at baseline, such as asking about A1c, not blood pressure or cholesterol.

In past research, intentions have been positively related to pharmacists' pharmaceutical care behaviors (Odedina & Segal, 1996). However, students' intentions for future behavior may be less likely to be related to their current clerkship behavior, as students may not have decided their future career path. Gender and ease of use were dropped from the conceptual models, as they did not predict either intentions or behaviors. Self-efficacy and monitoring role beliefs were retained in both models due to their consistent relationships. Positive outcome expectancies were retained in the model to predict intentions, though their inclusion in future research should be weighed against the response burden. Mattering was a predictor of intentions, although it was a positive predictor for the control group and did not predict intentions in the intervention group. Counseling role orientation was included in the behavior model as it is impacted by study group even thought it does not predict behavior. Finally, study group was an independent predictor of behavior when behavior was less routine at baseline, such as asking about A1c.

These models may not capture all aspects of the changes affected by the Diabetes Check. First, future changes in behavior may affect other changes in attitudes that can once more alter behavior. In addition, these models do not capture the effect of the intervention on the pharmacy site itself. Anecdotal reports from pharmacy educators and clinical instructors have suggested that, in some cases, there is uptake of these monitoring behaviors in pharmacy sites. While these models assessed the influence of pharmacy site counseling behaviors, a more systematic examination of organizational factors such as pharmacy policies, relationships with other health care providers, technicians' roles, and pharmacy reimbursement should be considered if a more comprehensive model of pharmacy change is to be considered (Roberts, Benrimoj, Chen, Williams, & Aslani, 2006)

Strengths and Limitations

Internal Validity

Internal validity refers to control of extraneous variables by a researcher so that observed effects in a study can be attributed to the study's intervention. Potential threats to internal validity include history, maturation, instrumentation, statistical regression, differential selection, experimental mortality, intervention implementation, treatment diffusion, compensatory equalization of treatments, and response of the control group (D. T. Campbell et al., 1969; Gall, Borg, & Gall, 1996b). Each term is defined and discussed in this section. The Hawthorne Effect and pretest sensitization, though sometimes classified as external validity, may also have impacted the internal validity of this study. By selecting a true experimental design, such as a pretest-posttest control group design, the majority of these factors were minimized (D. T. Campbell et al., 1969).

History, which refers to events that happened during a study, and maturation, or natural improvement over time, should not have impacted the findings because study groups were exposed to the same environment outside the pharmacy and were followed for a similar duration of time. In addition, there were no differences in behavior, intentions, or attitudes relative to asking about the diabetes ABCs between clerkship blocks, indicating that maturation during prior clerkships or work experience did not influence the intervention.

The effect of instrumentation was limited by using previously developed and tested questionnaires whenever possible, by using the same measures at the baseline and endpoint data collections, and by administering the questionnaires in the same fashion. Other strengths and limitations of survey measurement error are discussed in the section on measurement.

Statistical regression is the tendency for participants who have extreme scores at baseline to score nearer to the mean at endpoint measurements. In the present study, this effect was minimal because groups were not selected based on extreme scores and because a control group was used.

Differential selection was not a threat to internal validity, as all students eligible for the study were included.

Experimental mortality (i.e., attrition), while present, should not have weakened this study. Three students (2%) dropped out of the clerkship due to reasons unrelated to the Diabetes Check and eight students (6%) did not complete the survey at one timepoint, result in a 92% (119/130) participation rate. The non-response rate was similar in both groups, thus it is less likely it was a direct result of the intervention and thus is less likely to impact internal validity.

There is evidence that the treatment implementation was variable for the intervention group. While all students completed the required five patient interviews, use of the interview guide was inconsistent, with 8% of students not using the interview guide. While all students were trained, the application of this training and the actual implementation of the Diabetes Check is not known. In future, the training website could be monitored to track if and how often students used online training materials. In addition, a separate sub-study with observation of the Diabetes Check with a small subset of students would help determine implementation of the intervention. Results would only be strengthened by an incomplete intervention implementation in the current study.

Experimental treatment diffusion occurs when the control group receives the intervention. It can obscure any differences between study groups. After analyzing students'

comments describing the assignment, it appeared that five students in the control group talked to patients after completing a profile review. These students may have performed activities similar to the Diabetes Check assignment resulting in treatment diffusion. In addition, approximately 10% of students "somewhat" discussed their Diabetes Check assignment with their colleagues and 2% discussed the assignment "a lot" with colleagues at the orientation. The question did not specify if students talked with a colleague in the same or differing assignment. Furthermore, there were no group differences on the level of talking about the assignment. This suggests one assignment did not create more talk than the other. Thus, experimental treatment diffusion occurred—this could have only lessened the group differences. An additional manipulation check would have helped to determine the extent of diffusion. A possible question would be: How many patients with diabetes did you talk to about the diabetes ABCs?

Compensatory equalization of treatments refers to compensating the control group because the intervention group is receiving a desirable service. Indeed, the students in the control group received an additional assignment on monitoring diabetes with profile reviews as an alternative to the Diabetes Check assignment. This may only have reduced the study's ability to find differences, as both groups may have been monitoring patients (although in a different fashion). However, without a third study group that received no diabetes monitoring assignment, the magnitude of the control exercise effect cannot be estimated.

Compensatory rivalry and resentful demoralization of the control group could have threatened interval validity. As both study groups had improvements in asking about the diabetes ABCs, it was unlikely that demoralization was occurring. There is limited evidence that rivalry was taking place because one student in the control group spontaneously

commented that the intervention assignment was more interesting. In addition, five students in the control group talked with patients, which was not part of the control assignment. However, it is unlikely this was rivalry and more likely there was diffusion of the study intervention as discussed above.

The internal validity of the study can be threatened by the very nature of the study itself. Pretest sensitization and the Hawthorne Effect may have reduced the difference in change between the study groups and obscured the Diabetes Check's impact. In this study, students may have became aware of low levels of asking about the diabetes ABCs, negative attitudes from the MRO or CRO, potential benefits of asking about the ABCs from the outcome expectancies scale, or perhaps low self-efficacy for asking about the diabetes ABCs. Perhaps sensitization in the pre-test affected change in individual participants' scores. Sensitization is more likely to occur on a self-reported attitude or personality measure (Gall, Borg, & Gall, 1996b). Indeed, 20% of students reported that the learning assessment changed the way they completed the Diabetes Check assignment. It helped them reflect on the assignment, their skills, and pharmacists' role, and may have increased monitoring behavior. This effect was equally distributed between the groups and would have equally affected the control group. While sensitization may have occurred, the importance of collecting baseline and endpoint data to assess change between groups outweighed that risk.

Similar to sensitization, the Hawthorne Effect occurs when study participants improve merely because they are participating in research. Students are used to being evaluated and assessed in their clerkships, so this may have had a smaller effect than in research with non-student participants. In addition, it is nearly impossible to completely eliminate the Hawthorne Effect.

External Validity

External validity refers "to the extent to which the findings of an experiment can be applied to individuals and settings beyond those that were studied" (Gall, Borg, & Gall, 1996a). Threats to external validity include representativeness of participants, study setting, the intervention, timeframe, pretest sensitization, and the Hawthorne Effect.

While this study is representative of all advanced clerkship students in Madison, Wisconsin, they may differ somewhat from students in other parts of North America. Ideally, this study should be replicated in multiple schools of pharmacy to test for the effects of the schools' philosophies and teaching programs. Second, learning took place in a "real" world setting that may increase the future transferability of new behaviors and translation of these findings to pharmacy practice. Third, much of the intervention was self-directed and did not require additional resources. Thus, if it is successful, this intervention has a greater potential to be effectively implemented beyond research.

Another limitation was this study's short timeframe. Although the study measures intended to influence behavior, the timeframe prevented the researchers from determining the impact of the Diabetes Check on pharmacy students' actual behavior in future practice as pharmacists. This should be considered for future research.

The impact of pretest sensitization and the Hawthorne Effect in this study were discussed in the internal validity section, but they also influenced external validity. Exposure to the pretest may have sensitized students to some areas that required improvement and thus results should not be generalized to participants who have not taken a pretest. If participants improve because they are being studied, research findings cannot be generalized to participants who are not being studied. However, it may be feasible and even desirable to use

a pretest, titled a Learning Assessment, and monitor students' progress. In this manner, the positive influence of the research study may be retained.

Measurement

This section reviews general survey properties, the confirmatory factor analysis, and suggestions for survey exploration and redesign. This research has several limitations. First, the evaluation of the Diabetes Check relies primarily on self-reported data. Self-report measures are likely to correlate with each other. For some items, this will be minimized by the students' use of the interview guide to record their impressions of patient interactions before transcribing them to the course evaluation. In addition, self-reports are anonymous to decrease social desirability bias.

The use of the online survey is common in schools and pharmacies (Anderson, Cain, & Bird, 2005). In this case, Survey Monkey® (www.surveymonkey.com), an online survey tool, was used to successfully collect data on pharmacy students' assignment evaluations. The evaluation met three of the four criteria suggested to allow schools of pharmacy to have efficient and effective online evaluations: (1) easy format for designing the survey, (2) anonymous surveys that can be tracked for completion, and (3) good statistical reporting (Anderson et al., 2005). This system did not allow for automatic reminders, but the researcher did these manually. In addition, the requirement of the survey for the course assignment increased the response rate.

A confirmatory factor analysis was completed to assess the validity of the survey measure. A five-factor model of the survey measures for the Diabetes Check was a better fitting model than the originally-proposed four-factor model. The structure of the survey

instrument supports the conceptual model with each attitudinal measure assessing different attitudes, despite two changes to the original model. The outcome expectancies scale had two different subscales: positive and negative outcome expectancies. This is congruent with Social Cognitive Theory, which delineates these two domains separately (Bandura, 1997). Furthermore, two students can both have high expectances for positive outcomes; yet one has higher expectancies for negative outcomes than the other.

A second change was the elimination of two questions. One self-efficacy item asking about talking with patients who regularly patronize a pharmacy was eliminated because of poor model fit and student difficulty in answering the question. One positive outcome expectancies item was dropped; it queried if asking about the diabetes ABCs could empower patients. This item had poor model fit and was different from other questions which focused on students' outcomes. In future studies assessing outcome expectancies, additional questions could be added to create a separate scale measuring patients' outcomes.

The confirmatory factor analysis established that, despite correlations among scales ($r<0.65$), scales measured separate constructs. The largest correlations were found between self-efficacy and MRO ($r=0.64$) and between the two role orientation and positive outcome expectancies ($r=0.62$). Both self-efficacy and MRO scales assess similar student attitudes, specifically the beliefs that the students are sure they are able to ask about the diabetes ABCs and they should ask about the Diabetes ABCs. Similarly, MRO, the belief that students should monitor diabetes ABCs, would be more likely in students who have positive outcome expectancies. There was no relationship between mattering and negative outcome expectancies. Most scales had good reliability, with the exception of the CRO, which had one missing item, and negative outcome expectancies, which only had three items. Both of these

scales require further questions in future. Lacking an item may have contributed to CRO not being a robust predictor.

The interview guide provided additional evidence of the validity of the mattering scale, as the concepts of patients' interest and helpfulness were correlated with mattering. The students' overall experience in the intervention group was correlated with information from the interview guide on their experiences with each patient, providing evidence of validity of this measure.

There were several questions that may need refinement. First is the measure of routine behavior. This was operationalized as the number of Diabetes Checks students did greater than the required five and did not correlate with students' frequency of asking patients about A1c, blood pressure, and cholesterol. The way students responded to these questions suggests they considered asking about the ABCs to be a different behavior from performing the Diabetes Checks. This appeared to assess students who did more versions of the assignment; it did not assess routinely asking about the diabetes ABCs. In the future, questions should focus on specific behavior in asking questions about the diabetes ABCs.

Students indicated the pharmacy staff was very supportive, yet many did not talk to their clinical instructors about many of their Diabetes Check experiences. In pilot work, students reported they generally completed the Diabetes Check assignment independently of their clinical instructors. This raises the question of what "support" actually means. It may mean pharmacy staff did not hinder the students, pharmacy staff allowed them time to complete the interaction, or pharmacy staff took an interest in their activities. A cognitive interview with students on this issue could help elucidate students' definition of support.

There was a wording difference on a question on students' overall experience with the Diabetes Check. The question for the intervention group was "Overall, how was your experience with patients during the Diabetes Check?" The words "with patients" were dropped for the control group. While the answers may be comparable, the term "with patients" may have highlighted different elements of the assignment and altered the response. In the future, questions should be worded identically for both groups similarly.

Implications

Implications for Future Research

The Diabetes Check intervention was able to change students' behaviors in monitoring patients' A1c. Thus, role rehearsal with real patients should be considered and tried in other areas. The intervention was successful in improving from baseline the least frequently performed behavior. This suggests future interventions should be directed at behaviors that are not frequently performed by pharmacy students. There may be more variation in pharmacists' practice levels and the intervention, if acceptable to pharmacists, may have more potential to improve behaviors.

The interview guide for the Diabetes Check not only structures students' interaction with patients, but can also structure data collection. The questions on the interview guide provide sample text or script for pharmacy students or pharmacists who are trying a new service. In pilot research, students reported that the interview guide was very helpful in starting the Diabetes Checks. Future research could assess whether the video modeling a Diabetes Check at the training or the interview guide has a greater contribution to shaping the desired behavior. This could establish if the video, interview guide, or both are needed to

change behavior. The interview guide also facilitated the collection of patients' clinical targets for prior research (Guirguis, Kieser, Kanous, & Chewning, 2005a) and could be adapted for other areas. Pharmacists do not often document non-dispensing activities to it is important to find easy-to-use and concise forms for data collection.

This research also reinforces the value of rigorous research design. Pilot research was conducted with a single group posttest (ABC Diabetes Tool, 2003-4) and single group pre- and posttest (Blood Pressure Check 2004-5). While these studies provided valuable information about implementation and measures relating to the Diabetes Check, they were not able to answer the questions, "Does the Diabetes Check change behavior?" Randomized controlled trials, such as this dissertation study, are able to answer such questions robustly and should used frequently in pharmacy practice research.

The unique model proposed is the first research model examining pharmacists' behavior that combines role theory, social cognitive theory, and mattering. The conceptual model is encouraging and predominately consistent with existing theory, but requires further cross-validation in other samples. Both role monitoring beliefs and self-efficacy had a consistently positive role in pharmacy students' monitoring intentions and behaviors, and should be considered when examining predictors of pharmacy students' behavior. General counseling beliefs, as measured by the CRO, were not predictive of students' intentions and behaviors; however, students had relatively high scores on the CRO and one item was missing. This may differ in a sample of practicing pharmacists who may have more heterogeneous beliefs toward the importance of counseling. Mattering, which measures whether students believe they make a difference to patients, only predicted intentions in students in the control group, which was unexpected. However, mattering may not be a factor

when behavior is required, such as the Diabetes Check assignment. Perhaps a high level of mattering is not ideal for pharmacy and professional duty needs to be weighed with a sense of patient approval. These exploratory questions may be best answered with a qualitative probe into sources and results of mattering.

