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MOTIVATION AND EDUCATION: PERFORMANCE, COMMITMENT, AND
SATISFACTION AMONG PHARMACY STUDENTS

By

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B.A., The University of Montana, Missoula, MT, 2011

Thesis

presented in partial fulfillment of the requirements
for the degree of

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Motivation and Education: Performance, Commitment, and Satisfaction among Pharmacy Students

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This study examines the relationship between academic motivation and three different educational outcomes: academic performance, commitment, and satisfaction. This research explores these relationships by focusing on pharmacy students at The University of Montana. Pharmacy students tend to be driven by relatively high levels of external motivations (e.g., motivated by money or prestige), especially when compared to other health profession students. In contrast to previous work that simply describes the motivations of students, I uncover the links between motivation and various educational outcomes. This investigation contributes to a better understanding of motivations and their impact on education, especially among the specific population being studied.

Drawing upon self-determination theory, I argue that intrinsic or internal motivations will be related to positive educational outcomes, while extrinsic or external motivations will be related to negative educational outcomes. I used a survey to collect data from the entire population of pharmacy students (from first-year pre-pharmacy students through fourth-year pharmacy students) at The University of Montana during spring semester of 2013. I use ordinary least squares regression to show the direction and extent of relationships between my variables. Results show that motivation is related to the educational outcome variables included in this study, although not in all cases and not always in the predicted direction. I found that internal motivation is positively related to both overall academic commitment and academic satisfaction. Additionally, I show that external motivation is negatively related to academic satisfaction, but positively related to commitment. Finally, results indicate that neither internal nor external motivations are significantly related to academic performance. I address the implications of these findings for pharmacy students and pharmacy schools as well as suggest directions for future research on the topic.

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1. INTRODUCTION

Nearly all people have their own, distinctly unique, motivations for their behavior. Sometimes we can relate easily to other people because their motivations are in line with our own. Other times, we can barely comprehend what drives the people around us. Education is one realm where people vary greatly in their motivations. Some students go to school because there is some sort of obligation or expectation that it is the proper thing for them to do. Others are there because they believe it will help them obtain something they wouldn't otherwise be able to achieve (e.g., status, money, prestige). Some students are driven simply by their pleasure for learning and exploring new topics. It is logical that these different types of students might have systematically different approaches to and experiences in college.

Why do some students want to pursue a career in the health professions? Medical students often talk about their motivations in terms of helping people or pursuing intellectual interests in the sciences. Some studies have categorized the majority of medical students as humanitarians (Reissman et al. 1960) or altruistic (Draper and Louw 2007), meaning they were driven by a desire to help people. Similarly, studies of nursing students' motivation have found that those students commonly describe a desire to care for people or a desire to receive a broad education (Bengtsson and Ohlsson 2010). Dentistry students are a little bit different in their motivations. For instance, one study (Gallagher, Clarke, and Wilson 2008) found that dentistry students still expressed a desire to help people, but were also partially drawn to the field because of its combination of science, medicine, and art.

Compared to these other health profession students, pharmacy students stand out. In response to questions about why they pursue a pharmacy career, my students have typically cited motivations such as: "I don't want to be in school forever," "There are a lot of available jobs," or

even, “You don’t work very much and you make a lot of money.” While these might stand in stark contrast to motivations of other health profession students, pharmacy students are not necessarily wrong. According to the Bureau of Labor Statistics (BLS 2012), pharmacists can expect to earn a median annual income of \$111,570, or approximately \$54 per hour.

Furthermore, the projected ten-year growth of pharmacy careers is expected to be 25%, which translates into nearly 70,000 in employment changes (new jobs created, or old jobs opening up). These numbers can be compared to an overall median annual income of only \$33,840 for the U.S. labor market and a job growth rate of only 14%. Thus, for students who are seeking financial security or job availability upon graduation, the pharmacy profession is highly appealing.

Compared to other health professions, pharmacy is also unique in its educational requirements. Medicine, dentistry, and physical therapy each require a bachelor’s degree before admission to their respective professional programs. Furthermore, medicine and dentistry both require a minimum of four years of education after completion of a bachelor’s degree. This does not even include the internships, residencies, and fellowships that can continue for up to eight additional years, especially in advanced medical specialties (meaning it can take up to 16 years of post-secondary training to become a highly specialized physician). Currently in the United States, new pharmacists are required to have a professional doctorate to practice pharmacy. The Doctor of Pharmacy (Pharm.D.) degree is awarded after four years of professional school and is more akin to a J.D. (law), M.D. (medicine), or D.D.S. (dentistry) than it is to an academic doctorate such as a Ph.D. or an Ed.D. However, pharmacy schools are unique in not requiring incoming students to have a prior post-secondary degree. While it is common for students beginning pharmacy school to have previously received a bachelor’s degree (or even an

advanced degree), students also have the option of spending their first two years of college pursuing a pre-pharmacy curriculum that meets the prerequisites for admission to pharmacy school. This means that many students pursue a pharmacy education immediately out of high school and, within six years, graduate with a professional doctorate with no prior college degrees required.

One crude way to compare these different health professions is to look at their earning power per year of education. For instance, the BLS (2012) reported that primary care physicians earn a median annual income of \$202,392. At a minimum, these primary care doctors receive 11 years of post-secondary training before they are able to practice independently. Thus, for each year of post-secondary education, primary care physicians can expect to earn an additional \$18,399. This can be compared to dentistry at \$18,365 and physical therapy at \$10,901.

Pharmacists, however top other health professions by making roughly \$18,595 per year of post-secondary education they receive. In terms of a simple cost-benefit analysis, pharmacy school makes sense for many students, especially those who excel in the sciences.

It is important to note that the point of this thesis is not to suggest that pharmacists make more than they deserve. In fact, pharmacists play a crucial, if often unseen, role in a patient's healthcare. Furthermore, the four years of their education that they spend in pharmacy school are not easy (even the two years of pre-pharmacy curriculum involve some of the most rigorous courses on a college campus). However, pharmacy school and the career of pharmacy do offer a model through which we can explore a number of important questions. What role does motivation play in a student's education? Does it make a difference if students are driven by personal interests and a desire to help people, or if they are driven by the expectations of high

salary and relatively easy work? Are there more important factors than a student's academic motivation when trying to predict educational outcomes?

Some research suggests that students who are driven by internal/personal reasons will experience more positive educational outcomes (Gottfried 1982; Vallerand and Bissonnette 1992). Conversely, similar research suggests that people motivated by external forces (e.g., money, power, prestige) will experience more negative educational outcomes (Rascati 1989; Vallerand and Bissonnette 1992). If motivation has such an important impact on educational outcomes, we might be able to predict what makes "good" students good. Furthermore, a better understanding of students' educational outcomes might be used to predict future experiences in the profession, especially in terms of job commitment and satisfaction. This thesis examines pharmacy students to explore these relationships and to try to answer the questions outlined above. Additionally, this research goes beyond the scope and methodological limitations of past studies by including participants from all levels of pharmacy education and doing more than just describing the common motivations of pharmacy students. Specifically, this research examines the relationships among academic motivation, performance, satisfaction, and commitment. The following section provides a detailed theoretical background, an overview of prior literature on academic motivation, and a statement of each of the hypotheses to be tested.

2. BACKGROUND AND LITERATURE

Theoretical Background

One of the most powerful theories used in studying motivations is self-determination theory (SDT), originally developed by Deci and Ryan (1985). At its core, SDT is based upon the idea of individuals making their own choices. Thus, SDT makes the critical distinction between autonomous and controlled motivation. In autonomously motivated situations, individuals are acting on their own volition. Conversely, controlled motivation refers to acts done in response to forces that are external to the individual (Deci and Ryan 2008). Deci and Ryan suggest that humans not only have the *capacity* for self-determined behavior, but that there is a fundamental *need* for self-determination. This is particularly important because they suggest that there will be an overarching trend toward more intrinsically motivated behavior because it is marked by higher levels of choice and self-determination. In discussing this trend toward intrinsic behavior, Deci and Ryan go beyond the intrinsic-extrinsic dichotomy that is commonly used and instead propose a self-determination scale. This scale ranges from wholly internally regulated (intrinsic) behavior on one end to wholly externally regulated (extrinsic) behavior on the other and will be discussed in more detail below.

SDT's utility is increased by its ability to be used in different situations. Deci and Ryan (1985) and many others have discussed the application of SDT in the workplace and sports. Gagné and Deci (2005) provided a historical review of workplace motivation theory and research using SDT as an overarching framework. In general, the authors reported that workplaces where autonomy support (a prerequisite for internal regulation) is made a priority by management, worker satisfaction, organizational commitment, and positive work outcomes were noticeably improved. Similarly, in their review of sport motivation research, Pelletier et al. (1995) identify

motivation as influencing persistence, positive emotions, and greater interests in and satisfaction with sports.

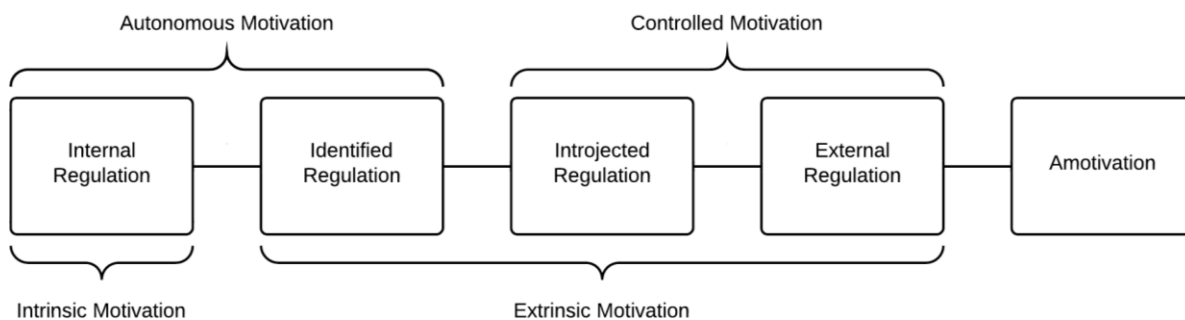
However, SDT it is not limited to these realms. In fact, there is an extensive body of work that has applied SDT to education (Baker 2004; Deci et al. 1991; Mitchell 2012; Williams et al. 1997; Williams, Saizow, and Ryan 1999). Overall, SDT suggests that internal regulation is central to learning, growth, and intellectual challenge, which are some of the core components of any education (Williams et al. 1997). Furthermore, and perhaps more importantly, SDT predicts that the more internally regulated an individual is, the more positive his or her experiences in various contexts (such as education) will be. Specifically, Vallerand and Bissonnette (1992) discussed internal regulation's positive effect on interest, creativity, cognitive flexibility, and conceptual learning. Conversely, they argue, environments that produce externally regulated individuals "appear to be less positive both in terms of affect and performance" (Vallerand and Bissonnette 1992:602).

As previously mentioned, SDT does not identify between intrinsic and extrinsic motivation as two competing ideas. Instead, it identifies them as two different components of a self-determination scale. In-between the two extremes exist motivations that are characterized by a mixture of intrinsic and extrinsic motivations. Specifically, Deci and Ryan (1985) labeled four different stages along the motivational continuum. In order of increasing self-determined regulation, the stages are: external regulation, introjected regulation, identified regulation, and internal regulation.

Guay (2005) offered a helpful summary of Deci and Ryan's motivational continuum (Figure 1). At one end of the scale is external regulation, which is used to describe what is often referred to as extrinsic motivation. Externally regulated behavior is guided solely by perceptions

of rewards and constraints *external* to the individual. The next category, introjected regulation, “refers to behaviors that are in part internalized by the person” (Guay 2005:79). These are closer to wholly extrinsic motivations because they are only regulated by the internalization of some external force. The most common forms of introjected regulation are shame and guilt (Deci and Ryan 1985). The third category, identified regulation, is more similar to wholly intrinsic motivation and “refers to behaviors that are performed by choice because the individual judges them to be important” (Guay 2005:79). Thus, adhering to social norms because of an internalized belief in those norms (e.g., going to college because it will assist in getting a job) falls under the category of identified motivation. The final category is internal regulation. Internal regulation is what is commonly referred to as intrinsic motivation and comprises the “innate, natural propensity to engage one’s interests and exercise one’s capacities, and in so doing, to seek and conquer optimal challenges” (Deci and Ryan 1985:43). In other words, internal regulation is behind actions that individuals perform purely out of personal pleasure and/or satisfaction.

