RESEARCH ARTICLES

Factors Affecting Prepharmacy Students' Perceptions of the Professional Role of Pharmacists

Mary E. Kiersma, PharmD, Kimberly S. Plake, PhD, Gail D. Newton, PhD, and Holly L. Mason, PhD

Purdue University College of Pharmacy

Submitted April 12, 2010; accepted June 11, 2010; published November 10, 2010.

Objective. To assess prepharmacy students' perceptions of the professional role of pharmacists prior to enrollment in pharmacy school, and the association between perceptions and student demographics.
Methods. A 58-question survey instrument regarding pharmacists' roles, work experiences, and demographics was developed and administered to students (N = 127) enrolled in an organic chemistry laboratory experience at Purdue University.
Results. Theory of planned behavior subscales (attitude, subjective norm, perceived behavioral control) were influenced by students' grade point average, gender, and application to pharmacy school, while unpaid work experience affected professional commitment. Students evaluated work experience related to their pharmacy studies more positively than non-pharmacy-related areas in the theory of planned behavior subscales.
Conclusions. Evaluating students' perceptions may be beneficial in helping pharmacy educators design their curricula, as well as allowing admissions committees to select the most qualified students to promote the development of positive perceptions toward the professional role of pharmacists. Grade point average (GPA) and application to pharmacy school were associated with significant differences for the theory of planned behavior and professional commitment subscales.

Keywords: Perceptions, professional role, theory of planned behavior, prepharmacy, pharmacist

INTRODUCTION

Admission to pharmacy school has become a competitive process, with GPA being one of the many factors assessed.[1-4] With the increasing number of applications to colleges and schools of pharmacy, admissions committees are challenged to determine each student's qualifications, including previous work experience, extracurricular activities, and interviews, all of which are incorporated into the final evaluation to determine student admission offers.

Accreditation Standards set by the Accreditation Council for Pharmacy Education (ACPE) reflect the importance of training pharmacy students to provide patient-centered care.[5] The patient-centered care model (pharmaceutical care model) focuses primarily on the patient in health care provision to improve quality of life.[6] In a patient-centered model, patients become active participants in their own care, and receive services designed to address their individual needs and preferences, in addition to advice and counsel from health professionals. In response to the standards, the focus of the pharmacy curriculum has shifted from medication dispensing tasks toward patient-centered care.[5,7] Therefore, as part of the admissions criteria, pharmacy schools should consider whether candidates' attitudes and behavioral traits reflect the ability to provide patient-centered care.[6,9]

Because admissions committees want to select students who will provide patient-centered care as future professionals, an assessment of attitudes and intention to perform patient-centered services is needed. At many colleges and schools of pharmacy, the admissions committees often recommend that students acquire experience in a pharmacy setting prior to applying to the doctor of pharmacy (PharmD) program. As a result, many students have experience in a hospital or community pharmacy setting before entering pharmacy school.[8,10] Work experience is a factor influencing student attitudes toward pharmaceutical care, career aspirations, and application to pharmacy school.[8,10-15] In a study by Siracuse and colleagues, work experience was positively associated with career aspirations of becoming a patient care pharmacist.[13] In a study by Duncan-Hewitt, students' commitment to the pharmacy profession and willingness to accept more responsibility were related to the desire to provide patient-centered care.[16] These results suggest

Corresponding Author: Mary E. Kiersma, PharmD, Purdue University, Heine Pharmacy Building, 575 Stadium Mall Drive, West Lafayette, IN, 47907-209. Tel: 765-496-2413. Fax: 765-496-1886. E-mail: mkiersma@purdue.edu

admissions committees may need to consider factors beyond traditional admissions criteria (eg, GPA) in selecting those students most likely to provide patient-centered care. If pharmacy admissions committees want to select individuals with a patient-centered focus, information regarding student attitudes and traits associated with the patient-centered model is needed.