This project provided evidence for the psychometric properties of new measures of specific self-efficacy and role beliefs as well as a new measure of general mattering for pharmacy. Both the self-efficacy scale and MRO could be adapted for other monitoring behaviors. Students' perceptions of patients' receptiveness was higher in the intervention group at the posttest; it would be helpful to measure this at two times to assess change.

This research did not address students' and pharmacists' expectations for patient-pharmacist interactions. In a recent US nationwide survey, people with diabetes expected pharmacists to counsel them about medication side effects, ways to reduce side effects, and ways to reduce medication cost (Hermansen-Kobulnicky & Worley, 2005). Based on current practices, it appears that pharmacists have low expectations for patient participation. Do pharmacists think that patients should simply listen to their "instructions" on how to use a medication (Pilnick, 1999), or do pharmacists desire a more interactive encounter? What impact does patient interaction or lack thereof have on the pharmacists' future counseling behaviors? Also, as some patients desire more interaction than others, how do students tailor this technique to the patient? While personal attention is an influential predictor of patients' satisfaction with pharmaceutical care (Ried et al., 1999), would patients consider the Diabetes Check personal attention and would this increase patient satisfaction with pharmacists' services? The impact of a more interactive patient-pharmacist encounter on patient outcomes is not known.

In addition, this model does not capture the effect of the intervention on the pharmacy site itself. Anecdotal reports from pharmacy educators and clinical instructors have suggested that, in some cases, there is uptake of these monitoring behaviors in pharmacy sites. This should be explored in a more systematic fashion.

Implications for Pharmacy Education

The Diabetes Check assignment gave students the opportunity to provide patient education and monitoring at routine patient encounters. These types of activities are less frequently completed in students' clerkship experiences (R. Kassam, 2006; Zarembski et al., 2005). The Diabetes Check intervention also increased students' counselor role orientation. It was not anticipated that the Diabetes Check intervention may influence not only students' monitoring behaviors, but also influence students' general counseling beliefs. This has important implications for pharmacy education, as pharmacists who have a higher counselor role orientation provide more counseling in pharmacy practice (Mason, 1979; Mason & Svarstad, 1984; Schommer& Wiederholt, 1994a; Schommer& Wiederholt, 1994b; J. C. Schommer, 1994; Schommer& Wiederholt, 1995; Schommer& Wiederholt, 1997).

The method of teaching the Disease Check model could be expanded to a greater number of pharmacy students. Pharmacy is at a crossroads. While routine community pharmacy practice emphasizes the distribution of product, schools of pharmacy emphasize patient-focused consultations designed to help patients optimize their medication therapy. The challenge is to develop feasible and structured interventions within pharmacy sites to allow all students the opportunity to master the skills needed to do this. Currently, not all pharmacy practice sites are routinely monitoring patients' clinical targets. Furthermore, communication

skills in monitoring patients on chronic therapy were less frequently evaluated in schools of pharmacy in the US (Kimberlin, 2006). The Diabetes Check intervention structured a patient experience in community pharmacies where students modeled for themselves techniques for monitoring patients. Once pharmacy students have the skills and confidence to do this in routine pharmacy practice, they may be ready to help patients optimize their medication therapies.

The Diabetes Check may also help facilitate the transfer of communication skills from the classroom to the pharmacy. Techniques that help learners transfer skills to the worksite have been shown to enhance communication skills (Heaven, Clegg, & Maguire, 2006). While not every skill taught in a school of pharmacy can be covered in a clerkship setting, the Diabetes Check model provides easy-to-implement methods of rehearsing communication skills in a supervised community pharmacy setting. This may help establish continuity in the teaching and assessment of communication (Kimberlin, 2006).

The following ideas may help to improve the Diabetes Check training. First, the impact of the intervention may be enhanced by increasing the amount of feedback provided to the student. The training could be designed to allow instructors, in addition to students, to provide feedback after practice in controlled environments. Practice in a controlled situation with feedback could also be added to the students' communication course. Student could also audio record a Diabetes Check interaction with a patient in their clerkship site and have an instructor provide feedback on that interaction. This could be facilitated by the small size of new digital audio recorders and the ease of transferring audio files on secure websites. Second, the Diabetes Check is a structured assignment; however, it is important for students to tailor their communicative style to the patients' needs (Dutta-Bergman, 2005; Swenson,

Zettler, & Lo, 2006). Some students may need to learn how to adapt this method to different patients. Third, as part of anticipatory guidance, it may be important to talk with students about how the Diabetes Check intervention may affect their relationships with patients. It is possible students may feel patients will not want to participate in pharmacist monitoring. It may be important to share success stories and provide positive models of monitoring, not only for patient health, but for the patient-pharmacist relationship.

The evaluation also uncovered specific changes that may be considered for the Diabetes Check assignment itself. First, students could explore ways to document their finding on the electronic profile for other pharmacists and students. It would be simple to document the ABCs and date in a format such as "20/09/2006 A-10, B-140/80 C-98" in the comments fields of any software program. This would also facilitate follow-up by pharmacist and other students at a later time. For example, a student in the first clerkship block could identify one patient who was to be followed over the entire year. Second, it would be interesting to examine the type of drug-related problems discovered and see if the Diabetes Check identifies different types of problems than a profile review. As suggested by students, additional online discussion or face-to-face discussion may help. Other students' suggestions for improvement of the Diabetes Check include adding room on the interview guide for documentation of patient values, focusing on one of the ABCs at a time, or a pocket-sized patient handout.

Implications for Pharmacy Practice

"Counseling to help patients… manage chronic illness is not a part of most routine medical care and its potential benefits are thus unrealized" (Center for the Advancement of

Health, 2001). Pharmacists could fill this gap by routinely helping patients manage chronic disease. Pharmacists see patients with chronic disease more often than any other health care professional. However, while patients recalled visiting their pharmacy more than their physician, pharmacists offered less lifestyle counseling (Lenz & Stading, 2005). Patients encounter pharmacists most often through dispensing (M. E. Brown & Bellaby, 2002). The Diabetes Check provides a model for pharmacists to build brief services into dispensing and capitalize on their frequent interactions with patients. Furthermore, it may move pharmacists away from just providing information and toward assessing patients and asking questions. The students who helped patients self-monitor the A1c are already doing this.

The Diabetes Check has the potential to increase patients' understanding and management of diabetes through increased awareness and self-monitoring of diabetes goals. Self-regulation and subsequent self-management is key to diabetes care and has been shown to improve patient health (Funnell & Anderson, 2004). Furthermore, interventions can be brief. One time workshops have helped people with diabetes became more aware of their diabetes ABC (Polonsky et al., 2005). Pharmacists have the potential to support patients' self-monitoring at brief, frequent encounters. Not only can students and pharmacists help support self monitoring, they have the extensive medication knowledge and skills to help people make sound medication decisions and the opportunity to reach patients with diabetes who may not be regularly seeing other health care professionals. This experience may be incorporated into the students' future pharmacy practices, helping patients with diabetes take charge of their health.

The Diabetes Check provides a model of service scripts or sample dialogue used to manage customer interactions via learned, scripted behavior (Holdford, 2006; Ramundo,

1997). Scripts may be useful for new pharmacy practitioners who may not have experience handling challenging questions or may not have an available role model. They may also be helpful for experienced pharmacists who are new to the type of service being scripted. The Diabetes Check script could be adapted to other diseases and common scenarios to help students (and possibly licensed pharmacists) gain confidence and skill in interacting with patients around specific services.

Future Directions

There are several directions this project could take in the future. First, training for the Diabetes Check could be incorporated into the pharmacy students' communications course in their final semester of coursework. In that way, instructors could provide feedback to the students in a controlled environment and complete the mastery modeling procedure. Patient surveys and patient follow-up may be important to assess the patients' health outcomes, attitudes toward asking about diabetes goals and numbers, perception of patient-pharmacist relationship, or satisfaction and expectations with pharmacy services. Finally, this teaching model could be adapted for pharmacists and assessed outside the confines of a pharmacy school clerkship.

Although it does measure intended behavior, the proposed research is not designed to assess the impact of the Diabetes Check on pharmacy students' actual behavior in future practice as pharmacists. A mail follow-up could be used when the students have become practicing pharmacists to determine if students are routinely asking about diabetes goals and numbers. Future analysis of the data collected in this proposal may include multivariate

statistics with a combination of regression, path analysis, or LISREL as required to fully test the theoretical model.

Finally, audio recording of the content of interactions between patients and pharmacists could provide information on how students start the interaction, patients' reception, and the co-creation of the encounter. This may help identify what elements are and are not working to foster partnership and manage the patients' diabetes in a respectful manner. Audio recording may also provide opportunities for instructors to provide more feedback to students on interactions in the real world.

Conclusions

In summary, this randomized controlled trial evaluated the effectiveness of the Diabetes Check building on existing theory. The Diabetes Check improved pharmacy students' monitoring behavior, general counseling beliefs, and negative outcome expectancies. Monitoring intentions and behaviors were influenced by pharmacy site counseling, monitoring role beliefs, and self-efficacy. The role of mattering in predicting monitoring intentions requires further study. The Diabetes Check is a practical intervention to get patients and community pharmacists working together to monitor diabetes and potentially improve patient health.

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APPENDIX 1

Directions and Materials for Intervention Group

Includes:
Training Slides
Directions
Take Care of Your Heart. Manage Your Diabetes Tool
Interview Guide

Pharmacy 741: Disease Check

Lisa M Guirguis
Mara A Kieser
Betty A Chewning

Disease Check 2005-6

Diabetes

☑ Diabetes Check

Why Diabetes?

- Diabetes effects 18 million Americans
- 60% of adults with diabetes have high blood pressure
- Nearly all have one or more lipid abnormalities
- 60% of diabetes mortality is due to CVD disease
- 60% of people with diabetes do not feel at risk for hypertension or dyslipidemia
- 68% of people with diabetes do not consider CVD disease to be a serious complication

(American Diabetes Association 2004)

Why Pharmacists?

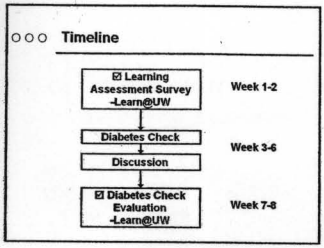
- Pharmacists are uniquely trained & situated to help patients with diabetes.
  - The Asheville Study.
  - Along with other 18 studies that demonstrate the benefits of pharmacists caring for patients with diabetes.
- You have been trained to take care of patients with diabetes!!

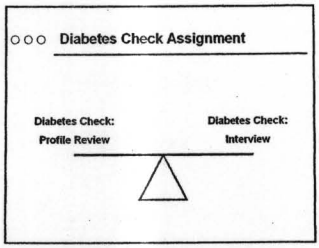
Why me?

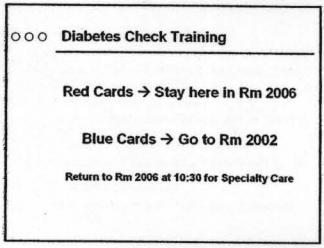
- The Diabetes Check:
  - provides you with additional practice in monitoring the clinical targets of patients in the community pharmacies.
  - helps model expanded roles to other staff in the community pharmacy.
  - gives you additional experience in an area where you can specialize.
  - helps you apply pharmacotherapy in 741
  - may help you find a patient for your case presentation

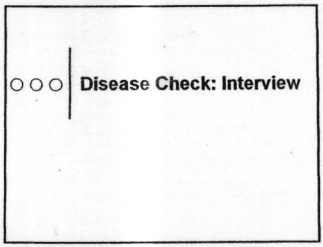
Grading

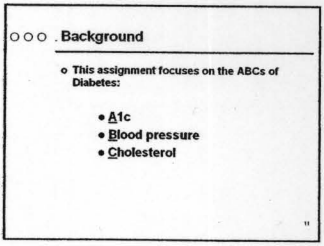
- 5 points
- Pass/Fail

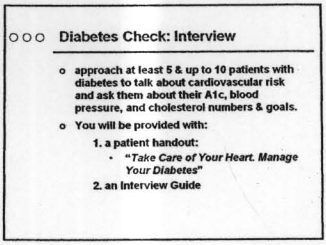

Timeline
☑ Learning Assessment Survey -Learn@UW
Week 1-2
Diabetes Check
Discussion
Week 3-6
☑ Diabetes Check Evaluation -Learn@UW
Week 7-8


Diabetes Check Assignment
Diabetes Check: Profile Review
Diabetes Check: Interview


Diabetes Check Training
Red Cards → Stay here in Rm 2006
Blue Cards → Go to Rm 2002
Return to Rm 2006 at 10:30 for Specialty Care


Disease Check: Interview


Background
This assignment focuses on the ABCs of Diabetes:
A1c
Blood pressure
Cholesterol


Diabetes Check: Interview
approach at least 5 & up to 10 patients with diabetes to talk about cardiovascular risk and ask them about their A1c, blood pressure, and cholesterol numbers & goals.
You will be provided with:
1. a patient handout:
"Take Care of Your Heart. Manage Your Diabetes"
2. an Interview Guide

Patient Handout

http://www.ndep.nih.gov/diabetes/pubs/catalog.htm#PubsPatCont

Interview Guide

Found on Learn@UW

Interview Guide Pointers

- Paraphrase & re-arrange the questions. Try to keep them open-ended.
- Probe patients as needed.
- Introduce the Diabetes Check as a way for you to help the patient learn about diabetes & monitor their diabetes medications.
- Discuss or educate the patients about diabetes management and its importance during the interview as required.
- Keep track of all 5-10 patients on 1 Interview Guide.

When to do a Diabetes Check?

- Anytime!!
- Suggestions:
  - Refills
  - During quiet times
  - At the blood pressure machine
  - With a patient who is on multiple meds
  - On patient who been asked by a different student…consider it follow-up
  - For a patient who does not seem interested…might spark a conversation!

Video Example

- John Bass at Target Pharmacy
- Patient had been:
  - working with John to find a new blood glucose meter
  - agreed to be video taped

Thoughts on the Video

- John did a great job of incorporating the Diabetes Check with his counseling style!!
- Length
  - Could be shorter?
- Order
  - Start with easiest, blood pressure?
- Use of Patient Handout
  - May use earlier?
- Intro
  - Expand intro to show concern etc.

Intro

I saw you are on several medication for diabetes and related conditions. I wanted to ask you a couple questions to so I can better understand if you are getting the most benefit from these medications.

What we did not get on tape...

- John talked a bit more to the patient about his blood pressure (~170/90).
- The patient felt his BP was high partly because of the video, but he also needs another med.
- The patient asked John if he could research a possible additional antihypertensive med & write a letter about it to take to his physician.
- John, *of course*, agreed. Previously, they had were focused on blood sugars and he was not aware of the patients' blood pressure levels.
- In addition, John was pleased to find that the patient also wore his meter on his belt daily.

Rehearsal

- Find a partner
- Pharmacist
  - Practice doing a Diabetes Check
  - Use interview guide & patient handout
- Patient
  - regular refill for Metformin (taking regularly)
  - Also taking Lisinopril, Calcuim, Niacin, & Aspirin
  - ABC values are up to you!!

Discussion

- Post your description of one or more interesting interviews with the Diabetes Check on Learn@UW.
- Reply to at least one other message.