Figure 1. Self-Determination Theory



Beyond the categorizations described above, individual researchers often choose to group certain categories together in different ways (summarized above in Figure 1). For instance, some research focuses on the distinction between autonomous and controlled motivation. In this conceptualization, internal and identified regulation are grouped together and characterized by a

relatively high level of autonomy. Similarly, introjected and external regulation are grouped together and characterized by less autonomy and more external control. Other researchers choose to take a more historical approach by using the intrinsic/extrinsic distinctions. In this conception, the only true form of intrinsic motivation is internal regulation. Identified, introjected, and external regulation are each characterized by some level of external influence and are grouped under the category of extrinsic motivation. There is one final category of motivation posited by SDT—amotivation. As represented in Figure 1, amotivation is separated from the rest of the self-determination continuum as being neither autonomous or controlled, nor intrinsic or extrinsic. Instead, “individuals are amotivated when they perceive a lack of contingency between their behavior and outcomes” (Vallerand and Bissonnette 1992:602). In an effort to be consistent, the rest of this thesis will use Deci and Ryan’s language of internally and externally regulated behavior instead of the more ambiguous intrinsic and extrinsic motivations or autonomous and controlled motivations.

Finally, this thesis focuses on the extremes of the SDT continuum because I believe they best represent what is commonly seen in pharmacy students. While introjected and identified regulation are undoubtedly important, in my experiences, pharmacy students express such motivations much less frequently. For instance, they are much less likely to admit pursuing a pharmacy education out of guilt or to please somebody (as would be consistent with introjected regulation), or because they believe it is important to go to college (as would be consistent with identified regulation). Instead, they commonly cite expectations of future rewards or they express internal interests and satisfaction with the field or related disciplines. It is important to note that I am not trying to reduce SDT back to the base intrinsic-extrinsic dichotomy, but simply direct this research toward the most commonly voiced motivations of pharmacy students.

Academic Motivation

As already stated, SDT theory has been applied to many different contexts. In support of the theory, a number of scales have been developed to measure motivation across different situations. Of particular interest to this study is the Academic Motivation Scale (AMS) developed by Vallerand et al. (1992). The scale, originally developed in French, has since been translated and used widely in studying student motivation. The instrument asks respondents to indicate how well certain statements describe their academic motivations, which are then translated into measures of different motivational types as described by SDT.

The AMS has not only been used extensively, but has been validated by a number of researchers (Cokley et al. 2001; Fairchild et al. 2005; Vallerand and Bissonnette 1992). Even since its translation into English, the AMS has largely been used in Canadian research. However, Cokley et al. (2001) and Fairchild et al. (2005) both made a concerted effort to test the validity of the AMS in the United States. In each study, researchers found support for the original factor structure proposed by Vallerand et al. (1992). However, both American studies suggested caution must be used in making comparisons between U.S. and Canadian populations and interpreting U.S. results, in general. This is not to say that the AMS should not be used with a U.S. population, but this limitation should be addressed when interpreting and discussing the results.

It is also important to note that SDT is not the only framework available to study motivation (see Perrot et al. 2001 for a short review of other motivational theories). Next to SDT, the most common motivational conception is based on the work of Dweck (1986) and Archer (1994). In their achievement motivation theory, performance oriented individuals seek to demonstrate competence or ability in exchange for praise or rewards. Conversely, mastery

orientated individuals' actions are directed more towards demonstrating comprehension and competence (Perrot et al. 2001). Despite differences in phrasing (and complexity of the theories), Archer and Dweck's conception of motivation is not entirely incompatible with SDT. Perrot et al. (2001) even go as far as to suggest that performance and mastery orientations are simply different conceptualizations of SDT's controlled and autonomous motivations, respectively. While achievement motivation theory provides a compelling alternative, its differences from SDT, especially as they relate to this thesis, are not significant enough to warrant using it as a framework instead of SDT. Furthermore, since previous researchers have dismissed SDT in favor of achievement motivation theory because of their similarities (Perrot et al. 2001), there is no reason to believe one theory should be used in favor of the other.

Academic Motivation and Health Professions

Much of the research using SDT has focused on secondary education or general college education (Baker 2004; Cokley et al. 2001; Lavigne, Vallerand, and Miquelon 2007; Lin, McKeachie, and Kim 2001). While a substantial body of research has also examined various health profession students and their motivations, for the most part, SDT has not been used extensively in studying those students. For instance, in one study of Israeli nursing students, researchers found that the lack of interest in the career was because it is not a particularly financially rewarding, respected or powerful position (Ben Natan and Becker 2010). In a separate study of Swedish nursing students, researchers found that students commonly reported an interest in caring for people and a desire for "broad and deep learning" (Bengtsson and Ohlsson 2010:154). Additionally, Bengtsson and Ohlsson found that both medical and nursing students reported intrinsic factors to be the most important for their learning.

The field of dentistry has also been the subject of a small body of research on student motivation. Gallagher and colleagues (2008) qualitatively examined the reasons students in the United Kingdom choose to pursue a dentistry education. Overall, the researchers found similar motivations as other studies of dental students including a desire for higher status, financial benefits, job security, job flexibility, and job independence. However, the researchers also discovered that their sample was more likely to report quality of life factors as being important in their career choice. Whether this finding was applicable only to their participants, their school, dental students in general, or all health profession students is still unclear.

Finally, the field of medicine has also been the subject of motivation research. In one of the most comprehensive motivation studies of health profession students, Perrot et al. (2001) sought to measure motivation among medical, nursing, and pharmacy students. Instead of SDT, this study chose to use Archer's achievement motivation theory described earlier. This study yielded a number of noteworthy findings. First, the authors reported differences in each of the three groups studied in terms of motivation. While researchers found that at least half of each group had a mastery orientation (the rough equivalent of internal regulation in SDT), the pharmacy sample had the smallest proportion of mastery oriented students (50%). Furthermore, pharmacy students were the most likely group to exhibit performance orientation (42% of students). While Perrot and her colleagues did not attempt to directly measure any impacts of these motivations, they did simultaneously measure preferred learning strategies among students. While broad, deep (metacognitive) learning strategies were overwhelmingly preferred among all types of students, pharmacy students were the most likely group to report a preference for non-cognitive learning strategies. Based on this research, there is no way to infer a causal relationship, but the connection between students' motivation and preferred learning strategy is

noteworthy, nonetheless. Finally, the authors note the tendency for health profession students' motivations to change over time. Because of this, it is particularly important to avoid a snapshot of one small group of students at one period in time.

In addition to the combined study of health profession students, pharmacy student motivation has been the subject of some targeted research. Hastings and colleagues used Archer's achievement motivation theory to explore how pharmacy students' motivations changed over the course of the professional program. Overall, they found a noticeable decrease in mastery orientation (arguably Archer's equivalent of internal regulation) over the course of the pharmacy curriculum (Hastings et al. 2001; Hastings, West, Hong 2005). In this shift away from mastery orientation, students were significantly more likely to care only about passing the class and significantly less likely to choose a difficult assignment where mistakes were expected, but meaningful learning was greater (Hastings et al. 2001).

In discussing the factors that influence student's choice to pursue a pharmacy education, Keshishian et al. (2010) provide a brief historical overview of pharmacy education research. As early as 1963, pharmacy students were shown to overwhelmingly choose their educational path for practical reasons such as a desire to earn a high salary. This desire for a high salary has been persistent throughout decades of research on pharmacy student motivation. At various times in the past fifty years, earning potential has also been joined by desires for job security, occupational prestige, career flexibility, and helping people.

In a separate, qualitative study of pharmacy students' experiences, the certainty of obtaining a job after graduation was one of the most common motivations discussed by respondents (Taylor and Harding 2007). Beyond job security, Taylor and Harding also discovered two unconventional motivations for pursuing a pharmacy education. First, they found

that pharmacy was a second choice for many students in their study. In fact, students who had failed to successfully enter medical or dental school often settled for pharmacy school as a relatively similar option. Finally, students often discussed family tradition when discussing their motivations. Instead of reasons more salient to the individual, participants often cited family members' careers in pharmacy as being influential in their own choices.

Despite prior research examining pharmacy student motivation, there are still a number of unanswered questions. First, most studies up to this point have been simply descriptive in nature. Instead of looking at the impact of motivation on a student's education, researchers have opted to describe the most common motivations. Another limitation of existing research on pharmacy student motivation is the relatively narrow scope of past studies. Some studies have focused solely on undergraduates (Keshishian et al. 2010), while others have focused on a single year of the professional program (Hastings et al. 2001). These not only limit the number of respondents available, but limit any direct comparisons between pre-pharmacy and pharmacy students as well as differences between years within each of those groups. Finally, those researchers who have used any sort of theoretical framework have largely overlooked SDT. SDT is particularly useful in researching this population, especially because of the long-standing evidence that pharmacy students are commonly motivated by expectations of money and prestige. Archer's achievement motivation theory, while powerful in its own way, does not place as much of an emphasis on the impact of external influences as SDT.

Academic Performance

Academic performance is a heavily studied topic. Historically, the most common measure of academic performance has been grade point average (GPA). GPA is a composite score based on numerical assignments to letter grades. For instance, an A grade generally is

equivalent to 4.0 GPA points. These points are then weighted by the credits a student is taking. Thus, four or five credit courses weigh more heavily on the GPA calculation than one or two credit courses. Within academic performance studies, research concerning GPA and its predictive power are very common (Allen and Bond 2001; Kuncel et al. 2005; Latif and Stull 2001). One of the reasons GPA is such a heavily studied topic is because it is commonly used to predict future performance by graduate and professional schools as well as potential employers. It is also commonly used as a performance measure because the uniformity of the score and its ability to be used to compare different students. At most universities, GPA is measured on a 4.0 scale, so relative comparisons between disciplines, programs, and schools can be made.

The relationship between student motivation and academic performance is also a heavily studied subject (Baker 2004; Gottfried 1982; Lin et al. 2001). For instance, Gottfried (1982) found that individual students' levels of internal regulation often vary across different subjects. Furthermore, students who were internally regulated in certain subjects showed higher achievement in those subjects. Different kinds of motivation are not completely incompatible, either. In fact, Lin et al. (2001) found that having some level of external regulation in addition to high levels of internal regulation leads to higher grades in school. Not all studies have found a relationship between motivation and academic performance, though. Despite expectations otherwise, Cokley et al. (2001) found that GPA was not significantly correlated with internal regulation. Additionally, Baker (2004) found that there were no relationships between any kind of motivation and academic performance.

Even though many researchers have studied this relationship, there is still no definitive conclusion about the connection between motivation and academic performance. Furthermore, no studies have specifically used SDT to examine the interaction between motivation and

academic performance among pharmacy students. Despite inconclusive prior research, SDT does predict that higher levels of internal regulation should be linked to better educational outcomes and higher levels of learning. If this is true, high internal regulation should translate directly into better performance in school. Similarly, because external regulation has been tied to negative educational experiences, it follows that those who are highly externally regulated will not perform as well as those who are more internally regulated. Regarding academic performance, the following hypotheses will be tested:

- H1a: Students who exhibit high levels of internal regulation will have higher levels of academic performance.
- H1b: Students who exhibit high levels of external regulation will have lower levels of academic performance.

Academic Commitment

Commitment is a particularly salient topic in education right now. In the most recent numbers available from The University of Montana, only 21.7% of incoming freshmen graduated within four years. This number is substantially improved if the time period is lengthened to six years (47.8%), but still disturbingly low (The University of Montana 2012). Better understanding student commitment may be helpful in introducing and implementing programs to help improve graduation rates at UM and beyond.

Commitment is also a complex and multidimensional construct. Like motivation, it has been studied in a variety of settings from the workplace to the family. Surprisingly, not much work has been done on commitment in an academic context. Some studies have examined the closely related concept of persistence in education (Lavigne et al. 2007; Vallerand, Fortier, and Guay 1997) and self-reported commitment to finishing college (Woosley and Shepler 2011).

Vallerand et al. (1997) used SDT as a model in their examination of drop-out behavior in high school and found dropouts were much more likely to exhibit lower levels of internal regulation. Until relatively recently, though, a comprehensive examination of academic commitment had not been attempted. Hellman and Williams-Miller (2005) reviewed previous attempts to measure and study commitment in education with the ultimate goal of developing an educational commitment scale. What they found is that research has traditionally focused on social and academic integration as a means to improve commitment. More recently, research has suggested commitment is more complicated than being committed or not. And while some studies have explored commitment from a multidimensional perspective, Hellman and Williams-Miller (2005) argue that prior conceptualizations of commitment were not complete enough nor substantially built upon theory.