The theory of planned behavior was used as the theoretical framework for this study. In this theory, the relationship between attitudes, subjective norm, and perceived behavioral control is described as the underlying foundational belief about the intention to perform specific behaviors.[17] In this study, patient-centered care was the specific foundational behavior. The theory of planned behavior uses 3 independent determinants of intention: (1) attitude, which is the favorable/unfavorable evaluation of the behavior; (2) subjective norm, which is the perceived social pressure to perform/not perform a behavior; and (3) perceived behavioral control, which is an individual's perception of the ease or difficulty of performing a behavior. Essentially, the theory of planned behavior suggests that behavior is a function of beliefs relevant to the behavior.[17] Attitudes toward the professional role of providing patient-centered care, subjective norm with respect to the perceived social pressure placed on performing the professional role, and perceived control over the professional role should predict behavioral intentions with a high degree of accuracy.[17]

Professional commitment was used as a construct in addition to the theory of planned behavior. Pharmacy is a profession requiring practitioners to commit themselves to acquiring and maintaining knowledge and skills to provide pharmaceutical care.[18] Pharmaceutical care requires students to be committed to the profession, and career commitment is an important factor in the stability of the pharmacy profession.[8,16] The professional commitment construct was used to evaluate the students' commitment to the profession.

The conceptual framework in this study focused on the prepharmacy students' perceptions of the professional role of pharmacists and the factors that may influence these perceptions. The theory of planned behavior (attitude, subjective norm, and perceived behavioral control) and professional commitment were the foundation of the framework to allow assessment of perceptions of the professional role of pharmacists to provide patient-centered care, a main focus of the pharmacy curriculum.[5] Attitude, subjective norm, and perceived behavioral control of the professional role, as well as professional commitment, can alter a student's intention to provide pharmaceutical care. Past experiences, such as work experience, and demographics may alter perceptions of behavioral control, which can have a direct effect on performing pharmaceutical care. At the time of this writing, there was a lack of published studies assessing prepharmacy students' perceptions of the professional role of pharmacists.

The first objective of this study was to assess prepharmacy students' perceptions of the professional role of pharmacists prior to enrollment in pharmacy school. The second objective was to determine the association between prepharmacy students' perceptions of the professional role of pharmacists based on student demographics and work experiences.

METHODS

The PharmD program at Purdue University includes 2 years in the prepharmacy curriculum and 4 years in the professional program. In January 2009, a 58-item survey instrument was distributed to second-year preprofessional students enrolled in the prepharmacy curriculum at Purdue University during a weekly scheduled organic chemistry laboratory. This laboratory is a requirement of the prepharmacy curriculum, with all second-year preprofessional students enrolled. The survey instrument was available for voluntary completion by 195 students in 11 laboratory sections. The survey instrument consisted of 4 sections including: past behavior/work experience; measures of the theory of planned behavior (attitude, subjective norm, and perceived behavioral control); professional commitment; and student demographics.

The survey instrument was constructed using a survey development guide specific to the use of the theory of planned behavior, as well as survey instruments previously used in related, published studies.[15,19-21] The first section of the survey instrument consisted of 12 questions pertaining to work experience. Items were modified from questions used in a previous study measuring pharmacy student professional commitment in relation to work experience.[15] Survey questions included whether the student received a wage, average weekly hours spent working, length and state of employment, relationship to pharmacy studies, and type of pharmacy setting (if applicable).