Course Evaluation

☑ Learning Assessment Survey -Learn@UW
↓
Diabetes Check
↓
Discussion
↓
☑ Diabetes Check Evaluation -Learn@UW

- Please complete the course evaluations. We value your experience and opinions about the Diabetes Check.
- It will provide course coordinators and researchers with valuable information about the Diabetes Check and how it worked for you

Course Evaluations

- Confidential
- 15-20 minutes
- So that we can link surveys, you will be asked to provide:
  - your mother's maiden name
  - street name of your permanent address
  - the name of a favorite pet
  - the name of the elementary school you attended
- Have a copy of the Interview Guide available when you complete the evaluation form.

If you have any questions or concerns, please contact: Lisa Guirguis at (608) 262-4723 or lmguirguis@pharmacy.wisc.edu .

Purpose:
The purpose of the Diabetes Check project is help you talk to patients with diabetes in your 741 Clerkship about A1c, blood pressure, and cholesterol using educational materials from the American Diabetes Association and the National Diabetes Education Foundation. Specifically, the Diabetes Check will give you opportunities to:

- ask patients about their A1c, blood pressure, and cholesterol and if needed, help them learn about more.
- gather clinical data to help monitor medication therapy.
- give you practice in talking to patients as an expanded role.
- model expanded roles in the pharmacy.

As part of this project we want to find out about your experiences using the Diabetes Check. To do this, you will complete a Pre & Post Diabetes Check Evaluation beforecourse evaluation on Learn@UW.

Diabetes Check:
For the Diabetes Check assignment you will be asked to approach at least 5 and up to 10 patients with diabetes to talk about cardiovascular risk and ask them about their A1c, blood pressure, and cholesterol numbers and goals.

You will be provided with an interview guide that provides you with an outline of a Diabetes Check and room to record information about each Diabetes Check.

You will also be provided with a patient handout from the American Diabetes Association and the National Diabetes Education Foundation which is titled, "Take Care of Your Heart. Manage Your Diabetes". This concise tool describes the risk of diabetes, questions, to ask your doctor, ways to take action, and includes a diabetes record form. It is available 16 languages and is easy to photocopy. Additional copies are avialable from the National Diabetes Education Foundation.

If you want, you can learn more about diabetes by reviewing the Wisconsin Essential Diabetes Mellitus Guidelines 2004 and the ADA 2005 Guidelines.

Week 1-2

- Complete the Pre Diabetes Check Evaluation before starting the Diabetes Check
- Once you have completed the Pre Diabetes Check Evaluation, you will be able to watch the video showing you how to do a Diabetes Check and also access materials for the Diabetes Check online.
- Read the materials provided in orientation and also available online that can also be found on Learn@UW. These include: directions, "Take Care of Your Heart. Manage Your Diabetes" handout, and Interview Guide.
- We will provide you with 1 copy of the "Take Care of Your Heart. Manage Your Diabetes" handout and the Interivew Guide. All materials will be available on Learn@UW.
- Talk to your Clinical Instructor about how to best identify at least 5 patients with diabetes. You can record up to 10 patients for the project.

Week 3-6

- Please complete the five Diabetes Checks in Week 2-6 of your 741 Clerkship.
- You are not required to make drug recommendations as part of the Diabetes Check, but you are encouraged to follow-up with these patients and provide care as you feel is necessary.

Week 7-8

- Complete the Post Diabetes Check Evaluation

How to do a Diabetes Check

All the questions you will ask patients are in the Interivew Guide. To make things easier, here are some pointers and detailed information on how to interview the patient.

Pointers

- Paraphrase and re-arrange the questions so they work best for you. Try to keep them open-ended.
- Probe patients as needed to uncover information.
- Introduce the Diabetes Check as a way for you to help the patient learn about diabetes and monitor their diabetes medications.
- Discuss or educate the patients about diabetes management and its importance during the interview as required.
- Keep track of all 5-10 patients on one Interivew Guide.

Here is an example of how to complete a Diabetes Check. (insert video clip)

Discussion:

Please post one message about an interesting interivew and reply to at least one other student's message on the discussion board.

Grading:

The Diabetes Check is worth 5 points. You will receive one point for each patient up to 5 patients.

Evaluation:

1. Please complete the Pre and Post Diabetes Check Evaluation. We value your experience and opinions about the Diabetes Check. It will provide course coordinators and researchers with valuable information about the Diabetes Check and how it worked for you.
2. The evaluations will be available on Learn@UW in the last 2 weeks of your clerkship.
3. We have found that it only takes students 10 to 15 minutes to complete the evaluation.
4. Information on this evaluation is confidential. Your name, your clerkship site, or the name of your preceptor will not be link to your responses.
5. You will be asked to provide your mother's maiden name, street name of your permanent address, the name of a favorite pet, and the name of the elementary school you attended, so that we can link pre- and post-surveys.
6. Have a copy of the Interivew Guide available when you complete the evaluation form.

Take Care of Your Heart
Manage Your Diabetes

- Blood Glucose
- Blood Pressure
- Cholesterol

If you have diabetes, take care of your heart. Having diabetes means you are more likely to have a heart attack or a stroke—but it doesn't have to—if you manage your diabetes.

You can live a long and healthy life by managing your blood glucose (sugar), blood pressure, and cholesterol.

Over time, high blood glucose levels can damage vital organs such as your kidneys and your eyes. High blood pressure is a serious disease that makes your heart work too hard. And bad cholesterol, or LDL, builds up and clogs your heart arteries. Managing all three means a longer and healthier life.

ASK YOUR DOCTOR THESE QUESTIONS

1. What are my blood glucose, blood pressure, and cholesterol numbers?
2. What should they be?
3. What actions should I take to reach these goals?

Use the Diabetes Record Form on the other side to write down the answers to these questions.

TAKE ACTION NOW

You can live longer for your family, improve your health, and reduce your risk of heart disease or stroke.

- ♥ Eat the right amounts of foods like fruits, vegetables, beans, and whole grains.
- ♥ Eat foods that are prepared with less salt and fat.
- ♥ Get at least 30 minutes of physical activity every day.
- ♥ Stay at a healthy weight—by being active and eating the right amounts of healthy foods.
- ♥ Stop smoking—seek help.
- ♥ Take medicines the way your doctor tells you.
- ♥ Ask your doctor about taking aspirin.
- ♥ Ask your family and friends to help you take care of your heart and your diabetes.

ENGLISH · SEPTEMBER 2002

DIABETES RECORD FORM

Goal

Take care of your heart by taking care of your blood glucose, blood pressure, and cholesterol.

Use this form to keep track of your blood glucose, blood pressure, and cholesterol numbers when you visit your doctor. Work with your provider, friends, and family to reach your goals.

BLOOD GLUCOSE (Sugar)

The A1C test—short for hemoglobin A-1-C—is a simple blood test that measures your average blood sugar over the last three months.
Suggested Blood Glucose Goal: Below 7 on the A1C test
TEST AT LEAST TWICE A YEAR

Date							
Result							

BLOOD PRESSURE

High blood pressure is a serious disease that makes your heart work too hard.
Suggested Blood Pressure Goal: Below 130/80
TEST AT EVERY VISIT

Date							
Result							

CHOLESTEROL

Bad cholesterol, or LDL, builds up and clogs your heart arteries.
Suggested Cholesterol Goal: LDL Below 100
TEST AT LEAST ONCE A YEAR

Date							
Result							

The National Diabetes Education Program is a joint program of the National Institutes of Health and the Centers for Disease Control and Prevention.
Website: www.ndep.nih.gov
Phone: 1-800-438-5383

ENGLISH · SEPTEMBER 2002

Diabetes Check | Interview Guide

- ✓ Please identify at least 5 and up to 10 patients with diabetes and complete a Diabetes Check.
- ✓ You can talk to patients who have talked to other students before.
- ✓ Please read or paraphrase the information in ***bold italics*** to the patient. The text in regular font contains directions for you.
- ✓ Use the completed version of this Interview Guide when you complete the course evaluation.

		Patient									
		1	2	3	4	5	6	7	8	9	10
1.	***I would like to take a few minutes to ask you some questions about diabetes to make sure that you are getting the most benefit from your medications. Do you have time?*** If N, end the interview and offer to contact later, then skip to 12	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
2.	***The American Diabetes Association has created this handout which has information about how to "Take Care of your Heart by Managing your Diabetes" It talks about the risk of heart disease and ways to manage this risk. One of the first steps is to talk to your doctor and other health care providers about these questions.*** Point to "Ask Doctor these Questions" on the front of the handout. ***The form has a Diabetes Record Form on the next page. I would like to take a few minutes to ask you about some of the information on the record form.*** Pont to the Record form on the second page of the handout.										
3.	***Are you familiar with the term A1c?***	If patient is not familiar with A1c, please explain A1c using Diabetes Record Form.									
4.	***What is your A1c goal?***	Record A1c goal on Diabetes Record Form if possible.									
5.	***What was your most recent A1c number?***	Record A1c number on Diabetes Record Form if possible.									
6.	***What is your blood pressure goal?***	Record blood pressure goal on Diabetes Record Form if possible.									
7.	***What was your most recent blood pressure number?***	Record blood pressure number on Diabetes Record Form if possible.									
8.	***Are you familiar with the term LDL or "bad cholesterol"?***	If patient is not familiar with LDL, please explain using Diabetes Record Form.									
9.	***What is your LDL or "bad cholesterol" goal?***	Record LDL goal on Diabetes Record Form if possible.									
10.	***What was your most recent LDL or "bad cholesterol" number?***	Record LDL number on Diabetes Record Form if possible.									

		Patient									
		1	2	3	4	5	6	7	8	9	10
11.	***Thanks for taking time to talk to me. I encourage you to find out more about the goals and numbers listed on the Diabetes Record Form. I would be interested in hearing about your numbers at future visits so that I can evaluate if you medications are working for you.*** (If possible). ***If you have any questions or concerns, do not hesitate to contact me, or any of the pharmacists. Thank you again.***										
End of the patient interview. Complete Questions 12-15 for all patients including those that did not have time to talk.											
12.	How many minutes did it take you to complete the Diabetes Check with this patient?	____ minutes	____ minutes	____ minutes	____ minutes	____ minutes	____ minutes	____ minutes	____ minutes	____ minutes	____ minutes
13.	How interested did this patient appear in talking to you about the Diabetes ABCs? (Pick one) 1 = Not at all interested 2 = Slightly interested 3 = Somewhat interested 4 = Rather interested 5 = Quite interested 6 = Very interested 7 = Extremely interested										
14.	How helpful was talking about the Diabetes ABCs for this patient? (Pick one) 1 = Not at all helpful 2 = Slightly helpful 3 = Somewhat helpful 4 = Rather helpful 5 = Quite helpful 6 = Very helpful 7 = Extremely helpful										
15.	How was your experience with this patient? (Pick one) 1 = Extremely Negative 2 = Negative 3 = Somewhat Negative 4 = Neutral 5 = Somewhat Positive 6 = Positive 7 = Extremely Positive										

APPENDIX 2

Directions and Materials for Intervention Group

Includes:
Training Slides
Directions
Profile Review Tool
Drug Therapy Assessment Worksheet
Case Example

Pharmacy 741: Disease Check

Lisa M Guirguis
Mara A Kieser
Betty A Chewning

Disease Check 2005-6

Diabetes

☑ Diabetes Check

Why Diabetes?

- Diabetes effects 18 million Americans
- 60% of adults with diabetes have high blood pressure
- Nearly all have one or more lipid abnormalities
- 60% of diabetes mortality is due to CVD disease
- 60% of people with diabetes do not feel at risk for hypertension or dyslipidemia
- 68% of people with diabetes do not consider CVD disease to be a serious complication

(American Diabetes Association 2004)

Why Pharmacists?

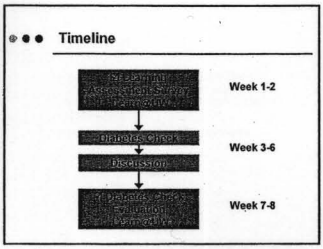
- Pharmacists are uniquely trained & situated to help patients with diabetes.
  - The Asheville Study.
  - Along with other 18 studies that demonstrate the benefits of pharmacists caring for patients with diabetes.
- You have been trained to take care of patients with diabetes!!

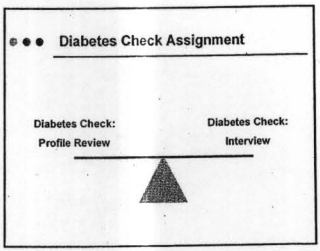
Why me?

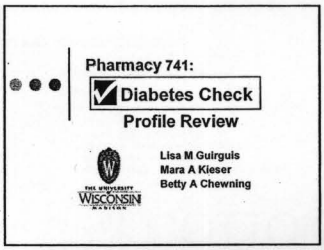
- The Diabetes Check:
  - provides you with additional practice in monitoring the clinical targets of patients in the community pharmacies.
  - helps model expanded roles to other staff in the community pharmacy.
  - gives you additional experience in an area where you can specialize.
  - helps you apply pharmacotherapy in 741
  - may help you find a patient for your case presentation

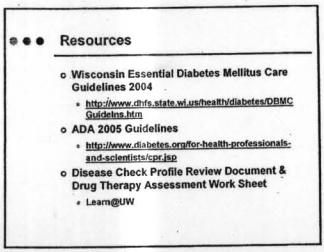
Grading

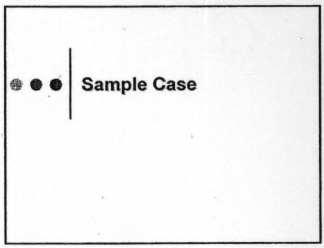
- 5 points
- Pass/Fail

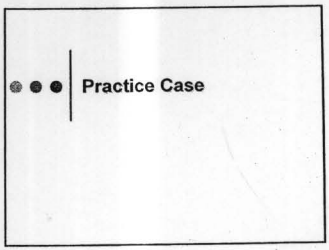

Timeline
Week 1-2
Week 3-6
Week 7-8


Diabetes Check Assignment
Diabetes Check:
Profile Review
Diabetes Check:
Interview


Pharmacy 741:
Diabetes Check
Profile Review
Lisa M Guirguis
Mara A Kieser
Betty A Chewning


Resources
Wisconsin Essential Diabetes Mellitus Care Guidelines 2004
http://www.dhfs.state.wi.us/health/diabetes/DBMCGuidelns.htm
ADA 2005 Guidelines
http://www.diabetes.org/for-health-professionals-and-scientists/cpr.jsp
Disease Check Profile Review Document & Drug Therapy Assessment Work Sheet
Learn@UW

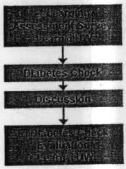

Sample Case


Practice Case

Discussion

- Post your description of one or more interesting findings with the experiences with the Diabetes Check -Profile Review on Learn@UW.
- Reply to at least one other message.