In the development of their own commitment measure, Hellman and Williams-Miller argue that educational commitment is a multidimensional construct consisting of three different kinds of commitment: continuance commitment, affective commitment, and normative commitment. Continuance commitment refers to the likelihood that students will continue to pursue their education. In its most basic form, it is based on the availability of viable alternatives and the cost-benefit analyses that are made when deciding between continuing an education and choosing an alternative. Affective commitment refers to the emotional bond that develops between an individual and his or her educational institution. Affective commitment is built upon identity theory and is influenced by how well a student identifies with his or her institution. The more students identify with their institutions, the more committed they will be to maintaining those connections. Finally, normative commitment refers to the “sense of obligation and conformity to what is valued by one’s referent group” (Hellman and Williams-Miller 2005:23).

In other words, normative commitment is related to pleasing the individuals closest to you or trying to meet other's expectations. Taken together, all three sub-dimensions can be used as a general measure of academic commitment.

Despite the body of literature that examines academic commitment, there are no studies that explore a direct relationship between student motivation and general commitment. Through a combination of SDT and Hellman and Williams-Miller's commitment ideas, I will directly examine these two variables. Furthermore, little research has looked at academic commitment in pharmacy programs. It is worth noting, however, that in terms of career commitment, one study found that pharmacy students who indicated a desire to earn a high salary had lower commitment scores than other students (Rascati 1989). This finding, paired with the link between persistence and internal regulation (Vallerand et al. 1997) suggest a relationship between academic motivation and academic commitment. Extrapolating from prior research, it is reasonable to predict that students who are internally regulated will have greater overall commitment to their education. Conversely, higher levels of external regulation may lead to lower levels of commitment in the immediate setting (as opposed to commitment toward reaching an end goal). Regarding academic commitment, the following hypotheses will be tested:

- H2a: Students who exhibit high levels of internal regulation will have higher levels of academic commitment.
- H2b: Students who exhibit high levels of external regulation will have lower levels of academic commitment.

Academic Satisfaction

Like commitment, satisfaction is a difficult idea to conceptualize. Especially for education, satisfaction encompasses a large variety of components. Because of this, there is little

research that has specifically examined students' satisfaction with their education. Some research (Lo 2010) has approached student satisfaction by studying it at the classroom level, specifically regarding satisfaction with instructors and course policies. Perhaps the most widespread measure of student satisfaction comes from end-of-term teaching evaluations. It is not uncommon for students to express satisfaction (or dissatisfaction) with more than just the instructor and the course on these evaluations, though. Other topics that emerge from teaching evaluations include perceptions of administration, complaints about university policies, and even commentary on the physical learning environment (e.g., room, furniture, etc.).

Because so many factors can influence student satisfaction, it is important to approach the topic systematically and at a more holistic level. Some of the first researchers to attempt this were Clemes, Gan, and Kao (2008), who examined student satisfaction from a service quality perspective. Drawing heavily from marketing research, they identified a number of different components that influence overall academic satisfaction including perceptions of teaching quality, evaluations of the physical education facilities, and perceptions of personal gain as a result of education. They argue that these three components make up perceptions of the quality of a given service (in this case, education), which is then directly related to overall satisfaction.

Dating as far back as the 1960s, internally regulated behaviors have been shown to increase levels of employee satisfaction (Saleh and Hyde 1969). As with commitment, though, there appears to be a void in current research regarding the relationship between student motivation and academic satisfaction. Following Deci and Ryan (1985), the more internally regulated students are, the more positively they should view their academic experiences. While there appears to be no direct examination of this relationship in education, motivation has long been tied to employee satisfaction with work. A similar relationship can be predicted for students

and their overall satisfaction with school. Regarding academic satisfaction, the following hypotheses will be tested:

- H3a: Students who exhibit high levels of internal regulation will have higher levels of academic satisfaction.
- H3b: Students who exhibit high levels of external regulation will have lower levels of academic satisfaction.

In the following section, I provide a detailed outline of the research methods used to test these hypotheses, including information about participants, survey design and implementation, and variable creation.

3. DATA AND MEASURES

Research Design

In order to test each of the hypotheses presented above, I employed a survey design. A survey allowed for a large number of participants to be reached relatively easily. Furthermore, surveys allow for consistency and comparability between individual participants. Survey respondents consisted of students at all levels of pharmacy education at The University of Montana. As discussed earlier, this includes students who are enrolled in the two-year pre-pharmacy curriculum and those who have shown an interest in pursuing pharmacy as a career. Additionally, it includes students who have enrolled in the four-year professional pharmacy program.

I used two different survey methods for this project—paper-and-pencil surveys and an online survey. Each version asked the exact same questions in the same order. The paper versions of the survey were distributed to students in the first five years of the six-year pharmacy curriculum during regularly scheduled courses. Because the final year of pharmacy education involves clinical rotations at various sites in and around Montana, it is impossible to locate all of the students as they move from one location to another. Thus, I designed an online version of the survey and distributed it to those students.

Before I distributed the survey to the entire body of student respondents, it was pre-tested by ten students. Using feedback from these pre-tests, I made minor revisions to make the survey more cohesive and understandable. I also received institutional review board approval for the research and permission from the assistant dean of the pharmacy school to distribute the survey prior to data collection. Data collection took place during the first month of the Spring 2013 semester.

Sample

To provide a comprehensive picture of pharmacy education, it was necessary to survey students at all levels of pharmacy education. The traditional pharmacy education model is a six-year, post-secondary program that culminates in the Pharm.D. degree. The first two years are commonly referred to as pre-pharmacy, during which students are still considered undergraduates. Coursework involves a series of preparation courses including general and organic chemistry, physics, biology, social science, and others. Sometime during their second year in the pre-pharmacy program, students apply to the professional program. Upon acceptance into the professional pharmacy program, students spend their first three years as a cohort taking courses on campus. The final year of the professional program involves no on-campus coursework. Instead, students complete nine months of clinical rotations at various clinical sites in the region.

I identified a total of six courses to survey in order to capture nearly all students pursuing a pharmacy education. Introductory courses in general and organic chemistry were identified as the best way to reach pre-pharmacy students. Because all pre-pharmacy students are required to take these courses, and only one section of each course is offered per semester, it is reasonable to assume that all pre-pharmacy students will be enrolled in either general or organic chemistry. In the spring semester, both the first and second semester of general chemistry are offered and were both included in my sampling. In order to capture students in their first three years of professional pharmacy school, I identified one course per year in which all students from that year were enrolled. This included two pharmacy practice courses and one pharmacy ethics course. Finding courses in which all students of a given cohort took together streamlined the data

collection process and limited the amount of time I was interrupting regularly scheduled coursework.

For these first five years of pharmacy education (the two years of pre-pharmacy and the first three years of professional school), I contacted individual professors and introduced them to the project. Upon obtaining permission to distribute surveys in their classes, I scheduled time to visit their courses during the first week of the spring semester. Nearly all faculty members who were contacted were open to the idea and supportive of my data collection.

As mentioned above, the final year of professional school posed a problem because students do not attend regularly scheduled courses on campus. Geographically, they are widely dispersed across the region taking part in clinical rotations. Unlike distributing the survey in a classroom, I could not easily speak to the entire group to explain the research and directly hand out surveys. Instead, I received support from the pharmacy school to send out an email on my behalf explaining the research and providing students with a link to the online version of the survey.

Procedures for Survey Implementation

I distributed surveys during single visits to each of the courses identified above. In order to obtain a higher response rate, surveys were completed as soon as they were handed out and immediately collected by myself or an assistant. The three pre-pharmacy courses that I surveyed posed somewhat of a problem during data collection. Because they are general survey courses, not all students taking the courses are pre-pharmacy students. The courses surveyed are also required for chemistry majors, pre-medicine students, and other pre-health profession students. To account for this, I created a slightly more generic version of the paper-and-pencil survey. I made only minor changes that consisted mostly of replacing pharmacy student and pharmacy

education with college student and college education, respectively. This allowed me to distribute the survey to everybody in these general courses. Ultimately, I excluded respondents who indicated that they were not pre-pharmacy students from the final analysis.

I distributed the paper version of the survey to approximately 600 students. Of these, 323 indicated that they were pre-pharmacy or pharmacy students. There are a few issues that may have influenced the total number of completed surveys returned to me and the representativeness of the sample. First, on any given day of my data collection, there were probably a number of potential respondents who were not in attendance. The number of these students was probably relatively small, especially considering I collected the data during the first week of the semester when students tend to have good attendance records. A second problem with representativeness stems from students simply choosing not to fill out a survey. As is common practice with surveys, I informed students that their participation was completely voluntary and they had no obligation to complete the survey. I attempted to mitigate students choosing not to complete the survey by being present for data collection instead of distributing the surveys and returning to collect them later or having students return them to me via mail. One final problem influencing response rates and representativeness is unique to the pre-pharmacy students. Many students in the courses I chose to survey may not have identified explicitly as a pre-pharmacy students, even though pharmacy is a career they are seriously considering. This means that those students may not be included in the analysis.

I distributed the online version of the questionnaire to the entire fourth-year professional student cohort—a group of 64 students. Because online surveys have a lower response rate than in-person surveys, I took further steps to increase the response rate. Specifically, I followed up with students who received the original survey link via email from the pharmacy school to

encourage them to complete the survey if they hadn't already. The first reminder was sent out through the fourth-year pharmacy students' Facebook page with the help from the page administrator. This was easier than asking the pharmacy school to send out a reminder email on my behalf or requesting student email addresses from the pharmacy school so I could send out a reminder. Furthermore, given the popularity of social networking sites, it was likely that a reminder sent through Facebook would be just as effective in reaching students (if not more so) than a reminder sent via email. However, the Facebook reminder only produced results for three additional respondents. Instead of sending out another reminder via Facebook, I contacted an administrative assistant in the pharmacy school who agreed to send out a final reminder on my behalf. This final reminder produced an additional 12 responses. Copies of the original contact email and each of these follow-up reminders for the online survey can be seen in Appendix B.

In the cover letter of the survey, students were ensured that their confidentiality would be maintained. This was achieved primarily by not asking any potentially identifying information in the survey. However, I also took further steps to ensure confidentiality including explicitly asking respondents to *not* write their names on their surveys and collecting the surveys as soon as students finished.

Unfortunately, response rates for this project are difficult to calculate, especially for the two pre-pharmacy years. On the whole, the university does not keep comprehensive records on pre-pharmacy students. There is, in fact, no requirement that students declare as pre-pharmacy to later be accepted by the professional program. Because of this, it is difficult to say exactly how many pre-pharmacy students potentially could have filled out the survey and compare it to how many actually did. A total of 370 surveys were filled out by students in the pre-pharmacy classes I surveyed out of a total enrollment of 456. As mentioned above, though, only a fraction of those

students who filled out a survey in these courses were pre-pharmacy students. Additionally, a small number of students were in more than one of the courses I surveyed, further complicating the calculation of response rates. In the end, the number of pharmacy surveys that I collected is the most meaningful number. The exact numbers of pre-pharmacy surveys filled out by first- and second-year pre-pharmacy students are presented in Table 3.1. For the professional school students, I obtained enrollment numbers from the pharmacy school which are also presented below in Table 3.1, along with corresponding response rates.

Table 3.1 – Completed Surveys and Response Rates by Year

Year	Pharmacy Surveys Filled Out	Enrolled Students	Percentage
Pre-Pharmacy (year 1)	54	--	--
Pre-Pharmacy (year 2 or more)	77	--	--
Pharmacy (year 1)	65	65	100.0%
Pharmacy (year 2)	64	68	94.1%
Pharmacy (year 3)	61	65	93.8%
Pharmacy (year 4)	29	64	45.3%

Survey Instrument Design

A copy of the paper survey for pharmacy students is provided in Appendix A. Because the more generic survey for pre-pharmacy courses and the online survey are nearly identical in all aspects, copies are not included in the Appendices. The surveys are a combination and adaptation of a number of questions developed by other researchers (Vallerand et al. 1992; Hellman and Williams-Miller 2005; Clemes, Gan, and Kao 2008). The inside cover of the paper surveys (and the first page of the online survey) provided background information on the project and informed respondents that their participation was important but voluntary and that their confidentiality would be maintained. I designed the first section of the survey to measure the academic motivations of respondents. The questions, based on the Vallerand et al. (1992) Academic Motivation Scale (AMS) include 28 statements about why students are pursuing a pharmacy education. I modified these questions lightly to make them more like Likert scales.