The second section consisted of 27 questions pertaining to students' attitudes (15 questions), subjective norm (5 questions), and perceived behavioral control (7 questions) regarding the professional role of pharmacists. The items were obtained from literature on the foundational elements of pharmaceutical care and selected to represent patient-centered activities pharmacists would perform in a variety of professional settings.[6,22] The questions were framed using specific verbs to illustrate the main constructs of the theory of planned behavior as recommended by Ajzen.[19] The specific verbs for attitude included "will" or "have" (example: "Will interview patients"). Subjective norm questions included the phrase "will be expected to" (example: "Will be expected to dispense medication"). Perceived

behavioral control questions included "can" as a specific verb (example: "Can identify problems a patient is having with medications"). In most methodological applications of the theory of planned behavior, responses are assessed using a 7-point Likert scale (3 = strongly agree, 2 = agree, 1 = somewhat agree, 0 = neutral, -1 = somewhat disagree, -2 = disagree, and -3 = strongly disagree).[19]

The third section of the survey instrument included questions designed to measure students' levels of professional commitment. These questions were based on Blau's career commitment scale and were included in a previous survey regarding a professional commitment model.[15,23,24] Responses were rated using the modified 7-point Likert scale. The fourth and final section of the survey instrument contained 9 questions related to student demographics, and included gender, ethnicity, age, GPA, marital status, financial aid/scholarships, pharmacist as a family member, and application to pharmacy school. The survey instrument was reviewed by advisory committee members, graduate students, and faculty members, who offered recommendations for revisions. After survey revisions were completed, the study protocol and instrument were forwarded to and approved by the Purdue University Institutional Review Board.

All data were analyzed using SPSS version 16.0 (SPSS Inc, Chicago, IL). An *a priori* level of statistical significance was set at 0.05. Descriptive statistics were calculated for past behavior/work experience and student demographics, as well as for all theory of planned behavior and professional commitment items. The Shapiro-Wilk test was used to determine whether the data were normally distributed. Pearson correlation coefficients were calculated to examine the relationship between student scores for perceptions on (1) the theory of planned behavior constructs (attitude, subjective norm, and perceived behavioral control), and (2) the professional commitment construct.

Cronbach's alphas were calculated to determine reliability of the extracted subscales and the theory of planned behavior instrument. Nunnally proposed that a Cronbach's alpha of 0.7 is considered acceptable.[25] Item subscale correlations were calculated to examine the correlation of each item with the rest of the items included in the subscale. The overall coefficient alpha for the instrument was 0.91. The coefficient alpha for the attitude was 0.84, subjective norm was 0.70, perceived behavioral control was 0.70, and professional commitment subscales was 0.83. All coefficient alphas were > 0.7, and hence demonstrated good reliability. Item subscale correlations > 0.3 indicated that sufficient correlations existed among individual items and among the subscales in which they were included. Four items had item subscale correlations < 0.3 ("Will listen to patients," "Can discuss information on over-the-counter products," "I am disappointed I began my pharmacy studies," and "Compared to a year ago, I am more convinced now that my career in pharmacy will be financially satisfying"). These items were included in the instrument to examine the construct in the prepharmacy student sample because the items were reliable and valid for the study of career commitment of pharmacy students.[23,24,26]

Questions from each subscale were combined to provide a composite total. One-way analysis of variance (ANOVA) was used for comparisons among each of the theory of planned behavior components (attitude, subjective norm, and perceived behavioral control) and professional commitment subscales. Tukey's multiple comparisons were used to evaluate between-group differences. Higher scores signify a more positive attitude toward the behavior, more control over the behavior, more favorable perceived attitude of others toward the behavior, and therefore a stronger intention to perform the behavior. To determine the factors affecting student perceptions of pharmacists' professional role, student demographics were compared and examined using ANOVA to determine their effects on student perceptions.

RESULTS

Of the 195 prepharmacy students enrolled in the organic chemistry laboratory, 127 responses were collected for a 65.1% response rate. Some survey items were not completed by all students; therefore, not all statistical tests included 127 students (ie, the total number of respondents) in the analysis.

Of the 127 respondents, 66.9% were female, 85.1% were 19 - 20 years of age, 60.6% received financial aid/scholarships amounting to $\leq 25\%$, and 74% were Caucasian (Table 1). Twenty-seven students (21.3%) had a parent or family member who was a pharmacist. Approximately 93% of the students had applied to the Purdue University College of Pharmacy, and 12 students had applied to a different PharmD program for 2009 admission.