Course Evaluations



- Please complete the course evaluations. We value your experience and opinions about the Diabetes Check.
- It will provide course coordinators and researchers with valuable information about the Diabetes Check and how it worked for you

Course Evaluations

- 15 to 20 minutes to complete
- Confidential
- so that we can link surveys, you will be asked to provide:
  - your mother's maiden name
  - street name of your permanent address
  - the name of a favorite pet
  - the name of the elementary school you attended

Overview

- Students will review two medication profiles of patients with diabetes.
- Students are required to complete two patient profile review exercises on the 728-741 Disease Check Profile Review Document.
- The patient profile reviews should be completed without the use of computerized drug-use-evaluation software.
- Students are also referred to the Wisconsin Essential Diabetes Mellitus Care Guidelines 2004 and the ADA 2005 Guidelines for further information on diabetes care.
- Students will use the profile review resources: Drug Therapy Assessment Work Sheet & the following questions as a guide for the diabetes patient profile review.

Questions:

1) What parameters would you evaluate to determine if the diabetes disease is being controlled? (Indicate information you would like if it is not available.)
2) What parameters would you evaluate to determine if diabetes disease complications are being prevented?
3) What recommendations would you make for the patients' diabetes therapy?
4) What parameters, including the frequency, would you monitor in the future to determine if the diabetes disease is being controlled?
5) What counseling points would you provide to the patient if you were to talk with the patient?

**Students will submit to the School two Disease Check – diabetes patient profile review forms at the end of the rotation for grading purposes.

Discussion:

Please post one message about an interesting finding with your profile review and reply to at least one other student's message on the discussion board.

Evaluation:

1. Please complete the pre & post Diabetes Check Evaluation. We value your experience and opinions about the Diabetes Check. It will provide course coordinators and researchers with valuable information about the Diabetes Check and how it worked for you.
2. The course evaluation will be available on Learn@UW in the last 2 weeks of your clerkship.
3. We have found that it only takes students 10 to 15 minutes to complete the evaluation.
4. Information on this evaluation is confidential. Your name, your clerkship site, or the name of your preceptor will not be link to your responses.
5. You will be asked to provide your mother's maiden name, street name of your permanent address, the name of a favorite pet, and the name of the elementary school you attended, so that we can link pre- and post-surveys.

728-741 Disease Check Profile Review

Pt. Gender: M / F	Pt. Age:
Allergies:	Medical History:

Patient Profile

Rx #	Date	Rx Name / Strength	Directions	Refills	Prescriber
1					
2					
3					
4					
5					
6					
7					

Please answer questions 1-5 on a separate sheet of paper and submit to the School (along with this document) at the end of the rotation.

Questions:

1) What parameters would you evaluate to determine if the diabetes disease is being controlled? (Indicate information you would like if it is not available.)
2) What parameters would you evaluate to determine if diabetes disease complications are being prevented?
3) What recommendations would you make for the patients' diabetes therapy?
4) What parameters, including the frequency, would you monitor in the future to determine if the diabetes disease is being controlled?
5) What counseling points would you provide to the patient if you were to talk with the patient?

DRUG THERAPY ASSESSMENT WORKSHEET

Type of Problem	Assessment	Presence of Drug-Therapy Problem	Comments / Notes
Correlation between Drug Therapy and Medical Problems	Are there drugs without a medical indication? Are any medications unidentified (are any unlabeled or are any - prior to visit - unknown)? Are there untreated medical conditions? Do they require drug therapy?	1. A problem exists. 2. More information is needed for determination 3. No problem exists or an intervention is not needed	
Appropriate Drug Selection	What is the comparative efficacy of the chosen medication(s)? What is the relative safety of the chosen medication(s)? Has the therapy been tailored to this individual patient?	1. A problem exists. 2. More information is needed for determination 3. No problem exists or an intervention is not needed	

Drug Regimen	Are the prescribed dose and frequency appropriate - within the usual therapeutic range and / or modified for patient factors? Is prn use appropriate for those medications prescribed or taken that way? Is the route / dosage form / mode of administration appropriate, considering efficacy, safety, convenience, patient limitations, and cost? Are doses scheduled to maximize therapeutic effect and compliance and to minimize adverse effects, drug interactions, and regimen complexity? Is the length or course of therapy appropriate?	1. A problem exists. 2. More information is needed for determination 3. No problem exists or an intervention is not needed
Therapeutic Duplication	Are there any therapeutic duplications?	1. A problem exists. 2. More information is needed for determination 3. No problem exists or an intervention is not needed

Drug Allergy or Intolerance	Is the patient allergic to or intolerant of any medicines (or chemically related medications) currently being taken? Is the patient using any method to alert health care providers of the allergy / intolerance (or serious medical problem)>	1. A problem exists. 2. More information is needed for determination 3. No problem exists or an intervention is not needed
Adverse Drug Events	Are there symptoms or medical problems that may be drug induced? What is the likelihood that the problem is drug related?	1. A problem exists. 2. More information is needed for determination 3. No problem exists or an intervention is not needed
Interactions: Drug-Drug, Drug-Disease, Drug-Nutrient, and Drug-Laboratory Test	Are there any drug-drug interactions? Are they clinically significant? Are any medications contraindicated (relatively or absolutely) given patient characteristics and current / past disease states? Are there drug-nutrient interactions? Are they clinically significant? Are there drug-laboratory test interactions? Are they clinically significant?	1. A problem exists. 2. More information is needed for determination 3. No problem exists or an intervention is not needed

Social or Recreational Drug Use	Is the patient's current use of social drugs problematic? Could the sudden decrease or discontinuation of social drugs be related to patient symptoms (e.g., withdrawal)?	1. A problem exists. 2. More information is needed for determination 3. No problem exists or an intervention is not needed
Failure to Receive Therapy	Has the patient failed to receive a medication due to system error or non-adherence? Are there factors hindering the achievement of therapeutic efficacy?	1. A problem exists. 2. More information is needed for determination 3. No problem exists or an intervention is not needed
Financial Impact	Is the chosen medication(s) cost effective? Does the cost of drug therapy represent a financial hardship for the patient?	1. A problem exists. 2. More information is needed for determination 3. No problem exists or an intervention is not needed
Patient Knowledge of Drug Therapy	Does the patient understand the purpose of his or her medication(s), how to take it, and the potential side effects of therapy? Would the patient benefit from education tools (e.g., written patient education sheets, wallet cards, and reminder packaging)?	1. A problem exists. 2. More information is needed for determination 3. No problem exists or an intervention is not needed

DISEASE CHECK MEDICATION PROFILE REVIEW

You are the pharmacist – how do you check a patient's medications for appropriateness? By using a standardized method you will be more consistent and thorough in your assessment process. Below is a drug assessment method taken from the American Society of Health System Pharmacists. It provides eleven steps to check when assessing a drug regimen. (See hand out).

Drug Therapy Assessment (ASHP 1993)

Step One – Check for correlation between drug therapy and medical problems.

Step Two – Check for appropriate drug selection.

Step Three – Check the drug regimen

Step Four – Check for therapeutic duplication

Step Five – Check for drug allergy or intolerance

Step Six – Check for adverse drug events

Step Seven – Check for interactions

Step Eight – Check for social or recreational drug use

Step Nine – Check for failure to receive therapy

Step Ten – Check for financial impact

Step Eleven – Check for patient knowledge of drug therapy

Sample Case:

60-year-old female

Diet: 2000 ADA – on Atkins Diet per her own wishes.

Allergies: No drug allergies

Social: The resident does not smoke or drink alcohol

Diagnosis:
- Left Total Knee Arthroplasty,
- Diabetes Mellitus Type 2
- Depression
- HTN
- Hyperlipidemia,
- UTI

Medications:
- Coumadin 4 mg daily
- Pericolace one PO BID while on narcotics
- Percocet 5/325 one to two tablets PO Q 4 hours PRN for pain
- Oxycodone 5-10 mg PO Q 4 hours PRN breakthrough pain
- Glyburide 1.25 mg PO BID
- Lisinopril 2.5 mg daily
- Ciprofloxacin 500 mg PO BID x 7 days
- Ferrous Sulfate 325 mg PO BID x 1 month
- Calcium with Vitamin D 600 mg PO Q morning

Step One – Check for correlation between drug therapy and medical problems.

Are there drugs without a medical indication?
No

Are there untreated medical conditions? Do they require drug therapy?
Depression, Hyperlipidemia
Need further information - check Geriatric Depression Screen (GDS)
- check lipid panel

Step Two – Check for appropriate drug selection.

What is the comparative efficacy of the chosen medication?
All are approved for the indications
Check C&S to determine sensitivity to Ciprofloxacin

What is the relative safety of the chosen medication?
Coumadin has a narrow therapeutic window.
Glyburide has a long half life and may increase the risk of hypoglycemia

Has the therapy been tailored to this patient?
Check to assure that INR is in the desired range
Check to assure that pain is controlled with medications.
Check renal function to assess drug dosing – Cipro
Check FBS / A1C to assess glyburide therapy

Step Three – Check the drug regimen
Dose
Dosing frequency
PRN drug use
Administration issues
Length of therapy
Efficacy
Toxicity
Interactions

1) Dose of Calcium with Vitamin comes 500/200. Request to change. Also to titrate dose up to TID with food.
2) Check renal function to determine appropriate Cipro dosing. May need to adjust dose.
3) Glyburide – dose may be given in one dose. Check BS, A1C. Check if patient has hypoglycemic protocol.
4) Coumadin – check INR in 4 days since resident is on antibiotic therapy. If stable check INR at least monthly. Range 2-3. Request a stop date.
5) Lisinopril – check BP weekly
6) Check frequency of PRN pain medications. Schedule if using frequent doses.
7) Drug interactions see below
8) Check to make sure stop dates are followed. Check for Coumadin stop date.

Step Four – Check for therapeutic duplication
Percocet , Oxycodone

Check which PRN medication the resident is using and frequency. If resident is using frequent amounts, start Oxycontin 10 mg BID for pain. Use Percocet for breakthrough pain.

Step Five – Check for drug allergy or intolerance
None listed

Step Six – Check for adverse drug events
Any symptoms noted?
Monitor for bleeding, hypoglycemia, constipation, nausea, BP

Step Seven – Check for interactions
Drug – Drug
Cipro; Iron; Calcium. Separate by two hours.

Coumadin; Cipro. Monitor INR 4 days after starting Cipro.
Cipro; Glyburide. Monitor BS daily while on Cipro.

Drug – Food
Ciprofloxacin may be taken without regard to meals. Ciprofloxacin should not be taken with dairy products (like milk or with yogurt) or calcium-fortified juices alone since absorption of ciprofloxacin may be significantly reduced.

Warfarin should be taken consistently in relation to meals. Large changes in dietary consumption of foods high in vitamin K should be avoided or accompanied by careful monitoring of the international normalized ratio

Iron and iron-containing products should not be administered with dairy products.

Drug – Lab
Not significant

Step Eight – Check for social or recreational drug use
Patient does not smoke or drink alcohol

Step Nine – Check for failure to receive therapy
Check refills / Check Medication Administration Record

Step Ten – Check for financial impact
Are these medications covered by insurance?
Check if patient is private pay; insurance; Medicaid; Senior Care; Medicare Part D

Step Eleven – Check for patient knowledge of drug therapy
Does the patient understand why she is taking her medications and the expected results?
Provide counseling as needed.
Provide medication reminder aids as needed.

Final Summary:

TO: Dr. Thomas Smith

FROM: Mara Kieser, Consultant Pharmacist

DATE: Today

PATIENT: Mary Jones

COMMENT:
Ms. Jones is a 60-year-old patient recently admitted to the nursing home facility. Diagnoses include depression and hyperlipidemia. Patient's orders include:

Coumadin 4 mg daily
Glyburide 1.25 mg BID for DM Type 2
Lisinopril 2.5 mg daily for HTN
Ciprofloxacin 500 mg PO BID for 7 days for UTI
Ferrous Sulfate 325 mg PO BID x 1 month
Calcium with Vitamin D 600 mg PO each morning.

1) Request to check INR in 4 days to monitor Coumadin therapy.
2) Request to check FBS daily while on Cipro therapy to monitor possible drug interaction between Glyburide and Cipro.
3) Calcium with Vitamin D comes as a 500/200 tablet. Suggest changing to available dosage form.
4) Ciprofloxacin absorption may be decreased if given with iron or calcium. Suggest giving Ciprofloxacin two hours before iron or calcium products.
5) Patient has a diagnosis of depression and is currently not on drug therapy. Suggest completing a GDS to assess depression.
6) Patient has a diagnosis of hyperlipidemia and diabetes mellitus and is currently not on drug therapy. Suggest checking a lipid panel to assess need for drug therapy.

RECOMMENDATIONS:
1) Check INR in 4 days to monitor Coumadin therapy.
2) Check FBS daily while on Cipro therapy.

3) DC Calcium with Vitamin D 600 mg PO each morning.
4) Start Calcium with Vitamin D 500/200 mg PO at 1200.
5) Give Ciprofloxacin two hours before iron or calcium products.
6) Social Services to complete a GDS.
7) Check lipid panel to monitor hyperlipidemia.

PHYSICIAN'S COMMENT:

_____ _____
Physician Signature Date

Question #1 Parameters to assess for DM disease control
SMBG, A1C, symptoms of hypoglycemia or hyperglycemia, diet, weight

Question #2 Parameters to assess for DM complications
Lipid profile, blood pressure, microalbumin, creatinine, eye exam, dental exam, feet exam

Question #3 Recommendations relating to diabetes therapy
1) Recommend taking glyburide as a once daily dose in the morning with breakfast.
2) May wish to consider changing glyburide to glipizde due to the long half-life of glyburide and possible risk of hypoglycemia.
3) Recommend to check blood glucose at least daily while on Cipro due to a possible drug interaction.

Question #4 Parameters to monitor and frequency
A1C every 3-6 months <7%
SMBG daily Fasting 90-130 mg/dl; Post prandial <180 mg/dl
Lipid profile annually; C<200 TG< 150 HDL >50 LDL <100
Blood Pressure weekly BP< 130/80
Microalbuminuria annually. Normal < 30 mcg/mg creatinine
Creatinine annually
Urinalysis annually
Eye exam annually
Foot care complete exam annually
Dental exam every 6 months
Immunizations – Flu vaccine annually; pneumococcal vaccine according to guidelines

Question #5 Diabetes Counseling Point (Provide 1 counseling point specific to diabetes therapy)
Recommend knowing the signs and symptoms of low blood sugar (hypoglycemia), which include headache, drowsiness, weakness, dizziness, fast heartbeat, sweating, tremor, and nausea. Use the rule of 15's to treat hypoglycemia. Eat or drink 15 grams of carbohydrate. Wait 15 minutes. Check blood glucose again. If blood sugar is still low repeat steps. Examples of 15 grams carbohydrate choices – 4 glucose tablets, 1 tube of glucose gel, ½ cup of fruit juice, 1 cup of milk.

APPENDIX 3

Pre-Survey: Learning Assessment

Diabetes Check

Exit this survey >>

Learning Assessment -Diabetes Check: Profile Review Block 6

1. Introduction

Please complete this survey before starting the Diabetes Check Assignment.

We value your experience and opinions about the Diabetes Check assignment. It will provide course coordinators & researchers with valuable information about the Diabetes Check & how it worked for you. We will use your feedback to improve the usefulness of the Diabetes Check for future students & preceptors.

Information on this evaluation is confidential. Your name, your clerkship site, or the name of your preceptor will not be link to your responses. You will be asked to provide your mother's maiden name, street name of your permanent address, the name of a favorite pet, & the name of the elementary school you attended, so that we can link pre- & post-surveys.