Originally, each question asked students how much each reason for attending college corresponded to them (from “Does not correspond at all” to “Corresponds exactly”). I adapted each reason for attending college into a statement that respondents were asked to indicate much they agreed or disagreed with each statement (from “Completely agree” to “Completely disagree”). Sample statements included, “I experience pleasure and satisfaction while learning new things” and “This education will help me obtain a more prestigious job later on.” These 28 statements were broken into two groups of 14 to help break up the monotony of a 28 item question. In between the two groups were three open-ended questions allowing students to provide more detailed information on their motivations, their career goals, and people who have influenced their choice to pursue a pharmacy education.

Following the section on motivation, the survey included two more multi-item questions—one to measure academic commitment and the other to measure academic satisfaction. Like the motivation questions, I derived these scales from previous research (Hellman and Williams-Miller 2005; Clemes et al. 2008). The final section of the survey asked respondents to provide their grade point average from the previous semester and respond to a number of demographic questions.

As previously mentioned, I thoroughly pre-tested both versions of the survey prior to data collection taking place. The paper survey was initially pre-tested in the fall of 2012 with five individuals who did not know each other. Some of these pre-testers were familiar with the pharmacy program and some were not. I did not include any pharmacy students in my pre-testing in an attempt to not influence potential future respondents. After each pre-tester had completed the survey, I conducted a short interview to discuss any complications or problems that they had

encountered. Based on the first five pre-tests and the feedback received, I made minor revisions to both the paper survey and the internet survey.

Once pre-testing had finished with the paper survey, I repeated the same process with the internet survey. Four more pre-testers were given access to the online survey and asked to provide feedback on the presentation of the survey and any complications that may have arisen. After discussing the survey with each of these pre-testers, I made adjustments to both the internet survey as well as to the paper survey. The last few pre-testers had little if any feedback to provide, suggesting the surveys were ready for full implementation.

Dependent Variable Measures

Performance

Academic performance was measured by question 10 on the paper survey which asked students to report their GPA from their *last semester* of classes. Last semester GPA was used because it was the most recent measure of student performance and was better able to speak to the relationship between *current* motivation and *current* performance (as opposed to measuring cumulative GPA). If students were not able to provide an exact GPA, the survey asked them to provide their credit load and grade for each course from the last semester (from which I could then calculate students' GPA from their most recent semester). At The University of Montana, GPA is measured on a 4.0 scale. For this research, higher GPA scores represent a proxy for higher levels of student performance.

Commitment

I measured academic commitment through question 6 on the paper survey. These 13 indicators were first developed by Hellman and Williams-Miller (2005) and asked students about the strength of ties to their educational institution, viable alternatives to school, and sense of

Table 3.2 – Factor Loadings and Alpha Reliabilities for Academic Commitment

Item	Factor
<i>Continuance Commitment ($\alpha=0.778$)</i>	
I am going to college because I don't have any practical options to do anything else	.466
If I could make a decent income doing something else, I would not have enrolled in college	.683
If I could find another way to achieve my goals, I would not go to college	.724
If I had a better alternative, I probably would not have enrolled in college	.724
<i>Affective Commitment ($\alpha=0.769$)</i>	
I am proud to be a college student	.783
Being a college student has a great deal of personal meaning for me	.710
I really enjoy talking to other people about my college experiences	.715
Being enrolled in college has made me happy	.797
I have always dreamed of going to college	.632
<i>Normative Commitment ($\alpha=0.820$)</i>	
In my family, going to college is highly valued	.794
My family would be disappointed if I did not go to college	.872
For the most part, it was expected that I would go to college	.814
It would really disappoint people who are close to me if I decided to drop out of school	.740

obligation to complete school. The exact questions and wording can be seen in Appendix A. The indicators were scored on a five-point scale from “Strongly Disagree” to “Strongly Agree.” In line with Hellman and Williams-Miller’s work, factor analysis suggested a three component structure to academic commitment. I calculated scores for each of the academic commitment subscales by averaging their respective indicators. All three of the subscale measures range from one to five with higher scores corresponding to higher levels of commitment. Factor loading scores and alpha reliabilities for the three components are listed above in Table 3.2. In addition to the three sub-dimensions of academic commitment, a general academic commitment variable was created using all thirteen indicators ($\alpha=0.764$). All four of these measures were used when examining the relationships between motivation and academic commitment.

Satisfaction

I measured academic satisfaction through question 7 on the paper survey. I adapted these 15 indicators from Clemes et al. (2008) and asked students about their overall impressions of academic staff, course content, and quality of education. The indicators were scored on a five-point scale from “Strongly Disagree” to “Strongly Agree.” Factor analysis suggested a single

component structure to academic satisfaction. I averaged all 15 items to produce a general measure of academic satisfaction ranging from one to five for each student. Higher scores on this measure correspond to higher levels of academic satisfaction. The nature of questions 7a, 7c, 7g, 7k, 7m and 7n required reverse coding for consistency with the other indicators of academic satisfaction. Factor loading scores and the alpha reliability for academic satisfaction are provided in Table 3.3.

Table 3.3 – Factor Loadings and Alpha Reliabilities for Academic Commitment

Item	Factor
<i>Satisfaction ($\alpha=0.853$)</i>	
My instructors and other teaching staff are NOT willing to help	.703
My instructors are polite and courteous	.595
I have NOT gained knowledge and skills for my first job	.641
I have faith in my instructors' knowledge of the subject matter	.489
I feel comfortable talking to my instructors	.558
The material presented in my courses is NOT useful for my education	.684
My instructors are NOT concerned about student welfare and student interests	.594
So far, I have acquired a broad general education in different fields	.299
So far, I have become more competent in my field of study	.592
The material presented in my courses is interesting	.675
So far, I have NOT been able to learn effectively by myself	.435
I have received guidance and information on career opportunities	.617
The material presented in my courses is NOT relevant to my education	.687
So far, my education has helped me develop analytical and logical thinking skills	.619
My instructors are well organized and prepared	.440

Independent Variable Measures

Internal & External Regulation

I measured internal regulation through a series of questions (1b, 1d, 1f, 1i, 1k, 1m, 5b, 5d, 5f, 5i, 5k, and 5m on the paper version in Appendix A) that asked students about personal pleasure or satisfaction that they receive from pursuing a pharmacy education. I measured external regulation through a series of questions (1a, 1h, 5a, and 5h on the paper survey) that asked students about the external reasons (higher pay, prestige, etc.) that they are pursuing a pharmacy education. Factor analyses conducted on both internal and external regulation suggested single component structures for each measure. I averaged scores on each of the

measures to provide overall internal regulation and overall external regulation measures ranging from one to seven, with higher scores indicating higher levels of each respective motivation.

Factor loading scores and alpha reliabilities for external regulation are presented below in Table 3.4.

Table 3.4 – Factor Analysis and Alpha Reliabilities for Internal Regulation and External Regulation

Item	Factor
<i>Internal Regulation ($\alpha=0.870$)</i>	
I experience pleasure and satisfaction while learning new things	.736
I experience pleasure when I am communicating my own ideas to others	.582
I experience pleasure when I surpass myself in my studies	.631
I experience pleasure when I discover new things never seen before	.761
I experience pleasure when I read interesting authors	.622
I experience pleasure when I surpass myself in one of my personal accomplishments	.668
I experience pleasure when broadening my knowledge about subjects which appeal to me	.740
I experience pleasure when I feel completely absorbed by what certain authors have written	.590
I feel satisfaction when I am in the process of accomplishing difficult academic activities	.592
My studies allow me to continue to learn about many things that interest me	.717
I experience a “high” feeling when reading about various interesting subjects	.525
College allows me to experience a personal satisfaction in my question for excellence in my studies	.687
<i>External Regulation ($\alpha=0.665$)</i>	
I would not find a high-paying job later on with only a high school degree	.611
This education will help me obtain a more prestigious job later on	.726
I want to have “the good life” later on	.783
I want to have a better salary later on	.766

Control/Demographic Variables

Several control variables were included in this study. The survey collected information about age, sex, ethnicity, race, prior education, and first-generation college student status for each respondent. While none of these variables were included in my predictions or hypotheses, they provided important controls for the research. Age and a number of dummy variables were used, including gender (1=female), race (1=non-white), ethnicity, (1=Hispanic/Latino), and first-generation college student status (1=first-generation college student) to control for demographic differences. Prior education was also included to account for differences among students, especially those who were returning to school after completing a previous (sometimes advanced)

degree. Prior education was coded as a dummy variable distinguishing between those with only a high school diploma and those with a post-secondary degree (1=prior post-secondary degree). Finally, I included current year in the pharmacy education program to account for year-to-year differences among students. This was coded from the least amount of pharmacy education to the most (0=first-year pre-pharmacy student, 5=fourth-year pharmacy student).

Table 3.5 – Summary of Dependent Variables, Independent Variables, and Measurements

Measured Characteristic	Measurement Instrument
<i>Dependent Variables</i>	
Performance	Question 10 (Self-reported last-semester GPA)
Commitment	Question 6 (13 indicators)
Satisfaction	Question 7 (15 indicators)
<i>Independent Variables</i>	
Internal Regulation	Questions 1 & 5 (12 indicators)
External Regulation	Questions 1 & 5 (4 indicators)

Method of Analysis

I first performed descriptive analyses to understand the demographic characteristics of my sample. In order to test the hypotheses outlined above, I developed multiple multivariate ordinary least squares regression models. In the following section, each dependent variable is accompanied by three models—one including internal regulation and controls, one including external regulation and controls, and one including both motivational measures and the control variables. The thresholds used for statistical significance testing are alpha levels of .05 and .01. I use these cutoffs primarily to avoid the risk of Type I errors when testing my hypotheses and inferring information about the theory. It is important to note, though, that relatively strong relationships should not be discounted simply because they do not meet these significance thresholds. Especially when considering the practical implications of this research, the effect size of each variable may be more important than the significance level when contemplating future policy changes.

4. ANALYSIS AND RESULTS

Descriptive Measures by Year in School

Descriptive statistics for pre-pharmacy and pharmacy students who completed the survey are provided in Table 4.1. Overall, the sample is comprised of slightly older participants than what might be expected, with an average age of nearly 24 (if we consider an incoming freshman to be 18 years of age, the average age of this group should theoretically be 21). Over one half of respondents are 22 years of age or younger and less than ten percent of respondents are over the age of 30. The sample is made up of nearly two-thirds women and one-third men. The overall proportion of females is slightly inflated by the fourth-year pharmacy students because female students from that year were much more likely to respond to the survey than their male counterparts (83% of respondents for fourth-year pharmacy students were female while only 17% were male). The overall ratio of females to males is not surprising as the dominance of females in the pre-pharmacy has been noted for the past several years. Unsurprisingly, the sample contained very few ethnic or racial minorities. Slightly over five percent of the sample identified as Hispanic or Latino and only 10 percent of the sample consisted of non-white students. Black students and Native Hawaiian or Pacific Islander students were the most underrepresented racial groups with only one and two students, respectively.

Nearly two-thirds of the respondents have only a high school diploma or equivalent. Students in the professional program are more likely than those in the pre-professional program to have a post-secondary degree, the most common being a bachelor's degree. Only four students indicated that they have previously received a professional degree or doctorate. This clearly indicates that the most common path for pharmacy students is to pursue the program immediately after high school. Table 4.1 also presents information about whether survey

respondents are first-generation college students or not. Overall, the number of first generation-college students is fairly stable in each year of the pharmacy program with about one-quarter or respondents indicating first-generation college student status (as defined by their parents or guardians not completing a college degree by the students' 18th birthday). Each of the variables described above are used as control variables in the multivariate analyses that follow.