One hundred twenty-three students completed the work experience section. For work experience, 92.7% had been employed since June 2008 and received a wage or salary (Table 2). Seventy-nine students felt their employment was closely related to their pharmacy studies, and 74.4% of these students were employed in a community/retail pharmacy. Approximately 66% of respondents had been working since June 2008 and had not received a wage or salary. Thirty students felt their employment was closely related to their pharmacy studies, and 43.9% of these students were employed in a hospital setting.

Students' Perceptions of Professional Role. The study evaluated prepharmacy students' perceptions of the professional role of pharmacists prior to the students'

Table 1. Demographics of Students (N = 127) Surveyed at Purdue University College of Pharmacy

Demographic Variable	No. (%)
Gender	
Male	42 (33.1)
Female	85 (66.9)
Ethnicity	
African American	4 (3.1)
Asian/Pacific Islander	20 (15.7)
Caucasian	94 (74.0)
Hispanic	5 (3.9)
Other	4 (3.1)
Marital Status	
Single	127 (100)
Married	0
Divorced/Separated	0
Grade point average on a 4.0 scale	
3.75 – 4.00	50 (39.4)
3.50 – 3.74	30 (23.6)
3.25 – 3.49	29 (22.9)
3.00 – 3.24	12 (9.4)
2.75 and below	5 (3.9)
Age, years	
18	2 (1.6)
19	43 (33.9)
20	65 (51.2)
21 and older	12 (9.5)
Parent or family member a pharmacist	
Yes	27 (21.3)
No	100 (78.7)
Financial Aid/Scholarships	
25% or less	77 (60.6)
26% to 50%	17 (13.4)
51% to 75%	6 (4.7)
76% to 99%	13 (10.2)
100%	14 (11.0)
Applied to school of pharmacy at Purdue University	
Yes	118 (92.9)
No	9 (7.1)
Applied to another college or school of pharmacy	
Yes	12 (9.4)
No	115 (90.6)

Table 2. Students' Past Work Experience Statistics of Students Surveyed (N = 123)

Work Experience Variable	No. (%)
Employed with wage	
Yes	114 (92.7)
No	9 (7.3)
Average weekly hours	
1 - 5 hours	6 (5.3)
6 - 20 hours	35 (30.7)
21 - 40 hours	70 (61.4)
More than 40 hours	3 (2.6)
Length of employment	
Less than 1 month	2 (1.8)
1 - 9 months	72 (63.2)
More than 10 months	40 (35.1)
State of employment	
Indiana	94 (82.5)
Other	20 (17.5)
Extent employment related to pharmacy studies	
Closely or somewhat related	86 (75.4)
Not at all related	28 (24.6)
Job setting if closely or somewhat related to pharmacy studies	
Community/retail	64 (74.4)
Hospital	11 (12.8)
Other	11 (12.8)
Employed without wage	
Yes	81 (65.9)
No	42 (34.1)
Average weekly hours	
1 - 5 hours	53 (65.4)
6 - 20 hours	23 (28.4)
21 - 40 hours	4 (4.9)
More than 40 hours	1 (1.2)
Length of employment	
Less than 1 month	6 (7.4)
1 - 9 months	53 (65.5)
More than 10 months	22 (27.2)
State of employment	
Indiana	73 (90.1)
Other	8 (9.9)
Extent employment related to pharmacy studies	
Closely or somewhat related	40 (49.3)
Not at all related	41 (50.6)
Job setting if closely or somewhat related to pharmacy studies	
Community/retail	10 (24.4)
Hospital	18 (43.9)
Other	13 (31.7)

enrollment in pharmacy school. Using the theory of planned behavior and professional commitment sections of the survey instrument, the students were asked to indicate their level of agreement or disagreement (modified 7-point Likert scale labeled: 3 = strongly agree, 2 = agree, 1 = somewhat agree, 0 = neutral, -1 = somewhat disagree, -2 = disagree, and -3 = strongly disagree) for each of the 37 questions posed. For the theory of planned behavior questions, the highest mean score was, "Will listen to patients" (2.8 ± 0.7), and the lowest mean score was, "Will receive compensation for activities related to patient care" (1.1 ± 1.5).