There are only 12 questions in this survey!!

We are interested in your opinions, so please take your time & answer each question as accurately & frankly as possible.

1. To begin, you must first enter your Net ID (NOT your Student ID). This will allow the course instructor to assign credit for the Diabetes Check to those who complete the evaluation. This information will NOT be linked to your survey answers, but will only be used to track which students complete the course evaluations.

Survey is the same for Intervention and Control Groups

2. Please complete the following information so that we can link pre- & post-surveys while keeping your responses confidential.

1a What is your mother's maiden name? _____

1b What is the street name of your permanent address? _____

1c What is the name of your favorite pet? _____

1d What is the name of an elementary school you attended?

3. What block are you taking the current 741 clerkship?

1 2 3 4 5 6

Next >>

Diabetes Check

Exit this survey >>

Learning Assessment -Diabetes Check: Profile Review Block 6

2. Your general pharmacy experience

4. In the last month, how often did you ask patients with diabetes about:

	Never	Almost Never	Less than half the time	Half the time	More than half the time	Almost always	Always	N/A
a) their A1c?	○	○	○	○	○	○	○	○
b) their blood pressure?	○	○	○	○	○	○	○	○
c) their cholesterol?	○	○	○	○	○	○	○	○

5. Please think about your general experiences with patients in the last month when answering the following questions.

	Not at all	Almost none at all	A little	Somewhat	A great deal
a) To what extent, do you "make a difference" to patients?	○	○	○	○	○
b) How helpful are you to patients?	○	○	○	○	○
c) How important do you feel you are to patients?	○	○	○	○	○
d) How much do you feel patients pay attention to you?	○	○	○	○	○
e) How much would patients miss you if you went away?	○	○	○	○	○
f) How interested are patients generally in what you have to say?	○	○	○	○	○
g) How much do patients depend on you?	○	○	○	○	○

<< Prev Next >>

Diabetes Check

Exit this survey >>

Learning Assessment -Diabetes Check: Profile Review Block 6

3. Asking about A1c, Blood Pressure, & Cholesterol

6. The following set of questions refers to your interactions with PATIENTS WITH DIABETES. How sure are you that you could ROUTINELY ask patients:

	Not sure at all	Slightly sure	Somewhat sure	Rather sure	Quite sure	Very sure	Extremely sure
a) about A1c?	○	○	○	○	○	○	○
b) about blood pressure?	○	○	○	○	○	○	○
c) about cholesterol?	○	○	○	○	○	○	○
d) about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
e) with prescriptions **for a new medication** about their about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
f) **at medication refills** about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
g) **who are in a hurry** about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
h) **who do not appear interested** about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
i) **who are new to you** about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
j) **who regularly come into your pharmacy** about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
k) about A1c, blood pressure, & cholesterol **when it is busy**?	○	○	○	○	○	○	○
l) about A1c, blood pressure, & cholesterol **when you have time**?	○	○	○	○	○	○	○

<< Prev Next >>

Diabetes Check

Exit this survey >>

Learning Assessment -Diabetes Check: Profile Review Block 6

4. Your opinions about pharmacy practice

7. We value your opinion and appreciate you taking time to carefully answer the next questions.

	Not important at all	Slightly important	Somewhat important	Rather Important	Quite Important	Very important	Extremely important
a) How important is it that **physicians** talk about A1c, blood pressure, and cholesterol with patients with diabetes?	○	○	○	○	○	○	○
b) How important is it that **community pharmacists** talk about A1c, blood pressure, and cholesterol with patients with diabetes?	○	○	○	○	○	○	○
c) How important is it that **you, in your 741 clerkship,** talk about A1c, blood pressure, and cholesterol with patients with diabetes?	○	○	○	○	○	○	○

You are over half way done! Thank you very much.

8. The next set of questions ask your opinions about pharmacist's roles.

	Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree
a) It takes too much time to counsel patients on the medications they receive.	○	○	○	○	○	○	○
b) Most patients are more interested in receiving quick and inexpensive service from their pharmacist rather than advice.	○	○	○	○	○	○	○
c) It is essential for the pharmacist to advise patients about potential side effects that their drugs may cause.	○	○	○	○	○	○	○
d) An affixed prescription and applicable auxiliary contain all the information about the prescribed drug that the patient should receive from the pharmacist.	○	○	○	○	○	○	○
e) There be should legal restrictions on what the pharmacist is allowed to tell patients about their medications.	○	○	○	○	○	○	○
f) It is unethical to discuss with a patient the therapeutic purpose of his or her prescriptions.	○	○	○	○	○	○	○
g) Patients receive the necessary information about their medications from their physician.	○	○	○	○	○	○	○
h) Community pharmacists should routinely talk to patients with diabetes about A1c, blood pressure, and cholesterol.	○	○	○	○	○	○	○

i) Community pharmacists should talk to patients with diabetes about A1c, blood pressure, and cholesterol *at every prescription refill.*	○	○	○	○	○	○	○
j) It is the community pharmacists' job to routinely talk to patients with diabetes about A1c, blood pressure, and cholesterol.	○	○	○	○	○	○	○

<< Prev **Next >>**

Diabetes Check

Exit this survey >>

Learning Assessment -Diabetes Check: Profile Review Block 6

5. Your thoughts about future practice

9. In the future, if you routinely asked patients about A1c, blood pressure, & cholesterol, what type of experience would you expect with most patients?

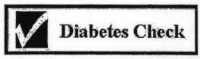
- Extremely Negative.
- Negative
- Somewhat Negative
- Neutral
- Somewhat Positive
- Positive
- Extremely Positive

10. If you routinely ask patients with diabetes about their A1c, blood pressure & cholesterol, how often do you think this practice will:

	Never	Almost Never	Less than half the time	Half the time	More than half the time	Almost always	Always
a) help patients take charge of their A1c, blood pressure, & cholesterol.							
b) give me a sense of personal accomplishment.							
c) help create a professional image of pharmacy.							
d) make patients feel uncomfortable.							
e) increase my satisfaction with pharmacy as a career choice.							
f) help me build relationships with my patients.							
g) take too much of time for community practice.							
h) open up opportunities to talk with patients.							
i) allow me to monitor drug therapy.							
j) frustrate pharmacy staff because it will slow workflow.							

Only 2 questions left!

<< Prev Next >>



Exit this survey >>

Learning Assessment -Diabetes Check: Profile Review Block 6

6. More thoughts on future practice & a bit about you

11. Have you worked with a community pharmacist(s) who routinely asks patients with diabetes about their A1c, blood pressure, and cholesterol?

- Yes
- No

12. What is your gender?

- Male
- Female

Thank you so much for taking time to complete the Learning Assessment.

If you have any questions about the Diabetes Check, please contact Mara Kieser or Lisa Guirguis.

<< Prev Done >>

APPENDIX 4

Post-Survey: Course Evaluation

Exit this survey >>

Diabetes Check

Evaluation: Diabetes Check Interview Block 6

Introduction (Page 1 of 10)

We value your experience and opinions about the Diabetes Check assignment. It will provide course coordinators & researchers with valuable information about the Diabetes Check & how it worked for you. We will use your feedback to improve the usefulness of the Diabetes Check for future students & preceptors.

Information on this evaluation is confidential. Your name, your clerkship site, or the name of your preceptor will not be link to your responses. You will be asked to provide your mother's maiden name, street name of your permanent address, the name of a favorite pet, & the name of the elementary school you attended, so that we can link pre- & post-surveys.

We are interested in your opinions, so please take your time & answer each question as accurately & frankly as possible.

1. To begin, you must first enter your Net ID (NOT your Student ID). This will allow the course instructor to assign credit for the Diabetes Check to those who complete the evaluation. This information will NOT be linked to your survey answers, but will only be used to track which students complete the course evaluations.

2. Please complete the following information so that we can link pre- & post-surveys while keeping your responses confidential.

1a What is your mother's maiden name? _____

1b What is the street name of your permanent address? _____

1c What is the name of your favorite pet? _____

1d What is the name of an elementary school you attended? _____

3. What block are you taking the current 741 clerkship?

1	2	3	4	5	6
◡	◡	◡	◡	◡	◡

4. The Learning Assessment is the survey you completed online before you started the Diabetes Check. Did answering the questions on the Learning Assessment change the way in which completed the Diabetes Check Assignment?

◡ Yes
◡ No

SKIP PATTERN

4 =YES go to 5
4 = NO skip to 6

Exit this survey >>

Diabetes Check

Evaluation: Diabetes Check Interview Block 6

5. In a few words, please describe how the Learning Assessment changed the way in which you completed the Diabetes Check Assignment.

Diabetes Check

Exit this survey >>

Evaluation: Diabetes Check Interview Block 6

Your general pharmacy experience (Page 2 of 10)

6. In the last month, how often did you ask patients with diabetes about:

	Never	Almost Never	Less than half the time	Half the time	More than half the time	Almost always	Always	N/A
a) their A1c?	○	○	○	○	○	○	○	○
b) their blood pressure?	○	○	○	○	○	○	○	○
c) their cholesterol?	○	○	○	○	○	○	○	○

7. Please think about your general experiences with patients in the last month when answering the following questions.

	Not at all	Almost none at all	A little	Somewhat	A great deal
a) To what extent, do you "make a difference" to patients?	○	○	○	○	○
b) How helpful are you to patients?	○	○	○	○	○
c) How important do you feel you are to patients?	○	○	○	○	○
d) How much do you feel patients pay attention to you?	○	○	○	○	○
e) How much would patients miss you if you went away?	○	○	○	○	○
f) How interested are patients generally in what you have to say?	○	○	○	○	○
g) How much do patients depend on you?	○	○	○	○	○

<< Prev Next >>

Diabetes Check

Exit this survey >>

Evaluation: Diabetes Check Interview Block 6

Asking about A1c, Blood Pressure, & Cholesterol (Page 3 of 10)

We are interested in your opinions, so please take your time & answer each question as accurately & frankly as possible.

8. The following set of questions refers to your interactions with PATIENTS WITH DIABETES. How sure are you that you could ROUTINELY ask patients:

	Not sure at all	Slightly sure	Somewhat sure	Rather sure	Quite sure	Very sure	Extremely sure
a) about A1c?	○	○	○	○	○	○	○
b) about blood pressure?	○	○	○	○	○	○	○
c) about cholesterol?	○	○	○	○	○	○	○
d) about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
e) with prescriptions **for a new medication** about their about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
f) **at medication refills** about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
g) **who are in a hurry** about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
h) **who do not appear interested** about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
i) **who are new to you** about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
j) **who regularly come into your pharmacy** about A1c, blood pressure, & cholesterol?	○	○	○	○	○	○	○
k) about A1c, blood pressure, & cholesterol **when it is busy?**	○	○	○	○	○	○	○
l) about A1c, blood pressure, & cholesterol **when you have time?**	○	○	○	○	○	○	○

<< Prev Next >>

Diabetes Check

Exit this survey >>

Evaluation: Diabetes Check Interview Block 6

Your opinions about pharmacy practice (Page 4 of 10)

9. We value your opinion and appreciate you taking time to carefully answer the next questions.

	Not important at all	Slightly important	Somewhat important	Rather Important	Quite Important	Very important	Extremely important
a) How important is it that **physicians** talk about A1c, blood pressure, and cholesterol with patients with diabetes?	○	○	○	○	○	○	○
b) How important is it that **community pharmacists** talk about A1c, blood pressure, and cholesterol with patients with diabetes?	○	○	○	○	○	○	○
c) How important is it that **you, in your 741 clerkship,** talk about A1c, blood pressure, and cholesterol with patients with diabetes?	○	○	○	○	○	○	○

10. The next set of questions ask your opinions about pharmacist's roles.

	Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree
a) It takes too much time to counsel patients on the medications they receive.	○	○	○	○	○	○	○
b) Most patients are more interested in receiving quick and inexpensive service from their pharmacist rather than advice.	○	○	○	○	○	○	○
c) It is essential for the pharmacist to advise patients about potential side effects that their drugs may cause.	○	○	○	○	○	○	○
d) An affixed prescription and applicable auxiliary contain all the information about the prescribed drug that the patient should receive from the pharmacist.	○	○	○	○	○	○	○
e) There should be legal restrictions on what the pharmacist is allowed to tell patients about their medications.	○	○	○	○	○	○	○
f) It is unethical to discuss with a patient the therapeutic purpose of his or her prescriptions.	○	○	○	○	○	○	○
g) Patients receive the necessary information about their medications from their physician.	○	○	○	○	○	○	○
h) Community pharmacists should routinely talk to patients with diabetes about A1c, blood pressure, and cholesterol.	○	○	○	○	○	○	○
i) Community pharmacists should talk to patients with diabetes about A1c, blood pressure, and cholesterol *at every prescription refill.*	○	○	○	○	○	○	○

j) It is the community pharmacists' job to routinely talk to patients with diabetes about A1c, blood pressure, and cholesterol.

Thanks for taking the time to answer that question. You opionions are important.

<< Prev **Next >>**

Diabetes Check

Exit this survey >>

Evaluation: Diabetes Check Interview Block 6

Your thoughts about future practice (Page 5 of 10)

11. In the future, if you routinely asked patients about A1c, blood pressure, & cholesterol, what type of experience would you expect with most patients?

- Extremely Negative.
- Negative
- Somewhat Negative
- Neutral
- Somewhat Positive
- Positive
- Extremely Positive

12. If you routinely ask patients with diabetes about their A1c, blood pressure & cholesterol, how often do you think this practice will:

	Never	Almost Never	Less than half the time	Half the time	More than half the time	Almost always	Always
a) help patients take charge of their A1c, blood pressure, & cholesterol.							
b) give me a sense of personal accomplishment.							
c) help create a professional image of pharmacy.							
d) make patients feel uncomfortable.							
e) increase my satisfaction with pharmacy as a career choice.							
f) help me build relationships with my patients.							
g) take too much of time for community practice.							
h) open up opportunities to talk with patients.							
i) allow me to monitor drug therapy.							
j) frustrate pharmacy staff because it will slow workflow.							

You are more than half way done!