Table 4.1 – Demographic Characteristics of Sample by Current Year in Pharmacy Education

	First-Year Pre-Pharmacy	Second-Year Pre-Pharmacy	First-Year Pharmacy	Second-Year Pharmacy	Third-Year Pharmacy	Fourth-Year Pharmacy	Total
<i>Age in Years (mean)</i>	21.70	21.75	24.51	24.16	26.25	26.55	23.87
<i>Gender</i>							
Female	37 (68.5%)	46 (59.7%)	35 (53.8%)	40 (62.5%)	37 (60.7%)	24 (82.8%)	219 (62.6%)
Male	17 (31.5%)	31 (40.3%)	30 (46.2%)	24 (37.5%)	24 (39.3%)	5 (17.2%)	131 (37.4%)
<i>Race</i>							
American Indian or Alaska Native	2 (3.7%)	0 (0.0%)	0 (0.0%)	2 (3.1%)	1 (1.7%)	0 (0.0%)	5 (1.4%)
Asian	4 (7.4%)	3 (3.9%)	3 (4.8%)	1 (1.6%)	1 (1.7%)	3 (10.3%)	15 (4.3%)
Black or African American	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.7%)	0 (0.0%)	1 (0.3%)
Native Hawaiian or Other Pacific Islander	0 (0.0%)	1 (1.3%)	0 (0.0%)	1 (1.6%)	0 (0.0%)	0 (0.0%)	2 (0.6%)
White	47 (87.0%)	64 (84.2%)	60 (95.2%)	60 (93.8%)	54 (90.0%)	25 (86.2%)	310 (89.6%)
Other	1 (1.9%)	8 (10.5%)	0 (0.0%)	0 (0.0%)	3 (5.0%)	1 (3.4%)	13 (3.8%)
<i>Ethnicity</i>							
Hispanic or Latino	2 (3.8%)	8 (10.5%)	4 (6.2%)	2 (3.1%)	3 (4.9%)	0 (0.0%)	19 (5.5%)
Not Hispanic or Latino	50 (96.2%)	68 (89.5%)	61 (93.8%)	62 (96.9%)	58 (95.1%)	29 (100.0%)	328 (94.5%)
<i>Highest Education</i>							
H.S. Diploma	43 (79.6%)	65 (84.4%)	37 (56.9%)	39 (60.9%)	29 (49.2%)	14 (48.3%)	227 (65.2%)
Associate's Degree	7 (13.0%)	6 (7.8%)	10 (15.4%)	5 (7.8%)	9 (15.3%)	4 (13.8%)	41 (11.8%)
Bachelor's Degree	4 (7.4%)	6 (7.8%)	17 (26.2%)	17 (26.6%)	17 (28.8%)	10 (34.5%)	71 (20.4%)
Master's Degree	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (4.7%)	2 (3.4%)	0 (0.0%)	5 (1.4%)
Prof. Degree	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.4%)	1 (0.3%)
Doctoral Degree	0 (0.0%)	0 (0.0%)	1 (1.5%)	0 (0.0%)	2 (3.4%)	0 (0.0%)	3 (0.9%)
<i>1st Generation College Student</i>							
Yes	17 (31.5%)	20 (26.0%)	16 (24.6%)	17 (26.6%)	15 (24.6%)	8 (27.6%)	93 (26.6%)
No	37 (68.5%)	57 (74.0%)	49 (75.4%)	47 (73.4%)	46 (75.4%)	21 (72.4%)	257 (73.4%)

First, basic relationships among all variables were examined through bivariate correlations, the results of which are presented in Table 4.2. The correlations indicate partial support for some of the relationships outlined in the hypotheses above. Overall, the strength of the relationships is moderate, at best. The strongest relationship is between academic

commitment and academic satisfaction (Pearson's $r = .423$) closely followed by the relationship between the two motivational variables (Pearson's $r = .405$). Positive relationships are observed between internal regulation and each of the dependent variables. However, external regulation is only negatively related to one of the dependent variables. The relationships between the control variables and the dependent variables are also shown in Table 4.2. Age, gender, prior post-secondary education, and current year in the pharmacy education generally exhibit stronger relationships to the dependent variables than do race, ethnicity, or first-generation college student status. However, relationships are still relatively weak among all of the variables. The relatively weak correlations among all variables suggest independence from one another. This means that including them in the same regression model should not be problematic.

Table 4.2 – Correlations Among Dependent, Independent, and Control Variables

	2	3	4	5	6	7	8	9	10	11	12
Dependent Variables											
(1) Acad. Performance	.134*	.153**	.102	-.023	.022	.288**	.014	-.008	-.012	.079	.264**
(2) Acad. Commitment	--	.423**	.366**	.197**	-.117*	.208**	.074	-.001	-.100	-.127*	.219**
(3) Acad. Satisfaction	--	--	.349**	.023	.140**	-.017	.018	.013	-.060	.004	.265**
Independent Variables											
(4) Internal Regulation			--	.405**	.012	.101	.094	-.060	.010	.011	.063
(5) External Regulation				--	-.157**	.078	.094	.018	.010	-.011	-.108*
Control Variables											
(6) Age					--	-.050	.005	.071	.119*	.334**	.308**
(7) Female						--	.154**	.013	-.003	-.044	.042
(8) Hispanic/Latino							--	.090	-.031	.024	.075
(9) Non-White								--	-.076	.016	.043
(10) First-Gen. College									--	.025	-.027
(11) Post-Secondary Ed.										--	.283**
(12) Current Year											--

* $p < .05$, ** $p < .01$

Hypotheses 1a & 1b: Regulation and Performance

Following the bivariate correlations, I created a series of regression models to test each of the hypotheses outlined above. Following Tabachnick and Fidell's (2007) suggested screening procedures, I ran diagnostic tests to verify the assumptions required for the interpretation of regression analyses. Normality, linearity, and homoscedasticity were examined by producing

histograms and scatterplots of residuals for each statistical model. None of these plots indicated any gross violations of the assumptions. Additionally, I checked for autocorrelation of errors by calculating the Durbin-Watson statistic for each model. None of these values indicated that autocorrelation was a concern. I also examined tolerance and variance inflation factor scores for the models, which indicated that multicollinearity was likely not a problem. Finally, influential outliers were screened by calculating Cook's distance scores for all cases in each model. No Cook's distance values exceeded 1.00, suggesting no specific cases were highly influential.

The first two hypotheses predicted the influence of motivation on academic performance. Specifically, I predicted that higher levels of internal regulation would be related to higher levels of student performance. Conversely, higher levels of external regulation were predicted to be related to lower levels of student performance. Table 4.3 shows the results for both Hypotheses 1a and 1b. The model including only internal regulation and the control variables is presented as Model 1. This model accounts for 13% of the variation in academic performance (as measured by last-semester GPA). While the relationship between internal regulation and performance is positive, the standardized coefficient is relatively small compared to other variables in the model ($\beta = .069$).

The regression model that includes only external regulation and the control variables, presented as Model 2, accounts for about 13% (Adjusted $R^2 = .125$) of the variation in academic performance. As predicted, the relationship between external regulation and academic performance is negative. However, the standardized coefficient indicates an extremely weak relationship ($\beta = -.014$). Hypotheses 1a and 1b are not supported because neither of the independent variables are shown to be statistically significant predictors of students' academic performance when the control variables are accounted for. However, both models do show that

gender and current year in the pharmacy program have significant relationships to academic performance. More specifically, females and those who are further along in the pharmacy education generally reported higher last-semester GPAs.

The final model in Table 4.3 is a complete model that includes both of the independent variables and all of the control variables. This model allows us to see the interactive effects of the motivation variables and compare them to each of the individual models. Overall, this model is consistent with each of the separate models and explain roughly the same amount of the variation in academic performance as each of the separate models (Adjusted $R^2 = .129$). The combined model still suggests no support for either Hypothesis 1a or 1b.

Table 4.3 – The Regression of Academic Performance on Academic Motivation (N = 329)

	Model 1		Model 2		Model 3	
	Standardized Coefficient	Standard Error	Standardized Coefficient	Standard Error	Standardized Coefficient	Standard Error
Motivation Variables						
Internal Regulation	.069 ¹	.032			.088	.035
External Regulation			-.014	.030	-.049	.033
Control Variables						
Age	-.053	.005	-.055	.005	-.061	.005
Female	.272**	.049	.279**	.049	.273**	.049
Hispanic/Latino	-.070	.105	-.061	.105	-.068	.105
Non-White	-.006	.077	-.011	.077	-.003	.077
1st-Gen	.010	.054	.008	.054	.010	.054
Post-Secondary Degree	.053	.030	.055	.030	.054	.030
Current Year	.247**	.016	.251**	.016	.242**	.016
Adjusted R ²	.130		.125		.129	
F Value	7.125**		6.882**		6.409**	
Degrees of Freedom	8		8		9	

* p < .05, ** p < .01

Hypotheses 2a & 2b: Regulation and Commitment

The next series of regression models explore the relationship between academic motivation and academic commitment. Although Hypotheses 2a and 2b are predictions for a

¹ While the numbers presented in this table and following tables are carried out to the one-thousandths place, this does not necessarily imply high precision of the results. As with all research, there is a level of uncertainty in measurement that should be considered when interpreting results.

single measure of academic commitment, the first nine models presented below break down commitment by Hellman and Williams-Miller's (2005) sub-dimensions—normative, affective, and continuance commitment. The final three models correspond to the combined sub-scales and represent models examining the relationship between motivation and general academic commitment. In a similar manner to the first hypotheses, I predicted that internal regulation would be positively related to commitment, while external regulation would be negatively related to commitment. Furthermore, I predicted these relationships would hold true for each of the subscales as well as the overall measure of commitment.

Table 4.4 shows the results from internal and external regulation models with respect to normative academic commitment (adhering to one's reference group's norms). As before, Model 1 represents the internal regulation model, Model 2 represents the external regulation model, and Model 3 represents the combined model. The internal regulation model accounts for 17% (Adjusted $R^2 = .171$) of the variation in normative academic commitment scores. However, internal regulation itself is not a significant predictor of normative commitment and has a relatively low standardized coefficient ($\beta = .065$). This provides no support for Hypothesis 2a. For the internal regulation-only model, four of the control variables have significant predictive effects. Three of these—age, race, and first-generation college student status—have a negative relationship with normative commitment. Thus, older students, non-white students, and first-generation college students generally reported lower levels of normative commitment. Current year in the pharmacy program is also a significant predictor, but in the positive direction. Thus, students who are further along in the pharmacy education reported higher levels of normative commitment.

The external regulation model (Model 2 in Table 4.4) accounts for about one-quarter (Adjusted $R^2 = .230$) of the variation in normative commitment. Not only is this higher than what the internal regulation-only model is able to account for, but the standardized coefficient of external regulation itself is noticeably large. However, the relationship is in the opposite direction from what was predicted, lending no support to Hypothesis 2b. Thus, students who reported higher levels of external regulation were also more likely to report higher levels of normative commitment. Similar to the internal regulation model, age, race, and first-generation college student status all have statistically significant negative relationships with normative commitment, while current year in the program has a significant positive relationship.

Table 4.4 – The Regression of Normative Commitment on Academic Motivation (N = 342)

	Model 1		Model 2		Model 3	
	Standardized Coefficient	Standard Error	Standardized Coefficient	Standard Error	Standardized Coefficient	Standard Error
Motivation Variables						
Internal Regulation	.065	.058			-.053	.062
External Regulation			.255	.051	.277	.056
Control Variables						
Age	-.368**	.008	-.331**	.008	-.328**	.008
Female	.063	.089	.053	.086	.057	.086
Hispanic/Latino	.025	.194	.012	.186	.016	.187
Non-White	-.103*	.140	-.114*	.134	-.119*	.135
1st-Gen	-.119*	.098	-.125**	.094	-.126**	.094
Post-Secondary Degree	-.059	.056	-.064	.054	-.064	.054
Current Year	.125*	.029	.148**	.028	.153**	.028
Adjusted R^2	.171		.230		.230	
F Value	9.774**		13.744**		12.324**	
Degrees of Freedom	8		8		9	

* $p < .05$, ** $p < .01$

Model 3 in Table 4.4 includes both of the independent variables as well as the control variables. It is notable that Model 3 differs only slightly from the external regulation-only model. The standardized coefficient for external regulation increases only slightly in the combined model (as compared to the external regulation-only model) and the adjusted R^2 does not change.

This suggests that including information about a student's internal regulation does nothing to strengthen our model for normative commitment.

Table 4.5 shows the results from regression models for affective academic commitment (commitment resulting from identification with the university). Again, Model 1 represents the internal regulation-only model, Model 2 represents the external regulation-only model, and Model 3 represents the complete model. The internal regulation-only model accounts for about one-quarter (Adjusted $R^2 = .266$) of the variation in affective academic commitment scores. Additionally, internal regulation itself is a statistically significant predictor of affective commitment with a relatively high standardized coefficient ($\beta = .481$), lending support to Hypothesis 2a. Prior post-secondary education and current year in the pharmacy program are also significant predictors of affective commitment, albeit in opposite directions. Specifically, students who already held a higher education degree generally reported lower levels of affective commitment than those without a higher education degree. Similar to each of the previous models, students who are further along in the pharmacy education reported higher levels of affective commitment.