The average scores on the majority of questions were between 2 and 3 (agree to strongly agree). In the professional commitment section, the question, "It is important for me to graduate from pharmacy school" received the highest mean score (2.8 ± 0.8), while "I am disappointed I began my pharmacy studies" received the lowest mean score (-2.2 ± 1.3). The average scores on the majority of questions were between 2 and 3 (agree to strongly agree). A list of items is included in Tables 3 and 4.

Work Experience and Subscale Comparisons. The study determined the association between prepharmacy students' perceptions of the professional role of pharmacists and student demographics. In the prepharmacy student instrument, the students were asked 9 types of demographic information and 12 questions regarding past work experience, including information on paid and nonpaid positions of employment. Subscale summated scores for the theory of planned behavior and professional commitment were combined to facilitate statistical analysis (Table 5). By combining the scores, the analysis provided an estimate of prepharmacy students' overall perceptions of the professional role of pharmacists. One-way ANOVA was performed to determine whether students' work experience influenced their responses to the theory of planned behavior subscales and professional commitment subscale. There were significant differences in the attitude subscale ($p = 0.01$), the subjective norm subscale ($p = 0.008$), and the perceived behavioral control subscale ($p = 0.006$), based on whether their paid employment was related to their pharmacy studies. Students who had paid employment relating to their pharmacy studies had a more positive attitude, subjective norm, and perceived behavioral control scores than those who did not have work experience related to their pharmacy studies.

Table 3. Prepharmacy Students' Responses to Theory of Planned Behavior Survey Items (N = 126)[a]

Item	Mean (SD)
Attitude	
Will be able to identify expected outcomes of drug therapy	2.7 (0.6)
Will provide monitoring for drug therapy such as patient adherence, correct medication, and adverse reactions	2.5 (0.8)
Will know as much about medications as a physician	2.5 (1.0)
Will know more about medications than a physician	2.5 (0.9)
Will interview patients	1.8 (1.1)
Will have access to patient records	1.9 (1.4)
Will be able make dose adjustments	1.3 (1.7)
Will be able to provide complete drug therapy information	2.3 (0.9)
Will receive compensation for activities related to patient care	1.1 (1.5)
Will listen to patients	2.8 (0.5)
Will be an essential component of the healthcare team	2.8 (0.7)
Will provide patient counseling	2.7 (0.6)
Will believe patient education is beneficial	2.7 (0.7)
Have the responsibility, not just that of the physician, to make sure the patient is receiving the best drug therapy	2.5 (0.9)
Have an important role in identifying problems patients are having with their drug therapy	2.5 (0.8)
Subjective Norm	
Will be expected to dispense medication	2.6 (0.7)
Will be expected to counsel patients	2.7 (0.5)
Will be expected to communicate with other members of the healthcare team (eg, physician or nurse)	2.6 (0.9)
Will be expected to communicate with patients with special needs (eg, low literacy, hearing impairment)	2.7 (0.6)
Will be expected to identify problems patients are having with their drug therapy	2.3 (0.9)
Perceived Behavioral Control	
Can identify problems a patient is having with medications	2.5 (0.6)
Can select parameters of patient care to monitor (eg, blood pressure, blood glucose)	2.1 (1.0)
Can discuss patient concerns with physician	2.4 (0.8)
Can obtain accurate information on all medications currently taken by patient	2.3 (1.1)
Can discuss information on over-the-counter products	2.7 (0.6)
Can identify drug problems of patients not detected by the physician	2.1 (0.9)
Can assess a patient's response to therapy as a standard of practice	2.2 (0.9)

[a] Items rated on a 7-point Likert scale: 3 = strongly agree, 2 = agree, 1 = somewhat agree, 0 = neutral, -1 = somewhat disagree, -2 = disagree, and -3 = strongly disagree.