<< Prev Next >>

Diabetes Check

Exit this survey >>

Evaluation: Diabetes Check Interview Block 6

More thoughts on future practice (Page 6 of 10)

13. How likely are you to routinely ask patients with diabetes about their A1c, blood pressure, & cholesterol:

	Extremely Unlikely	Very Unlikely	Unlikely	Likely	Very Likely	Extremely Likely	N/A
a) in future practice?	☐	☐	☐	☐	☐	☐	☐
b) in your next clerkship?	☐	☐	☐	☐	☐	☐	☐
c) in the pharmacy setting you expect to practice in next year?	☐	☐	☐	☐	☐	☐	☐
d) in a pharmacy setting when you are busy?	☐	☐	☐	☐	☐	☐	☐
e) in a pharmacy setting when you have time to spend with patients?	☐	☐	☐	☐	☐	☐	☐

<< Prev Next >>

Diabetes Check

Exit this survey >>

Evaluation: Diabetes Check Interview Block 6

Your experiences with the Diabetes Check (Page 7 of 10)

14. How easy was it to do a Diabetes Check?

- Extremely Difficult
- Difficult
- Neutral
- Easy
- Extremely Easy

15. Overall, what was the most common patient reaction to the Diabetes Check?

- Patients said their doctor already watched their levels
- Patients really appreciated this service
- Patients asked why I wanted to know their levels
- Patients were receptive, but did not ask questions.
- Patients were embarrassed about not knowing their levels
- Patients were accommodating mostly to help me as a student complete an assignment
- Other (please specify)

16. What kind of patient are you most likely to approach to do a diabetes check? Patients:

- on many diabetes medications.
- who appear interested in talking.
- who ask me questions.
- who do not appear motivated to manage their diabetes.
- Not sure.
- Other (please specify)

17. Overall, how did the patient reaction affect you?

- It *discouraged* me from talking to patients about diabetes A1c, blood pressure and cholesterol
- It *somewhat discouraged* me from talking to patients about diabetes A1c, blood pressure and cholesterol
- I was unaffected.
- It *somewhat encouraged* me to talk to more patients about diabetes A1c, blood pressure and cholesterol
- It *encouraged* me to talk to more patients about diabetes A1c, blood pressure and cholesterol

18. Overall, how was your experience with patients during the Diabetes Check?

- Extremely Negative.
- Negative
- Somewhat Negative
- Neutral

- Somewhat Positive
- Positive
- Extremely Positive

19. During or after a diabetes check, for how may patients did you do any of the following ?

	None	A few	Some	Most	All
a) Educated the patient on diabetes					
b) Talked to my clinical instructor					
d) Contacted other health care providers					
d) Clarifed patients concerns					
f) Recommended medication changes					
g) Wrote a documentation note (SOAP note)					

<< Prev **Next >>**

Diabetes Check

Exit this survey >>

Evaluation: Diabetes Check Interview Block 6

A bit about your 741 clerkship site (Page 8 of 10)

This information is confidential. You or your clerkship site will not be identified.

20. At your 741 clerkship site, how receptive were patients to pharmacist counseling?

- Not receptive
- Slightly receptive
- Somewhat receptive
- Rather receptive
- Quite receptive
- Very receptive
- Extremely receptive

21. In your opinion, at your 741 clerkship site:

	No patients	Almost no patients	Less than half	Half of patients	More than half	Almost all patients	All patients
a) how many patients with diabetes does your clinical instructor ask about their A1C, blood pressure, & cholesterol?							
b) how many patients expect pharmacists to counsel them with every prescription?							

22. Overall, how supportive was the pharmacy staff of YOU taking time to:

	Not supportive at all	Slightly supportive	Somewhat supportive	Rather supportive	Quite Supportive	Very supportive	Extremely Supportive
a) counsel patients?							
b) to ask patients with diabetes about the A1c, blood pressure, & cholesterol?							

<< Prev Next >>

Exit this survey >>

Diabetes Check

Evaluation: Diabetes Check Interview Block 6

A bit about you (Page 9 of 10)

23. Have you worked with a community pharmacist(s) who routinely asks patients with diabetes about their A1c, blood pressure, and cholesterol?

- Yes
- No

24. What is your gender?

- Male
- Female

25. Have you worked with a community pharmacist(s) who you consider to be a role model?

- Yes
- No

26. In a few words, describe the diabetes check assigment you completed in 741.

27. How much did you talk to other students about the Diabetes Check:

	Not at all	Almost none at all	A little	Somewhat	A great deal
a) at orientation ?					
b) at clerkship meetings?					
c) in general?					

<< Prev **Next >>**

Diabetes Check

Exit this survey >>

Evaluation: Diabetes Check Interview Block 6

Your information from the Interview Guide (Page 10 of 10)

Please use your COMPLETED INTERVIEW GUIDE to complete this final page of the evaluation.
THANKS!

28. The Interview Guide is the double sided page which listed sample questions you could ask patients about A1c, blood pressure & cholesterol on the front side with room to record time required & your reactions for each patient on the back side.

There are many "correct" ways to use the Interview Guide. How did you use the it?

- I did not use it at all.
- I had it with me for the first patient(s) and later I filled it in after I talked to the patient.
- I used it to write down information, but did not have it with me when I talked to the patient.
- I had it with me for each patient interaction and completed questions about my reactions immediately after I talked to the patient.
- Other (please specify)

29. Think about all the patients who completed a diabetes check with you whether or not you counted them for the assignment. How many patients completed a Diabetes Check with you?

Number of patients

30. Please refer to question 12 on your completed Interview Guide to answer this question. How many minutes did it take you to complete the Diabetes Check with each patient? Enter n/a for any blanks.

Patient 1
Patient 2
Patient 3
Patient 4
Patient 5
Patient 6
Patient 7
Patient 8
Patient 9
Patient 10

31. Refer to question 13-14 on your completed Interview Guide to these questions.

	Patient 1	Patient 2	Patien
Q13. How interested did this patient appear in talking to you?			→PL5
Q14. How helpful was talking about the Diabetes Check for this patient			

32. Use this space to enter your responses for questions 13 & 14 for any patients you completed abov

Patient 6	Patient 7	Patien
		→Pt 10

Q13. How interested did this patient appear in talking to you?

Q14. How helpful was talking about the Diabetes Check for this patient

33. Refer to question 15 on your completed Interview Guide to answer this question.

Patient 1 Patient 2 Patient 3 →Pt5

Q15. How was your experience with this patient?

34. Use this space to enter your responses for question 15 for any patients you completed above the 5

Patient 6 Patient 7 Patient 8 →Pt 10

Q15. How was your experience with this patient?

35. Do you have any comments or suggestions for improving the Diabetes Check?

Thanks for completeing the evaluation. Good luck on the remainder of your Clerkship.

<< Prev **Done >>**

Diabetes Check

Exit this survey >>

Evaluation: Diabetes Check Profile Review -Block 6

Your experiences with the Diabetes Check (Page 7 of 9)

14. How easy was it to do a Diabetes Check?

- Extremely Difficult
- Difficult
- Neutral
- Easy
- Extremely Easy

15. Overall, how was your experience with the Diabetes Check?

- Extremely Negative.
- Negative
- Somewhat Negative
- Neutral
- Somewhat Positive
- Positive
- Extremely Positive

Evaluation: Diabetes Check Profile Review (Control Group)
Questions 1 to 13 are the same as the Intervention Group (Interview)

16. During or after a diabetes check, for how may patients did you do any of the following ?

	None	A few	Some	Most	All
a) Educated the patient on diabetes					
b) Talked to my clinical instructor					
d) Contacted other health care providers					
d) Clarifed patients concerns					
f) Recommended medication changes					
g) Wrote a documentation note (SOAP note)					

<< Prev Next >>

Diabetes Check

Exit this survey >>

Evaluation: Diabetes Check Profile Review -Block 6

A bit about your 741 clerkship site (Page 8 of 9)

This information is confidential. You or your clerkship site will not be identified.

17. At your 741 clerkship site, how receptive were patients to pharmacist counseling?

- Not receptive
- Slightly receptive
- Somewhat receptive
- Rather receptive
- Quite receptive
- Very receptive
- Extremely receptive

18. In your opinion, at your 741 clerkship site:

	No patients	Almost no patients	Less than half	Half of patients	More than half	Almost all patients	All patients
a) how many patients with diabetes does your clinical instructor ask about their A1C, blood pressure, & cholesterol?							
b) how many patients expect pharmacists to counsel them with every prescription?							

19. Overall, how supportive was the pharmacy staff of YOU taking time to:

	Not supportive at all	Slightly supportive	Somewhat supportive	Rather supportive	Quite Supportive	Very supportive	Extremely Supportive
a) counsel patients?							
b) to complete the Diabetes Check profile reviews?							

<< Prev Next >>

Diabetes Check

Exit this survey >>

Evaluation: Diabetes Check Profile Review -Block 6

A bit about you (Page 9 of 9)

20. Have you worked with a community pharmacist(s) who routinely asks patients with diabetes about their A1c, blood pressure, and cholesterol?

- Yes
- No

21. What is your gender?

- Male
- Female

22. Have you worked with a community pharmacist(s) who you consider to be a role model?

- Yes
- No

23. In a few words, describe the diabetes check assigment you completed in 741.

24. How much did you talk to other students about the Diabetes Check:

	Not at all	Almost none at all	A little	Somewhat	A great deal
a) at orientation ?					
b) at clerkship meetings?					
c) in general?					

25. Do you have any comments or suggestions for improving the Diabetes Check?

Thanks for completeing the evaluation. Good luck on the remainder of your Clerkship.

<< Prev Done >>

APPENDIX 5

Survey Questions and Theoretical Constructs

Theoretical Construct	Variable Name	Question Numbers		
		Pre Survey	Post Survey	
			Intervention	Control
Identifiers	(NETID)	1	1	1
	Matching Variables (Maiden)	2a	2a	2a
	Matching Variables (Address)	2b	2b	2b
	Matching Variables (Pet)	2c	2c	2c
	Matching Variables (School)	2d	2d	2d
	Clerkship Block (Block)	3	3	3
	ID From Survey Monkey (SM_ID)	Survey Monkey	Survey Monkey	Survey Monkey
Routinely Asking About Clinical Targets	Routine Behavior (B_ROUT)=patient > 5 from nDC	---	---	29 (nDC)
	Behavior Asking About A1c (B_A)	4a	6a	6a
	Behavior Asking About Blood Pressure (B_B)	4b	6b	6b
	Behavior Asking About Cholesterol (B_C)	4c	6c	6c
Mattering (7 items)	Mattering (MAT)=Mean (MAT_a- MAT_g)	5a-g	7a-g	8a-l
Self-Efficacy (12 items)	Self-Efficacy (SE)=mean (SE_a-SE_l	6a-l	8a-l	8a-l
Role Beliefs (4 items)	Monitoring Role Orientations (MRO)=mean (MRO_s, MRO_r, MRO_rf, MRO_j)	7c* 8h, 8i, 8j	9c 10h, 10i, 10j	9c 10h, 10i, 10j
Role Beliefs- (7 items)	Counselor Role Orientation (CRO) = mean (CRO_a-CRO_g) ** *Reverse Code a, b, d, e, f, and g*	8a-g	10a-g	10a-g
Outcome Expectancies (11)	Outcome Expectations (OE)=mean of (OE_o & OE_a-OE_j) *Reverse Code d, g, j*	9 (OE_o) 10a-j (OE_a-OE_j)	12a-j	12a-j
Intentions	Intentions (INT)=Mean (39-43)	---	13a-e	13a-e

Theoretical Construct	Variable Name	Question Numbers		
		Pre Survey	Post Survey	
			Intervention	Control
Experience with the Diabetes Check	Effect of Learning Assessment (eLA)	---	4	4
	Describe Above If Yes (eLA_DES)	---	5	5
	Role Capacity (ROLEC)	---	14	14
	How Was Experience With DC? (ST_EXP1)	---	18	15
	Follow-up Activities (FUA)	---	19a-g	16a-g
	Talk to Other students (Talka-c)	---	27a-c	24a-c
	Describe Diabetes Check (des)	---	26	23
	Comments (COMM)	Comm	35	25
	Most Common Pt Reaction? (PTRXN) (PTRXN_o)=other	---	15	---
	What Kind of Pt Would You Approach? (A_PT) (A_PT_O)= Other	---	16	---
	Affect of Pt Reaction (E_PTRXN)	---	17	---
	How Did You Use the Interview Guide? (USE_IG) (USE_IG_o)= Other	---	28	---
	Time_x=Time to Completed Diabetes Check (time_1-Time_10)	---	30 (items 1-10)	---
	ptin_x=How Interested Did The Patient Appear In Talking To You? (ptin_1-ptin_10)	---	31/32	---
	pth_s=How Helpful Was Talking About The DC For This Patient? (pth_1-pth_10)	---	31/32	---
	pte_x_How Was Your Experience With This Patient? ST_EXP =mean (pte_1-pte_10)	---	33/34	---
Site Description	How Receptive Were Pts to Counseling? (PT_rec)	---	20	17
	How Many Patients Does CI Ask About ABCs? (B_Prec)	---	21a	18a
	How Many Patients Expect Counseling With Every Rx? (PT_exp)	---	21b	18b
	How Supportive Were Staff Of Counseling (SUP_c) And Diabetes Check (SUP_dc)?	---	22a-b	19a-c
student Description	Work With Community RPh Who Asks About ABCs' (B_Rx)	11	23	20
	Gender	12	24	21
	Role Model (R_MOD)	---	25	22

Note: DC=Diabetes Check. Pt=patient. CI=clinical instructor.

* Questions 7a and 7b were used to anchor Question 7c.

**One item of the Counselor Role Orientation was lost in translation between the paper and web survey: "The physician is better qualified than the pharmacist to advise patients about their medications."

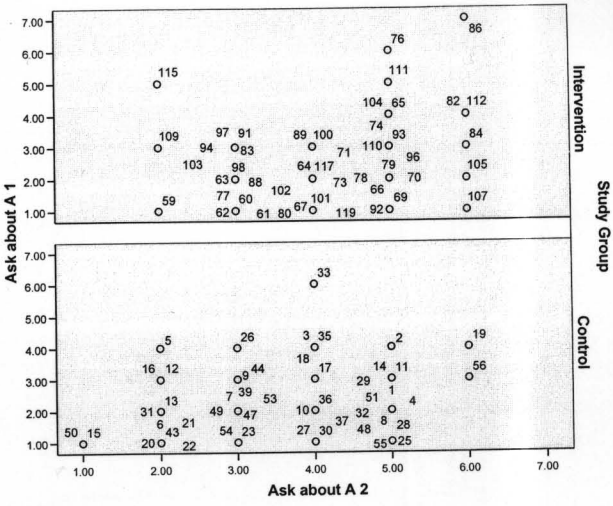
APPENDIX 6

Variable Distributions

Variable Distributions Statistics

			Skewness		Kurtosis	
			Value	Ratio	Value	Ratio
Behavior						
A1c	Pre	Statistic	1.129	4.922*	1.703	3.742*
		Std. Error	0.229		0.455	
	Post	Statistic	-0.171	-0.746	-0.936	-2.058
		Std. Error	0.229		0.455	
Blood Pressure	Pre	Statistic	0.362	1.577	-0.046	-0.102
		Std. Error	0.229		0.455	
	Post	Statistic	-0.115	-0.501	-1.118	-2.457*
		Std. Error	0.229		0.455	
Cholesterol	Pre	Statistic	0.369	1.608	-0.511	-1.122
		Std. Error	0.229		0.455	
	Post	Statistic	0.173	0.752	-0.879	-1.933
		Std. Error	0.229		0.455	
Intentions						
Intention Scale	Post	Statistic	-0.284	-1.272	0.386	0.870
		Std. Error	0.224		0.444	
Attitudes						
Mattering	Pre	Statistic	-0.182	-0.815	-0.417	-0.940
		Std. Error	0.224		0.444	
	Post	Statistic	-0.406	-1.816	-0.024	-0.053
		Std. Error	0.224		0.444	
Self-Efficacy	Pre	Statistic	0.081	0.363	-0.184	-0.416
		Std. Error	0.224		0.444	
	Post	Statistic	-0.351	-1.571	-0.322	-0.727
		Std. Error	0.224		0.444	
MRO	Pre	Statistic	-0.625	-2.794*	0.640	1.443
		Std. Error	0.224		0.444	
	Post	Statistic	-0.612	-2.735*	1.043	2.350*
		Std. Error	0.224		0.444	
CRO	Pre	Statistic	-0.233	-1.043	-0.859	-1.935
		Std. Error	0.224		0.444	
	Post	Statistic	-0.830	-3.710*	0.838	1.888
		Std. Error	0.224		0.444	
Negative Outcome Expectancies	Pre	Statistic	0.346	1.548	-0.160	-0.361
		Std. Error	0.224		0.444	
	Post	Statistic	0.322	1.442	-0.801	-1.805
		Std. Error	0.224		0.444	
Positive Outcome Expectancies	Pre	Statistic	-0.317	-1.417	0.234	0.527
		Std. Error	0.224		0.444	
	Post	Statistic	-0.531	-2.374*	0.046	0.104
		Std. Error	0.224		0.444	