The external regulation-only model (also presented in Table 4.5) accounts for 10% (Adjusted $R^2 = .104$) of the variation in affective commitment scores. While the amount of variance accounted for is lower than the internal regulation model, the predictive power of external regulation itself is larger than internal regulation. As in the normative commitment model, though, external regulation's relationship is in the opposite direction from what was predicted, lending no support to Hypothesis 2b. Thus, students who reported higher levels of external regulation were also more likely to report higher levels of affective commitment. As was true with the corresponding internal regulation model, students with a prior post-secondary

degree were more likely to report lower affective commitment scores and those who are further along in the pharmacy program reported higher levels of affective commitment.

The complete model for affective commitment is very similar to Model 1 (the model that only included internal regulation and control variables). More importantly, when internal and external regulation are included in the same model, the standardized coefficient for external regulation is significantly reduced. This suggests that having information about a student's external regulation does little to help predict his or her affective commitment when internal regulation scores are controlled for. Additionally, the combined model shows no improvement over the internal regulation-only model in terms of the amount of explained variance in affective commitment scores.

Table 4.5 – The Regression of Affective Commitment on Academic Motivation (N = 342)

	Model 1		Model 2		Model 3	
	Standardized Coefficient	Standard Error	Standardized Coefficient	Standard Error	Standardized Coefficient	Standard Error
Motivation Variables						
Internal Regulation	.481**	.039			.452**	.043
External Regulation			.262	.039	.068	.039
Control Variables						
Age	.023	.006	.060	.006	.033	.006
Female	.047	.060	.076	.066	.046	.060
Hispanic/Latino	-.056	.131	-.026	.144	-.058	.131
Non-White	.082	.094	.038	.104	.078	.094
1st-Gen	.043	.066	.029	.073	.041	.066
Post-Secondary Degree	-.152**	.038	-.147**	.042	-.153**	.038
Current Year	.159**	.020	.210**	.022	.166**	.020
Adjusted R ²	.266		.104		.267	
F Value	16.432**		5.967**		14.826**	
Degrees of Freedom	8		8		9	

* p < .05, ** p < .01

The results from the last sub-dimension of the academic commitment scale—continuance commitment (commitment in light of viable alternatives)—are provided in Table 4.6. Model 1, the internal regulation-only model, accounts for 14% of the variation in continuance commitment scores. This is relatively low compared to the internal regulation model for affective

commitment, but internal regulation itself remains a significant predictor ($\beta = .187$) of continuance commitment. This is also in the predicted, positive direction, lending more support to Hypothesis 2a. For continuance commitment, gender and current year in the pharmacy education are also both significant predictors. In this case, females and those further along in the program were more likely to report higher levels of continuance commitment.

Table 4.6 – The Regression of Continuance Commitment on Academic Motivation (N = 342)

	Model 1		Model 2		Model 3	
	Standardized Coefficient	Standard Error	Standardized Coefficient	Standard Error	Standardized Coefficient	Standard Error
Motivation Variables						
Internal Regulation	.187**	.060			.290**	.064
External Regulation			-.117*	.055	-.242**	.058
Control Variables						
Age	.039	.009	.022	.009	.004	.009
Female	.175**	.092	.201**	.093	.181**	.090
Hispanic/Latino	.037	.200	.066	.202	.045	.195
Non-White	.060	.144	.048	.146	.074	.141
1st-Gen	-.060	.101	-.061	.102	-.054	.098
Post-Secondary Degree	.015	.058	.023	.058	.019	.056
Current Year	.232**	.030	.235**	.031	.207**	.030
Adjusted R ²	.140		.119		.185	
F Value	7.954**		6.761**		9.587**	
Degrees of Freedom	8		8		9	

* p < .05, ** p < .01

The external regulation-only model (Model 2 in Table 4.6) accounts for 12% (Adjusted R² = .119) of the variation in continuance commitment scores. Additionally, external regulation is a significant predictor ($\beta = -.177$) of continuance commitment in the predicted, negative direction, supporting Hypothesis 2b. This is the only instance in any of the separated regression models where external regulation is shown to have a statistically significant negative relationship to the dependent variable. As with the internal regulation model, females and those further along in the program were also more likely to report higher levels of continuance commitment.

The combined model (Model 3 in Table 4.6) accounts for 19% of the variation in continuance commitment. Both of the independent variables were predictive at a statistically significant level in the expected direction. This lends support to both Hypotheses 2a and 2b. As with each of the separate models, gender and current year in the program were also both significant predictors of continuance commitment. Overall, the combined model for continuance commitment represents an improvement over either of the separate models (which was not the case for either normative or affective commitment).

The results presented in Table 4.7 represent the internal regulation, external regulation, and complete regression models for overall academic commitment. While the previous models were important in keeping with Hellman and Williams-Miller's (2005) proposed measures, Hypotheses 2a and 2b predict the relationship of motivation with *overall* academic commitment. Thus, the dependent variable in the following models is a consolidation of the three sub-dimensions of academic commitment. Model 1, the internal regulation-only model, accounts for about one-quarter (Adjusted $R^2 = .239$) of the variation in overall academic commitment. Furthermore, the internal regulation variable is a significant ($\beta = .352$) predictor of overall commitment when the control variables are accounted for. Thus, those who reported high levels of internal regulation also reported higher levels of overall commitment, supporting Hypothesis 2a. Age, gender, and current year in the pharmacy program are also significant predictors in the internal regulation model. As with normative commitment, older students were more likely to exhibit lower levels of commitment. Additionally, females and those further along in the program were more likely to exhibit higher levels of overall commitment.

The external regulation-only model for overall academic commitment (Model 2 in Table 4.7) accounts for 15% (Adjusted $R^2 = .152$) of the variation in overall commitment. External

regulation is a stronger predictor of overall commitment than many other variables in the model, albeit in the opposite direction ($\beta = .191$) from what was predicted, offering no support for Hypothesis 2b. The control variables in the external regulation model mirror those for the internal regulation model. Age is shown to have a statistically significant negative relationship with overall commitment, while females and those further along in the program are shown to have higher levels of overall commitment.

Model 3, the combined model, is nearly identical to the internal regulation-only model. When internal and external regulation are included in the same model, there is no additional variance explained from the internal regulation-only model (Adjusted $R^2 = .239$ for both Model 1 and Model 3). Furthermore, when external regulation is included in the combined model, its relationship with overall commitment is largely mitigated. Overall, this suggests that internal regulation is a more important predictor of overall academic commitment than external regulation is.

Table 4.7 – The Regression of Overall Commitment on Academic Motivation (N = 342)

	Model 1		Model 2		Model 3	
	Standardized Coefficient	Standard Error	Standardized Coefficient	Standard Error	Standardized Coefficient	Standard Error
Motivation Variables						
Internal Regulation	.352**	.033			.331**	.037
External Regulation			.191	.032	.049	.033
Control Variables						
Age	-.157**	.005	-.130*	.005	-.150**	.005
Female	.145**	.051	.166**	.054	.144**	.051
Hispanic/Latino	.005	.111	.027	.117	.004	.111
Non-White	.015	.080	-.017	.085	.012	.081
1st-Gen	-.072	.056	-.082	.059	-.073	.056
Post-Secondary Degree	-.093	.032	-.089	.034	-.094	.032
Current Year	.258**	.017	.295**	.018	.263**	.017
Adjusted R^2	.239		.152		.239	
F Value	14.381**		8.644**		12.868**	
Degrees of Freedom	8		8		9	

* $p < .05$, ** $p < .01$

Hypotheses 3a & 3b: Regulation and Satisfaction

Finally, the models for Hypotheses 3a and 3b are presented in Table 4.8. These hypotheses predict the relationships between academic motivation and academic satisfaction. Like the other hypotheses, I predicted that internal regulation would have a positive relationship with academic satisfaction while external regulation would have a negative relationship. The internal regulation-only model is presented as Model 1 and accounts for 19% of the variation in academic satisfaction. Furthermore, there is support for Hypothesis 3a since internal regulation ($\beta = .355$) is a significant predictor of academic satisfaction, even when the control variables are accounted for. Like each of the previous models, current year in the pharmacy program is also a significant predictor of the dependent variable with students who are further along in the program reporting higher levels of satisfaction.

Model 2 in Table 4.8 shows the relationship between external regulation and academic satisfaction when control variables are accounted for. Overall, the model is not very powerful—accounting for only 7% of the variation in academic performance. Furthermore, external regulation in this model is not a significant predictor of academic satisfaction. In fact, with a positive standardized coefficient ($\beta = .058$), there is no support for Hypothesis 3b, which suggested that the relationship between external regulation and academic satisfaction would be negative. The only significant predictor of academic satisfaction in the external regulation model is current year in the program, with more advanced students reporting greater levels of satisfaction.

The combined model (Model 3) represents an improvement over either of the separate models. Overall, the combined model accounts for 20% (Adjusted $R^2 = .199$) of the variation in academic commitment scores. Additionally, both internal and external regulation are shown to be

significant predictors in the directions predicted by Hypotheses 3a and 3b. Thus, while external regulation in the separate model was not shown to be related to satisfaction in the predicted direction, when internal regulation is accounted for, the relationship is shown to be negative and statistically significant. This combined model lends support to both of the hypotheses regarding academic satisfaction.

Table 4.8 – The Regression of Academic Satisfaction on Academic Motivation (N = 341)

	Model 1		Model 2		Model 3	
	Standardized Coefficient	Standard Error	Standardized Coefficient	Standard Error	Standardized Coefficient	Standard Error
Motivation Variables						
Internal Regulation	.355**	.031			.403**	.034
External Regulation			.058	.030	-.114*	.031
Control Variables						
Age	.085	.004	.093	.005	.068	.004
Female	-.064	.047	-.035	.051	-.062	.047
Hispanic/Latino	-.029	.102	.003	.110	-.025	.102
Non-White	.020	.074	-.010	.079	.026	.074
1st-Gen	-.064	.052	-.073	.056	-.061	.052
Post-Secondary Degree	-.076	.030	-.069	.032	-.074	.029
Current Year	.241**	.016	.270**	.017	.230**	.016
Adjusted R ²	.191		.070		.199	
F Value	11.045**		4.203**		10.399**	
Degrees of Freedom	8		8		9	

* p < .05, ** p < .01

Summary of Results

Table 4.9 provides a summary of the results presented above. My hypotheses predicted that internal regulation would be positively related to each of my dependent variables, while external regulation would be negatively related to each of the dependent variables. The results presented above provide mixed support for those hypotheses. Academic performance (as measured by last-semester GPA) was not related to either type of motivation, offering no support for Hypotheses 1a or 1b. Motivation was related to academic commitment, but those relationships varied depending on what kind of commitment was examined. The composite measure of academic commitment was positively related to internal regulation, but was not

significantly related to external regulation when all other variables were accounted for. This supports Hypothesis 2a, but not 2b. Finally, academic satisfaction was the only dependent variable that was positively related to internal regulation and negatively related to external regulation, supporting both Hypotheses 3a and 3b.

Table 4.9 – Summary of Results by Dependent Variable

Variables	β_{Internal}	β_{External}	R ²
<i>Performance (H1a & H1b)</i>			
Internal Regulation	.069		.130
External Regulation		-.014	.125
Internal & External Regulation	.088	-.049	.129
<i>Normative Commitment (H2a & H2b)</i>			
Internal Regulation	.065		.171
External Regulation		.255	.230
Internal & External Regulation	-.053	.277	.230
<i>Affective Commitment (H2a & H2b)</i>			
Internal Regulation	.481**		.266
External Regulation		.262	.104
Internal & External Regulation	.452**	.068	.267
<i>Continuance Commitment (H2a & H2b)</i>			
Internal Regulation	.187**		.140
External Regulation		-.117*	.119
Internal & External Regulation	.290**	-.242**	.185
<i>Overall Commitment (H2a & H2b)</i>			
Internal Regulation	.352**		.239
External Regulation		.191	.152
Internal & External Regulation	.331**	.049	.239
<i>Satisfaction (H3a & H3b)</i>			
Internal Regulation	.355**		.191
External Regulation		.058	.070
Internal & External Regulation	.403**	-.114*	.199

* p < .05, ** p < .01

5. DISCUSSION AND CONCLUSION

This study provides mixed results for self-determination theory as it relates to education, at least among pharmacy students. Overall, support for my hypotheses is somewhat dependent on which statistical model is examined. For instance, some hypotheses were supported when examining the separate models of internal and external regulation for each dependent variable. Some hypotheses, though, were only supported in the models that contained both motivational variables and all of the control variables. In some respects, the separate models provide a more detailed analysis of the relationships, especially the relative impacts of the independent motivational variables as compared to the control variables. However, since both internal and external regulation can influence the dependent variables, there is some reason to believe they should be included in the same model. Both ways of calculating and presenting the models are included in the results primarily because they allow for interesting comparisons.

Interestingly, results based on the separate and combined models were sometimes very different. In some models, the effects of one of the independent variables were largely mitigated when it was included in the same model as the other independent variable. Additionally, the explained variance in the combined model was sometimes no greater than one of the separate models. This suggests that the addition of the second independent variable does little to nothing to improve the model. This phenomenon was particularly interesting because it varied by dependent variable on whether the internal or external regulation variable was a more important predictor. For example, the combined affective and overall commitment models were very similar to each of their internal regulation-only models. On the other hand, the combined normative commitment model was almost identical to the external regulation-only model for normative commitment. This suggests that different kinds of motivation can have differential

impacts on different kinds of commitment. The nature of the commitment measures in this study makes this phenomenon apparent, but it may be true for other educational outcomes as well. Further research is clearly necessary to better understand why internal and external regulation differentially impact educational outcomes. Perhaps additional measures of performance and satisfaction could be examined to see if those variables are differentially related to different kinds of motivation. By examining more measures, possible trends may be identified to explain when and why internal (or external) regulation is more important.

Outside of these differences in separate and combined regression models, a number of other findings are noteworthy. The first set of hypotheses predicted the relationship between motivation and academic performance. Overall, these were not supported in either the separate or the combined models. Hypothesis 1a predicted that higher levels of internal regulation would be related to higher levels of academic performance, while Hypothesis 1b predicted that higher levels of external regulation would be related to lower levels of academic performance. Neither internal regulation nor external regulation was shown to have significant predictive abilities regarding students' GPAs. Despite not supporting the hypotheses, these findings are actually consistent with some prior research that has shown little to no link between motivation and academic performance (Cokley et al. 2001; Baker 2004).

One possible explanation for these findings is related to the way academic performance was measured. After much debate, I eventually decided that GPA was the best measure because of the need for a standardized measure for between-year comparisons. Instead of measuring cumulative GPA, though, the survey asked students to report their last-semester GPA. Specifically, the question asked, "What is your GPA **from last semester**?" Despite the question being relatively well received during pretesting, it later became clear that the question could still

be interpreted as asking about cumulative GPA. The fact that this question may have been interpreted differently by different students may help explain the lack of support for my hypotheses.

In each of the statistical models examining academic performance, the only statistically significant predictors were gender and current year in the pharmacy education. Females and those further along in the program were much more likely to report higher GPAs. Exactly why women tend to perform higher in the courses in this study might be due to any number of reasons including advanced developmental maturity or better study habits. One possible explanation for the relationship between current year and performance is that the pharmacy program becomes easier over time, bringing up average grades. While this alone seems unlikely, it is possible that as students advance through the program, they generally mature and become better students. Often it takes some adjustment time to figure out exactly what needs to be done to succeed at school. The longer students have been in the program, the better they are likely to be at this. Another possible explanation is that the pre-pharmacy program consists of a number of “weed out” courses. Furthermore, pre-pharmacy students at UM are a particularly resilient group who will often retake courses multiple times to reach the threshold for acceptance into pharmacy school. If they are retaking a course, it is likely that their last-semester GPA is going to be relatively low. Finally, it is also true that the better students tend to get accepted into the professional program which might help explain why those in later years reported higher GPAs.

The second set of hypotheses, those examining the relationship between motivation and academic commitment, received mixed support. Hypothesis 2a predicted that higher levels of internal regulation would result in higher levels of academic commitment. This hypothesis was supported by the composite measure of academic commitment as well as two of the three

subscales of commitment. The only commitment measure not shown to be related to internal regulation was normative commitment. Since normative commitment is related to adhering to reference group norms, this might suggest that pharmacy students' reference groups do not place high value on internal rewards such as intellectual pleasure or satisfaction.

Hypothesis 2b, which predicted that the more externally regulated a student is, the less commitment he or she would exhibit, was generally not supported by my results. While external regulation and overall academic commitment were shown to be related at a statistically significant level in the external regulation-only model, their relationship was in the opposite direction than predicted. Upon reflection, this is not necessarily inconsistent with general logic. If students are mostly motivated by some external force (e.g., money or prestige), it is not surprising that they are highly committed to taking the necessary steps to reach those goals. In this case, it is necessary to finish pharmacy school to become a pharmacist. However, when external regulation was included in the combined model, its predictive power was substantially decreased. Additionally, including information about students' external regulation scores in the regression model did nothing to improve the explained variance in overall academic commitment scores. While this does not support the hypothesis that external regulation would have a negative relationship with commitment, it does suggest that internal regulation is more important in predicting a student's academic commitment.

Even if we examine academic commitment broken down into its three subscales, only one subscale supports Hypothesis 2b. Continuance commitment in both the external regulation-only model and the combined model was negatively related to external regulation, as predicted. This suggests that students who are looking for a high paying career (or other external rewards) realize there are other ways to achieve their goals. Exactly why they choose to pursue pharmacy

could be due to any number of variables not included in these models. Perhaps it is a simple cost-benefit analysis of the time required to obtain the Pharm.D. degree versus the benefits of the career (as outlined in the Introduction to this thesis). Or perhaps these students have a preference for science-related fields. Further research that explores motivations outside of the SDT typology may be necessary to definitively make any conclusions regarding the relationship between continuance commitment and academic motivation.

The final set of hypotheses predicted the relationships between motivation and academic satisfaction. In the separate models, internal regulation was a significant predictor of academic satisfaction in the predicted direction, while external regulation was not. However, when I included both variables in the same model, internal regulation maintained its positive relationship with academic satisfaction, while external regulation was shown to be negatively related to satisfaction, as the hypotheses predicted. Thus, when I accounted for both types of motivation and all of the control variables, Hypotheses 3a and 3b were both supported. Exactly why external regulation was only negatively related to satisfaction in the combined model is unclear and further research would be necessary to fully explore the relationship. While diagnostic statistics suggest no mathematical anomalies with these models, replication is necessary to test whether this is unique to my subjects or true for all pharmacy students.

Limitations and Future Research

While this study went beyond previous studies by including students at all levels of the pharmacy education in the sample and examining the relationships between motivation and various educational outcomes, there are still possible limitations that must be acknowledged. First and foremost, this study uses subjects only from The University of Montana. The demographics of UM are very different from other campuses and universities in other regions of

the nation. The sample in this study was nearly 90% white. Future research could broaden the scope of this project by including other schools of pharmacy and other institutions where students pursue a pre-pharmacy curriculum in order to provide a more geographically and racially diverse sample. This would provide a more representative sample of students from which broader generalizations could be made.

As with most survey research, there should also be some hesitation when interpreting self-reported data. In general, students may not read questions fully or even misunderstand questions. Some of the data collected in this study (especially GPA) may have been improved by collecting it from university records instead of having students self-report. While more accurate, obtaining such records is not always easy, especially when confidentiality is considered. Finally, the nature of the data collection may have encouraged some students to finish the survey as quickly as possible. Since the survey was distributed at the end of most classes, there was some incentive for students to finish quickly so they could leave early. This may have contributed to not reading questions fully or answering dishonestly. The ideal time to distribute the survey is probably at the beginning of a class, but this is also the most disruptive and time consuming.

In addition to concerns about the validity of self-report data, it is also important to address the general validity of all of the measures used. As previously mentioned, my measurement of internal and external regulation came from the pre-established academic motivation scale (AMS). The AMS has been used extensively and validated by a number of researchers, suggesting it does in fact measure the motivational constructs outlined in SDT. However, I adapted the scale slightly, rewording questions and changing the response categories. While these changes were not drastic, prior tests of validity may no longer apply. It is also important to address the fact that, despite researchers validating the AMS in American

populations, the instrument was developed with a Canadian population in mind. Whether the differences between the two populations are large enough to warrant any serious problems is questionable, but some researchers have suggested that this potential limitation at least be acknowledged (Cokley et al. 2001).

The measures of commitment and satisfaction used in this study also came from established scales, but neither had been used as extensively as the AMS. Following the pre-testing of the instrument, I assessed the face validity of these two scales (and the rest of the survey) through debriefing interviews with participants. Pre-testers generally indicated that the measures accurately represented what they were intended to measure. Furthermore, factor analysis of my commitment measures suggested a similar factor structure to the Hellman and Williams-Miller (2005) commitment scale. However, with so little research done using these questions, it is difficult to say to what extent they are accurately measuring academic commitment. A similar situation exists with the satisfaction scale. Factor analysis suggested a single component measure, but this only indicates that each of the items measured something similar. Ultimately, further studies that explicitly validate the measures as well as replicate and reproduce similar findings will strengthen our inferential abilities regarding these relationships.

The use of GPA as a measure of performance was briefly mentioned above, but requires further discussion. Despite being calculated and reported in a manner that allows for comparisons between groups, how grades are assigned varies drastically by course. Depending on which courses a student takes (or who teaches those courses), his or her GPA could be dramatically impacted. Additionally, in many programs, grading tends to become more relaxed in later years. This means that the GPA of students in later years may be artificially inflated and not an accurate representation of true academic performance. Future research should seriously

evaluate how well GPA measures performance and consider using other options for measuring performance.

Finally, many of the regression models presented above produced relatively low R^2 values. This suggests that there are many other factors beyond motivation and the control variables that are related to students' academic performance, commitment, and satisfaction. While it was not the goal of this research to necessarily suggest that motivation was the defining factor in students' educational outcomes, it may be helpful to further explore what other variables are related to each of my dependent variables. For instance, social characteristics of each respondent such as family support, past experiences with pharmacy and other health professions, and personal interests are not well represented in this study. Additionally, cognitive variables such as intelligence or developmental ability may help explain more variation in my dependent variables, especially performance (which motivation was not significantly related to).

In addition to addressing some of these limitations, future research that offers a direct comparison of pharmacy students to other health professions is necessary. The purpose of this thesis was not to draw conclusions about how pharmacy students relate to other health professions students, but, as outlined in the introduction, there are noticeable differences. While other health profession students are not necessarily completely devoid of external motivations, there is a relatively clear difference between pharmacy and similar professions. Exactly what these differences in motivation mean for each respective group's education and future careers is not clear at this point. Comprehensive research that includes students from multiple health professions and institutions might allow for direct comparisons to be made.

Conclusion

Despite some of the limitations described, the results do have important implications. Even without support for many of my hypotheses, a lot can still be said about the impacts of motivation on education. For instance, in nearly all cases, internal regulation was more positively related to each educational outcome than external regulation. Even though external regulation was not shown to have a negative relationship with most of the dependent variables, internal regulation was shown to be a more positive predictor in nearly all cases. This suggests that pharmacy students who have high levels of internal regulation will also generally have higher academic commitment and satisfaction. In short, externally regulated students are not necessarily “bad,” but internally regulated students seem to be better.

While these results do not provide explicit support for self-determination theory, they do suggest that an effort should be made to promote internal regulation among students. One way to do this is by providing an autonomy supportive environment. This means that either focus should be taken away from external rewards or incentives, or more emphasis should be placed on individual autonomy and supporting individual interests. By promoting the idea of autonomy among students, they are more likely to see the internal rewards in what they are doing. Ideally, students would then develop more internally regulated motivations, which tend to be related to more positive outcomes (at least commitment and satisfaction in this study). Pharmacy programs are at a distinct disadvantage in this realm because the external rewards for a pharmacy career are so apparent and influential. Thus, advisors and professors have to work harder to provide an environment which supports and encourages students to recognize the internal rewards that the pharmacy education and profession offers. This is especially important for pre-pharmacy students who may only see pharmacy as a way to make good money. Any way that pharmacy programs can promote the internally rewarding aspects of the pharmacy career and actually have

students buy into the idea should help produce more positive outcomes for students in school and in their future careers.

There is more work to be done to fully understand exactly how motivation is related to various educational outcomes. Even though motivations are not the only contributing factor to students' educational experiences and outcomes, this research shows that they do play an important role. Better understanding these relationships can strengthen our conceptions of higher education and allow faculty and advisors to provide students the best education possible. The findings presented above place us one step closer to this goal and will be useful for informing and advancing future research in the area.

APPENDIX A: SURVEY INSTRUMENT

The University of Montana Pharmacy Student Survey



Mike King &
Dr. Kathy Kuipers

Department of Sociology
University of Montana
2013

Department of Sociology
University of Montana
Missoula, MT 59812
January 28, 2013

Dear Student,

Welcome to The University of Montana Pharmacy Student Survey. Thank you for taking the time to fill out this questionnaire. As you probably know, the collection of accurate information about topics like this depends very much on the willingness of those surveyed to provide accurate and timely survey responses. Therefore, we ask you to complete the entire survey.