*Non-normal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Ask about A 2
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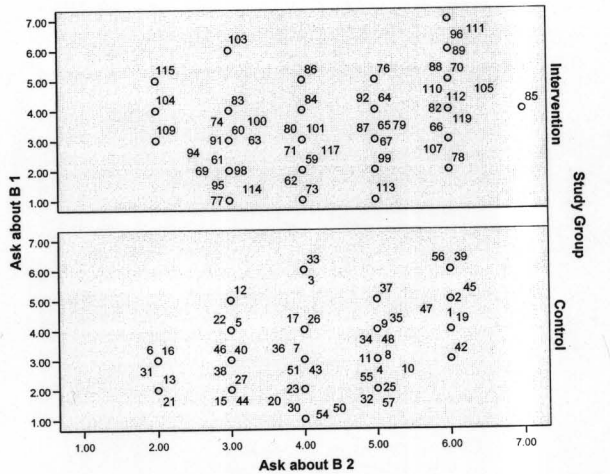
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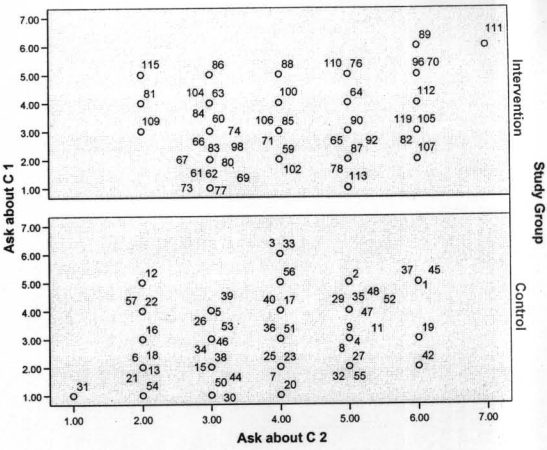
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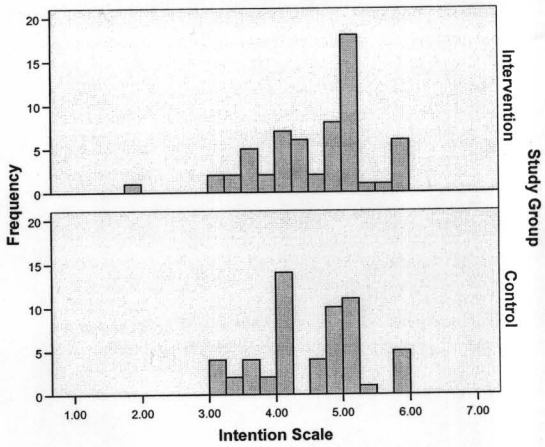
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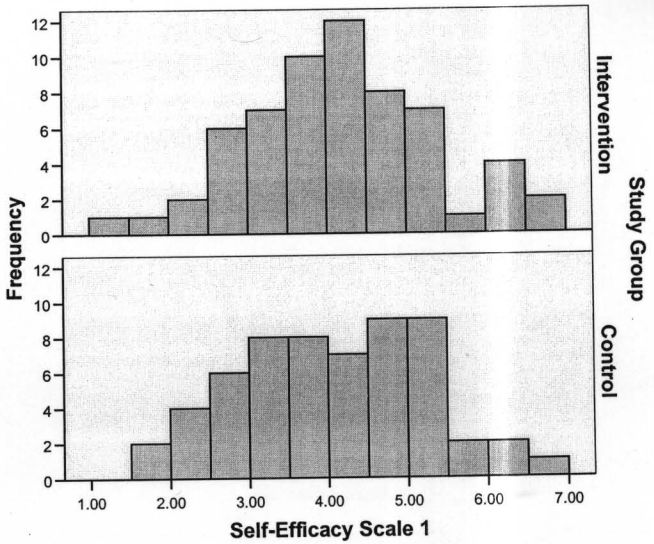
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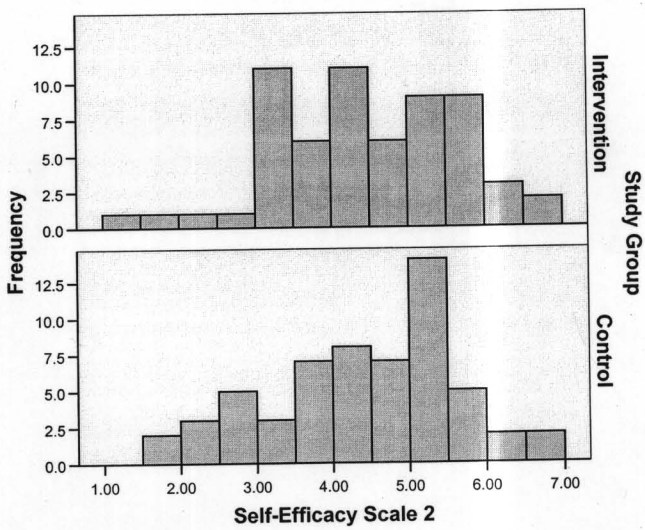
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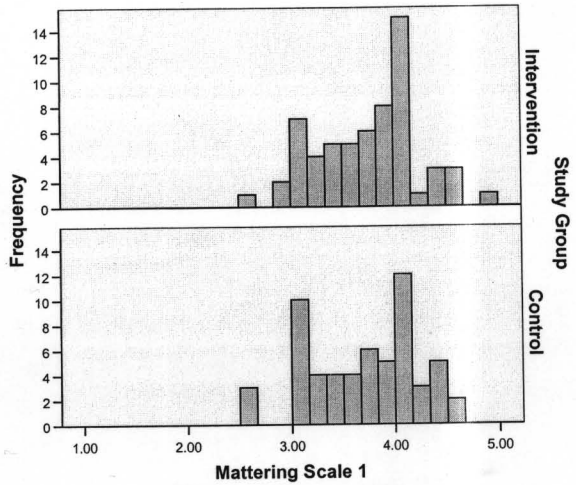
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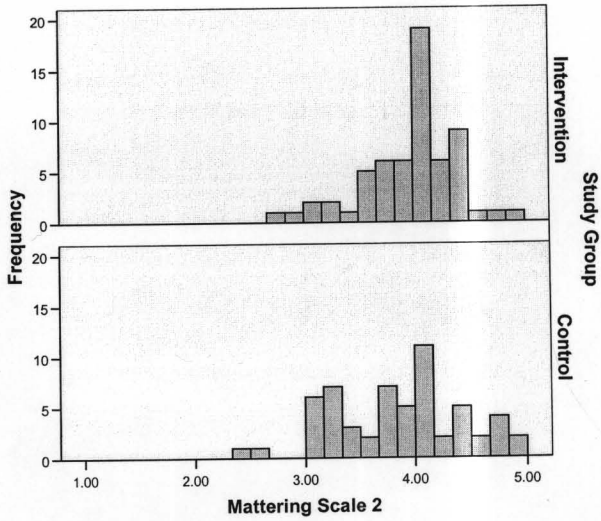
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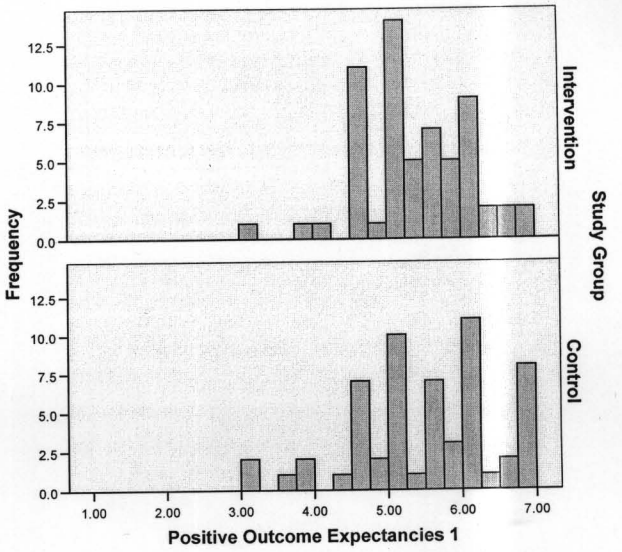
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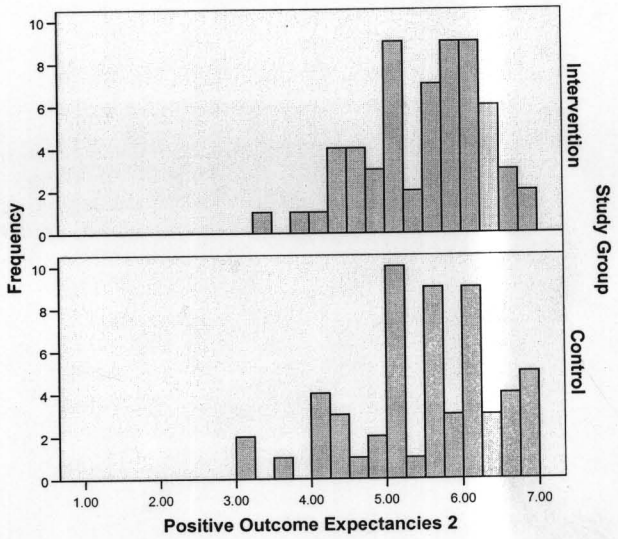
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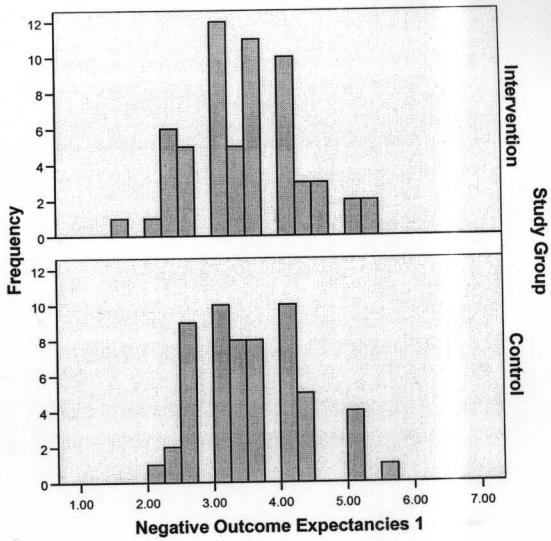
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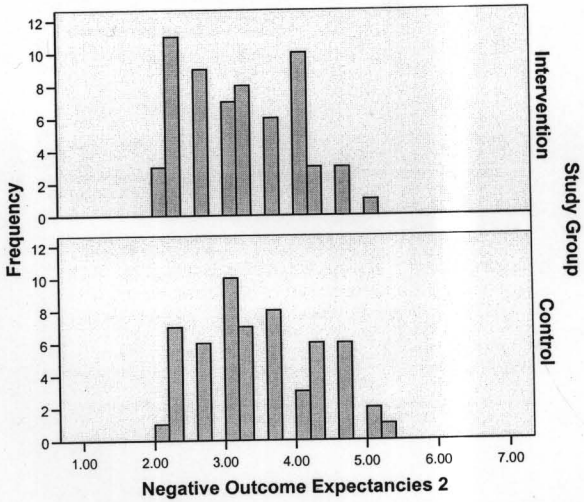
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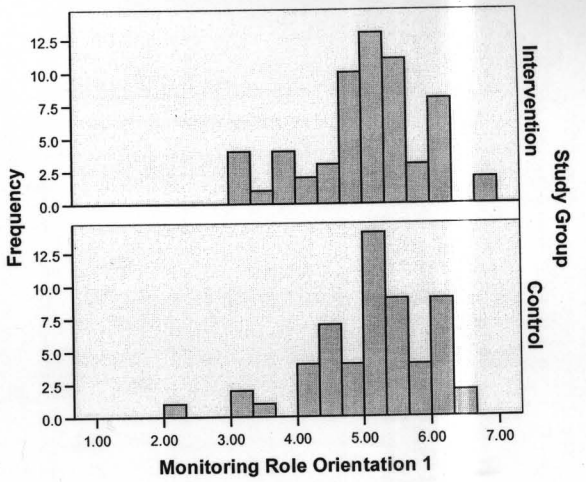
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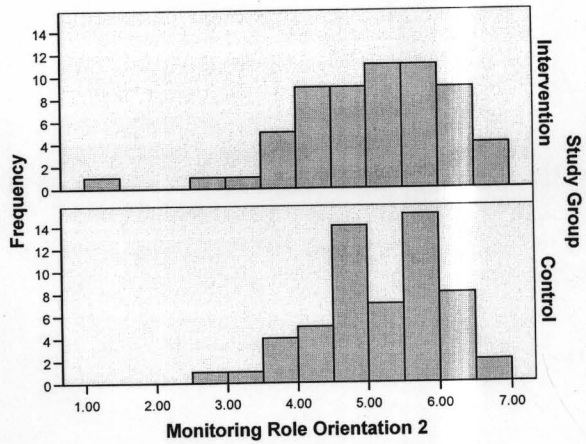
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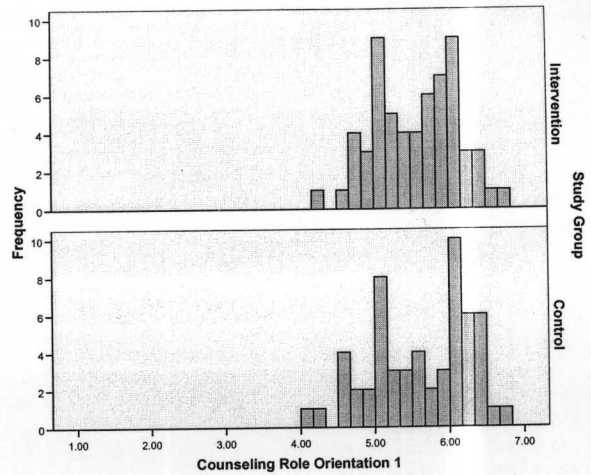
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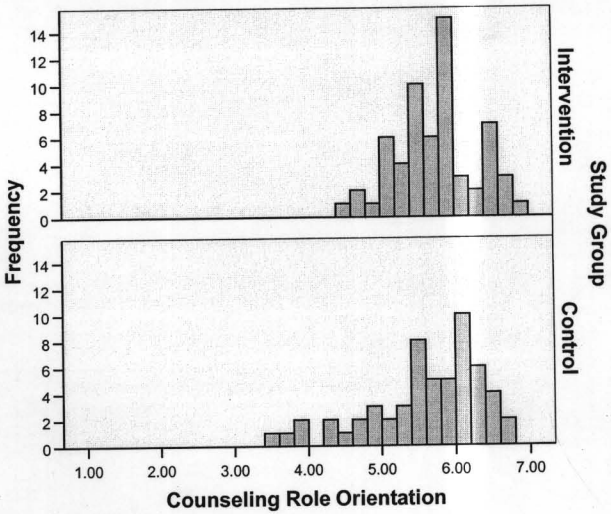
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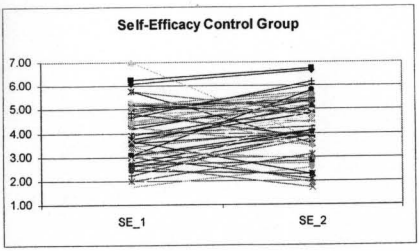
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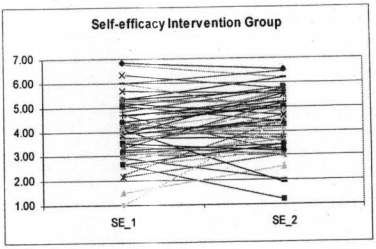
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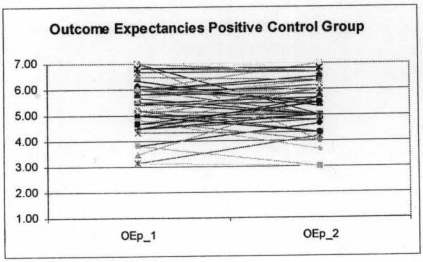
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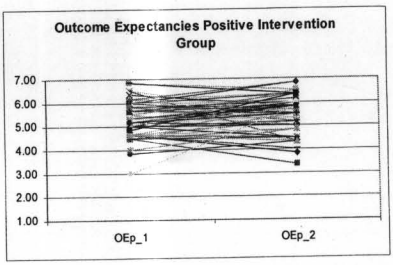
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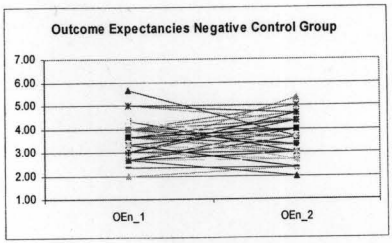
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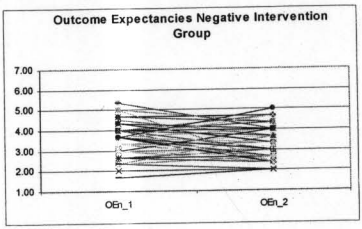
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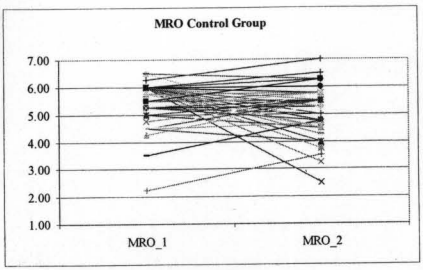
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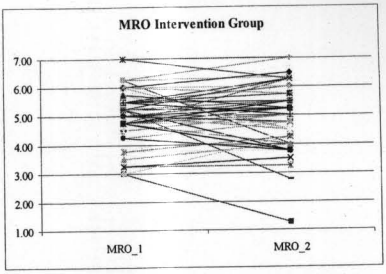
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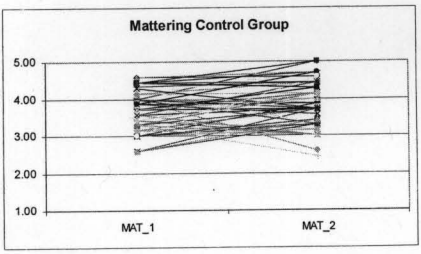
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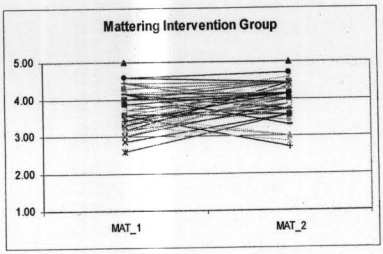
MAT_1
MAT_2