Instructions:

1. Your privacy and confidentiality are important to us. All survey responses will be kept strictly confidential per the ethical standards of the American Sociological Association and the University of Montana.
2. We anticipate no risk in responding to the survey, but your responses may help inform the pre-pharmacy and pharmacy programs at the University of Montana.
3. This survey takes approximately 10 minutes to complete.
4. Please read each item carefully and answer as honestly as possible.
5. This survey is voluntary and you may skip questions that you are not comfortable with or stop taking the survey at any time.
6. You must be 18 years or older to complete this survey.

If you have any questions regarding this study, now or in the future, you may contact me by email at michael.king@umontana.edu or my faculty advisor, Kathy Kuipers, at (406) 243-4381 or by email at kathy.kuipers@umontana.edu. If you have any questions regarding your rights as a research subject, you may contact the Chair of the Institutional Review Board through The University of Montana Research Office at (406) 243-6670.

Thank you in advance for your participation in this important study.

Sincerely,

Mike King
Graduate Student
Project Director

Kathy J. Kuipers, PhD
Associate Professor
Faculty Advisor

First we'd like to ask you some questions about the reasons you have chosen to pursue a pharmacy education. Please read each of the questions very carefully and answer honestly.

1) This first question has to do with how much you **AGREE** with the following statements about why you have chosen to pursue an education in pharmacy. For each statement, please indicate whether you Completely Agree, Neither Agree Nor Disagree, Completely Disagree, or if you fall in between two of those categories.

	Completely Agree			Neither Agree nor Disagree			Completely Disagree
A) I would not find a high-paying job later on with only a high school degree.	1	2	3	4	5	6	7
B) I experience pleasure and satisfaction while learning new things.	1	2	3	4	5	6	7
C) A pharmacy education will help me better prepare for the career I have chosen.	1	2	3	4	5	6	7
D) I experience pleasure when I am communicating my own ideas to others.	1	2	3	4	5	6	7
E) I really feel that I am wasting my time in school.	1	2	3	4	5	6	7
F) I experience pleasure when I surpass myself in my studies.	1	2	3	4	5	6	7
G) I like proving to myself that I am capable of completing a pharmacy degree.	1	2	3	4	5	6	7
H) This education will help me obtain a more prestigious job later on.	1	2	3	4	5	6	7
I) I experience pleasure when I discover new things never seen before.	1	2	3	4	5	6	7
J) After school, I will be able to enter the job market in a field that I like.	1	2	3	4	5	6	7
K) I experience pleasure when I read interesting authors.	1	2	3	4	5	6	7
L) I once had good reasons for pursuing a pharmacy degree; however, now I wonder whether I should continue.	1	2	3	4	5	6	7
M) I experience pleasure when I surpass myself in one of my personal accomplishments.	1	2	3	4	5	6	7
N) When I succeed in school, I feel important.	1	2	3	4	5	6	7

2) Now that you have seen some of the common reasons people choose to go to school, please take some time to reflect on the reasons that are most important to you. Specifically, please list your top three reasons for pursuing an education in pharmacy.

Reason 1: _____

Reason 2: _____

Reason 3: _____

3) Taking a step back from reasons you have chosen a pharmacy education, take a few moments to reflect on your career goals. Specifically, please use the following lines to list the three jobs you would most like to have when you graduate. These jobs do not need to be limited to careers in pharmacy.

Job 1: _____

Job 2: _____

Job 3: _____

4) Now, please take a moment to think back on the individuals that have influenced you most in your choice to focus on pharmacy while in college. These may be family members, friends, teachers, or other individuals in your life who have had a significant impact on your choice. Using the lines below, please list the top three people who were most influential in your decision to pursue a pharmacy education. Please do not use specific names, instead use generic titles and descriptors (e.g., Mother, Grandfather, family doctor, etc.)

Person 1: _____

Person 2: _____

Person 3: _____

Now that you have had some time to reflect on some of your goals and influences, please take some time to answer some more questions regarding your reasons for focusing on pharmacy while in college.

5) As before, this question has to do with how much you AGREE with the following statements about why you have chosen to pursue an education in pharmacy. For each statement, please indicate whether you Completely Agree, Neither Agree Nor Disagree, Completely Disagree, or if you fall in between two of those categories.

	Completely Agree			Neither Agree nor Disagree			Completely Disagree
A) I want to have "the good life" later on.	1	2	3	4	5	6	7
B) I experience pleasure when broadening my knowledge about subjects which appeal to me.	1	2	3	4	5	6	7
C) This education will help me make a better choice regarding my career orientation.	1	2	3	4	5	6	7
D) I experience pleasure when I feel completely absorbed by what certain authors have written.	1	2	3	4	5	6	7
E) I can't see why I am in school and frankly, I couldn't care less.	1	2	3	4	5	6	7
F) I feel satisfaction when I am in the process of accomplishing difficult academic activities.	1	2	3	4	5	6	7
G) This education allows me to show myself that I am an intelligent person.	1	2	3	4	5	6	7
H) I want to have a better salary later on.	1	2	3	4	5	6	7
I) My studies allow me to continue to learn about many things that interest me.	1	2	3	4	5	6	7
J) A few additional years of education will improve my competence as a worker.	1	2	3	4	5	6	7
K) I experience a "high" feeling when reading about various interesting subjects.	1	2	3	4	5	6	7
L) I'm honestly not sure why I am pursuing a pharmacy degree.	1	2	3	4	5	6	7
M) Pharmacy school allows me to experience a personal satisfaction in my quest for excellence in my studies.	1	2	3	4	5	6	7
N) I want to show myself that I can succeed in my studies.	1	2	3	4	5	6	7

Now that you have thought about some of the reasons you are pursuing a pharmacy education, we would like to ask you about your experiences in school.

6) The next question has to do with how much you AGREE with each of the following statements. For each statement, please indicate whether you Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, or Strongly Disagree.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
A) My family would be disappointed if I did not go to college.	1	2	3	4	5
B) I am proud to be a pharmacy student.	1	2	3	4	5
C) Being a pharmacy student has a great deal of personal meaning for me.	1	2	3	4	5
D) If I could make a decent income doing something else, I would not have enrolled in college.	1	2	3	4	5
E) I really enjoy talking to other people about my college experiences.	1	2	3	4	5
F) It would really disappoint people who are close to me if I decided to drop out of school.	1	2	3	4	5
G) Being enrolled in college has made me happy.	1	2	3	4	5
H) I have always dreamed of going to college.	1	2	3	4	5
I) If I had a better alternative, I probably would not have enrolled in college.	1	2	3	4	5
J) For the most part, it was expected that I would go to college.	1	2	3	4	5
K) In my family, going to college is highly valued.	1	2	3	4	5
L) I am going to college because I don't have any practical options to do anything else.	1	2	3	4	5
M) If I could find another way to achieve my goals, I would not go to college.	1	2	3	4	5

Next, we'd like to find out about your impressions of being a pharmacy student.

7) Below, we list a number of statements about how you may feel about your education thus far (classes, professors, etc.). Please indicate whether you Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, or Strongly Disagree with each of the following statements.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
A) My instructors and other teaching staff are NOT willing to help.	1	2	3	4	5
B) My instructors are polite and courteous.	1	2	3	4	5
C) I have NOT gained knowledge and skills for my first job.	1	2	3	4	5
D) I have faith in my instructors' knowledge of the subject matter.	1	2	3	4	5
E) I feel comfortable talking to my instructors.	1	2	3	4	5
F) The material presented in my courses is NOT useful for my education.	1	2	3	4	5
G) My instructors are NOT concerned about student welfare and student interests.	1	2	3	4	5
H) So far, I have acquired a broad general education in different fields.	1	2	3	4	5
I) So far, I have become more competent in my field of study.	1	2	3	4	5
J) The material presented in my courses is interesting.	1	2	3	4	5
K) So far, I have NOT been able to learn effectively by myself.	1	2	3	4	5
L) I have received guidance and information on career opportunities.	1	2	3	4	5
M) The material presented in my courses is NOT relevant to my education.	1	2	3	4	5
N) So far, my education has helped me develop analytical and logical thinking skills.	1	2	3	4	5
O) My instructors are well organized and prepared.	1	2	3	4	5

Finally, we would like to ask you a few questions about yourself.

8) Are you female or male? (please circle your answer) Male Female

9) How old are you? (please answer in years) _____

10) What was your GPA from last semester? (If you are not sure, please use the table to the right to provide your credit load and course grades from last semester) _____

	Credits	Grade
Example	4	B+
Course 1		
Course 2		
Course 3		
Course 4		
Course 5		
Course 6		

11) What is your ethnicity?

- Hispanic or Latino
 Not Hispanic or Latino

12) What is your race?

- American Indian or Alaska Native
 Asian
 Black or African American
 Native Hawaiian or Other Pacific Islander
 White
 Other, please specify _____

13) What is the highest level educational degree you have received?

- High School Diploma or Equivalent
 Associate's Degree or Technical School Credential
 Bachelor's Degree
 Master's Degree
 Professional Degree (e.g., JD, DDS, MD, etc.)
 Doctoral Degree (e.g., EdD, PhD)

14) Had either of your parents (or guardians) completed a college degree before your 18th birthday?

- Yes
 No

15) Which of the following best describes your current position in college?

- Pre-Pharmacy Student (first year)
 Pre-Pharmacy Student (second year or more)
 P1 Student (pharmacy first year)
 P2 Student (pharmacy second year)
 P3 Student (pharmacy third year)
 P4 Student (pharmacy fourth year)
 Other, please specify _____

16) Please use the space below to add any additional comments you may have.

Thank you very much for your participation in this important study!

APPENDIX B: ONLINE SURVEY COMMUNICATIONS

Initial Contact Email (on my behalf from pharmacy administrative associate)

Subject: Sociology Survey Distribution

Hi all,

I am writing to ask for your participation in a survey that I am conducting at The University of Montana. I am asking pharmacy students like you to reflect on your experiences as a student.

Your responses to this survey are very important and may help inform the pre-pharmacy and pharmacy programs at The University of Montana.

This is a short survey and should take about ten minutes to complete. Please click on the link below to go the survey website to begin the survey.

<http://itoselect.ito.umt.edu/TakeSurvey.aspx?SurveyID=n6K28m65>

Your participation in this survey is entirely voluntary and all of your responses will be kept confidential. No personally identifiable information will be associated with your responses in any reports of this data. Should you have any further questions or comments, please feel free to contact me at michaell.king@umontana.edu or my faculty supervisor, Kathy Kuipers, by email at kathy.kuipers@umontana.edu or at (406) 243-4381.

I appreciate your time and consideration in completing the survey. Thank you for participation in this study! It is only through the help of students like you that I can provide information to help guide the direction of the pre-pharmacy and pharmacy programs at UM.

Best,

Mike King
Graduate Student
Department of Sociology

Facebook Follow-Up Reminder (from current fourth-year pharmacy student)

Hey Everyone,

Last week you should have received an email from Erika on behalf of Mike King, a sociology graduate student on campus. Mike is looking for our help to respond to his survey about pharmacy students at UM.

If you have already responded to the survey, you can ignore this, but if you haven't already, please take some time to check it out today. You can access it by following the link in the email Erica sent out or by using this link:

<http://itoselect.ito.umt.edu/TakeSurvey.aspx?SurveyID=n6K28m65>

It doesn't take very long and it will help him out a lot. Thanks for taking the time to do this everyone!

Final Reminder Email (on my behalf from pharmacy administrative associate)

Subject: Final Reminder: Pharmacy Student Survey

P4s –

Last week Alex Pfeiffer sent out a notice on my behalf that asked for you to complete a questionnaire about your experiences as pharmacy students at UM. About 20 of you have already completed the survey—I thank you and you can disregard this message. However, there is still a large proportion of you whose voices are not being represented.

I am contacting you one final time because of the importance of P4 responses in helping to get accurate results. I have already collected complete data from pre-pharmacy students as well as all P1s, P2s, and P3s. It is only by hearing from nearly everyone that I can be sure that the results truly represent UM pharmacy students. **Time is running out to participate—the survey will close on Thursday, February 28.** The survey can be completed by visiting the following link:

<http://itoselect.ito.umt.edu/TakeSurvey.aspx?SurveyID=l4K28mm1>

The questions should take less than 15 minutes to complete—many people have finished in less than 10. Your responses are voluntary and will be kept confidential. I know how busy all of you are at this time of the year and truly appreciate your willingness to help. If you have any questions at all, feel free to contact me at michael1.king@umontana.edu.

Thank you,
Mike King

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