Mattering Intervention Group
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MAT_2

APPENDIX 7

Confirmatory Factor Analysis

A confirmatory factor analysis was performed to reduce items, ensure constructs measured items as intended, and provide evidence for the factor structure of the scales. Individual items and scales were examined for normality. There appeared to be no outliers. Visual inspection of all individual items and scale score distributions revealed no marked deviations from normality. All five scales had kurtosis and skewness values less than one, indicating no extreme deviations from normal. All individual items except one had kurtosis and skewness values of one or lower. One item (i.e., OE_e) had a skewed value of 1.1 and a kurtosis of 1.8, indicating a slightly positive tail. However, as this did not impact the scale distribution and appeared normally distributed on visual inspection, this item was retained and the integrity of the statistical test was unlikely to be violated.

Ideally, a CFA analysis would have over 200 cases (Garson, 2006c). This was not possible with the fixed sample size of this study. Another CFA criterion was for 5 to 10 cases per item (DiStefano & Hess, 2005). The analysis sample size was fixed at 119 students, so 23 questions could be included in the analysis. There were 33 total questions in the self-efficacy, outcome expectancies, MRO, and mattering scales. To reduce the number of indicators, parceling was used. Parceling is a mean score across a set of homogenous items (Bandalos, 2001; Kline, 2005).

Five parcels were created based on a theoretical knowledge of the survey questions and previously published work. First, five of the seven mattering scale elements (MAT_c to MAT_g) that were previously published were combined (MAT_co) (Marcus & Rosenberg, 1987). Second, the first four items of the self-efficacy scale (SE_a to SE_d) were combined (SE_coABC), as these items asked separately about each Diabetes ABC value and then about the items combined. Third, three further items from the self-efficacy scale were combined (SE_g, SE_h, and SE_k). In development work, these items represented difficult conditions for asking about the diabetes ABCs (i.e., patient in a hurry, patient not interested, and limited time). The fourth parcel was the outcome expectancies Scale. Items that clearly labeled students' beliefs about the benefit of pharmacists asking about the Diabetes ABCs (OE_b, OE_c, and OE_e) were combined (OE_s). The fifth parcel (OE_p) in the outcome expectancies combined two items that focused on patient-student interactions (i.e., OE_f, OE_h). These items queried the outcome of asking about Diabetes ABCs on patient relationships and having an opportunity to talk. The correlation matrices of items within all parcels were examined and found to be

statistically significantly correlated. Correlations were medium to large for all parcels except the mattering scale. Correlations for the mattering scale ranged from 0.30 to 0.57. These small to medium correlations were accepted, as this scale was previously used by others. By creating these parcels, the number of items (i.e., either individual questions or parcel) in the CFA was reduced from 33 to 21 and the analysis had approximately five cases per item.

Maximum likelihood estimates were used to perform the CFA with a covariance matrix. Three models were tested and compared based on the fit of the factors loadings and goodness of fit. The comparison was performed with the theory used to develop the survey in mind, and with an understanding of students' experiences from pilot work.

Many criteria rules are used to judge the "goodness" of fit statistics for CFA. These may appear arbitrary, and the goal of any model confirmation is to find the best fit possible in a field (DiStefano & Hess, 2005; Garson, 2006c; Hu & Bentler, 1999). The goodness of fit criteria were examined for model fit, model parsimony, relative fit, and model comparison. Model fit indices examined the fit of the entire model to the data. These included the standardized root mean square residual (SRMR; measures the absolute mean of the covariance residuals), the goodness of fit index (GFI; analogous to the regression R2 as the level of error explained in reproducing the model), and the root mean square error of approximation (RMSEA; "badness of fit" indicator) (Kline, 2005). The model adjusted goodness of fit index (AGFI), a model parsimony index, evaluated the fit of the model versus the number of estimated coefficients needed to achieve that level of fit (Garson, 2006c). Relative fit indices included the non-normed fit index (NNFI), which used degrees of freedom and comparative fit index (CFI) to examine how well the model fit compared to a null model that assumed all variables were uncorrelated, using different methods of calculation. Finally, the model comparison indexes allowed for comparisons between non-hierarchical models. These included the model AIC, which is a chi square, corrected to penalize for model complexity (Garson, 2006c). These goodness of fit indicators were used to evaluate the proposed factors and competing models.

The first model (Figure 7-1) was based strictly on the proposed structure of the survey. Goodness of fit statistics were acceptable but not indicative of a good model fit (Table 7-1). The factors were allowed to freely

correlate in the model and thus the moderate correlations between the factors (0.39 to 0.64) do not affect the integrity of the model.

Factors which measured factors directly related to asking about the diabetes ABCs (i.e., self-efficacy, MRO, and outcome expectancies) had higher correlations than mattering attitude which relate to more general patient-pharmacist interactions. The factor loadings, which could be seen as regression coefficients, ranged from 0.71 to 0.93 for the mattering and self-efficacy scales, respectively (Figure 7-1). The MRO scale had the most items above 0.8, with one item at 0.59. The outcome expectancies scale had three factors with loadings above 0.8 (one at 0.52 and three at 0.22 or less). The final three did not have acceptable factor loadings (>0.45) (DiStefano & Hess, 2005). These three items were theoretically different, as they asked about negative outcome expectancies, while all other questions in the scale were about positive expectancies. This was intended to measure different aspects of outcome expectancies. In addition, model misfit for these three items was also suggested by the modestly high modification indexes (3 to 5) and large standardized residuals. The second model was proposed to separate the outcome expectancies scale into two subscales that represented positive (OE_p) and negative expectances (OE_n). Next, the model fit of this second proposed confirmatory factor analysis was examined.

The second, more complex model (Figure 7-2) had improved goodness of fit statistics (Table 7-1). Three questions were of concern due to low factors loadings and/or large standardized residuals and elevated modification indices. The first question (SE_j) was, "How sure are you that you could routinely ask patients who regularly come into your pharmacy about A1c, blood pressure, and cholesterol?" This item had a high factor loading of 0.85, but large standardized residuals (2.7 and 4.0). In addition, pilot work suggested some students starting clerkships were not familiar with any patients and may have had trouble answering this question. Thus, this item was dropped.

Further changes were made based on the finding from the second, more complex model (Figure 7-2). Two items from the outcome expectancy scale had low factor loading, large standardized residuals, and elevated modification indices. The first question (OE_a) asked, "If you ask patients with diabetes routinely about their A1c, blood pressure, and cholesterol, how often do you think this practice will help patients take charge of their A1c, blood pressure, and cholesterol?" On further examination of the positive outcome expectancies scale, where

this question focused on patients' outcomes, other questions were related to students' outcomes. Thus, this question was dropped. Finally, the question (OE_d) "If you ask patients with diabetes routinely about their A1c, blood pressure, and cholesterol, how often do you think this practice will embarrass patients?" was problematic for many students in the developmental work. Some students felt that it was how one asked about the Diabetes ABCs that embarrassed patients, and thus embarrassment was not an issue. Other students felt patient embarrassment was a relevant outcome to expect. This question was retained despite low loadings, because it had relevance for some students; it also allowed retention of three predictors per factor. In future usage of the scale, additional questions for negative outcome expectancies should be developed and validated.

Model three (Figure 7-3) had a good overall fit. All of the standardized factor loadings were statistically significant ($p<0.05$).

For Model 3, both the SRMR and GFI were at acceptable levels, suggesting the observed covariance matrix was an acceptable fit to the estimated matrix (Table 7-1). The AGFI fit was 0.85, indicating the model had an acceptable fit when correcting for its complexity. Both relative fit indices, NNFI and CFI, were at an ideal level of 1.00, indicating the model had good fit when compared with a null model. The AIC of model three was the lowest of the three proposed models and therefore had the best fit of the three. Finally, the RMSEA was at an ideal level of 0.00 (0.00 to 0.04), indicating a good fit between the model and the data. This model will require replication with larger samples and an increased number of items in the negative outcomes expectancy scale to confirm its model fit.

In summary, the confirmatory factor analysis provided evidence that, despite correlations among scales ($r<0.65$), scales measured separate constructs. The final model with the revised scales with positive and negative outcome expectancies scales and the elimination of two questions was used for all subsequent analyses.

Table 7-1 CFA Goodness of Fit Indices

Indices	Good/ Acceptable Fit	Model 1	Model 2	Model 3
Model Fit				
Standardized Root Mean Square Residual (SRMR)	<0.08	0.09	0.06	0.06
Goodness of Fit Index (GFI)	>0.90	0.82	0.87	0.90
Root Mean Square Error of Approximation (RMSEA; 95% confidence interval)	<0.08	0.06 (0.05-0.08)	0.05 (0.3-0.07)	0.00 (0.0-0.04)
Model Parsimony				
Adjusted Goodness of Fit Index (AGFI)	>0.90/0.85	0.78	0.80	0.85
Relative Fit				
Non-Normed Fit Index (NNFI)	>0.95/0.90	0.97	0.98	1.00
Comparative Fit Index (CFI)	>0.95/0.90	0.97	0.98	1.00
Model Comparison				
Model AIC	lower	365	332	236

Figure 7-1 CFA Model 1 with Complete Survey

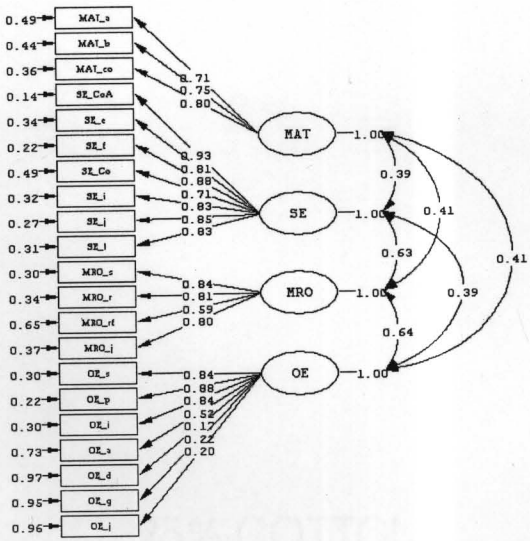

Figure 7-2 CFA Model 2 with Outcome Expectancies in Two Scales

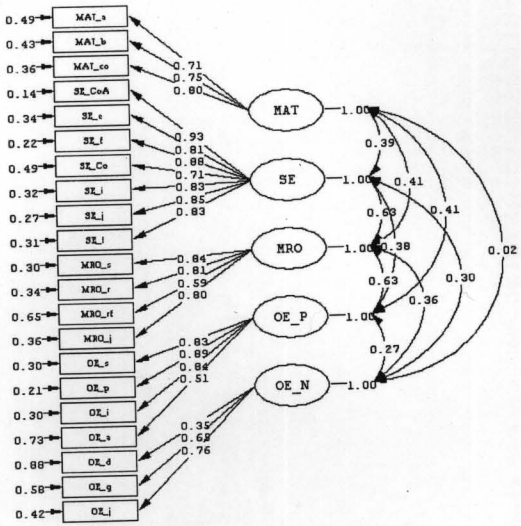

Figure 7-3 CFA Model 3