Table 4. Prepharmacy Students' Responses to Professional Commitment Items (N = 125)[a]

Professional Commitment	Mean (SD)
It is important for me to graduate from pharmacy school.	2.8 (0.8)
I am more committed now to a career in pharmacy than I was a yearago.	2.5 (1.2)
I am disappointed I began my pharmacy studies.	-2.2 (1.3)
Compared to a year ago, I am more convinced now that my career in pharmacy will be personally satisfying.	2.3 (1.3)
If I had to choose my major again, I would still choose pharmacy.	2.3 (1.3)
If I had all the money I needed without working, I would continue my pharmacy studies.	2.0 (1.4)
I like the profession of pharmacy too much to give up my pharmacy studies.	2.1 (1.2)
Those important to me believe pharmacy will be the ideal profession for a life's work.	2.3 (1.2)
Compared to a year ago, I am more convinced now that my career in pharmacy will be financially satisfying.	1.9 (1.1)
Compared to a year ago, I am more convinced now that my career in pharmacy will be intellectually stimulating.	2.4 (1.0)

[a] Items rated on a 7-point Likert scale: 3 = strongly agree, 2 = agree, 1 = somewhat agree, 0 = neutral, -1 = somewhat disagree, -2 = disagree, and -3 = strongly disagree.

Students also were asked to report if they had employment where they had not received a wage or salary in the 6 months prior to the survey instrument being administered. There were significant differences for students who reported non-paid employment in the perceived behavioral control subscale ($p = 0.01$) and the professional commitment subscale ($p = 0.04$). Students' responses on perceived behavioral control and professional commitment were more positive if they had non-paid work experience.

There was a significant difference ($p = 0.024$) with the professional commitment subscale dependent on the length of unpaid employment. Students with > 10 months of unpaid employment had higher positive scores compared to students with < 1 month. Students also were asked to report the type of employment setting when their unpaid employment was closely or somewhat related to their pharmacy studies, as well as the relationship between their unpaid employment and pharmacy studies. There were no significant differences in the relationship of employment to pharmacy studies and type of employment setting for the theory of planned behavior and professional commitment subscales.

Comparisons also were performed for those students who: (1) had worked for either a wage or salary in addition to an unpaid position; (2) held only 1 position of employment; and (3) had neither a paid nor an unpaid position. There was a significant difference ($p = 0.017$) for the perceived behavioral control subscale based on the number of employment positions the student held in the prior 6 months. Students who held both paid and unpaid employment had a more positive perceived behavioral control score than those who held 1 type or neither type of employment.

Demographics and Subscale Comparisons. One-way ANOVA was performed to determine whether student demographics influenced students' responses to theory of planned behavior subscales and professional commitment subscale. Demographic categories (ethnicity, age, and GPA) were collapsed to improve statistical inferences because frequencies were too small to allow for data analyses for all categories. For ethnicity, African American, Hispanic, and Other categories were combined. GPA categories were combined if students indicated they had a GPA < 2.75. Age groups were combined if the students were 21 years and older and 19 years and younger. Based on the theory of planned behavior and professional commitment subscales, no significant differences were found for ethnicity, age, parent or family member who was a pharmacist, and level of financial aid/scholarships dependence.

There were significant differences identified when examining gender and GPA. Results indicated that there was a difference between male and female students for the subjective norm ($p = 0.014$) and professional commitment ($p = 0.000$) subscales. Overall, female students had a more positive score than male students for the subjective norm (13.2 ± 2.3 vs. 12.0 ± 3.1), and professional commitment (19.6 ± 4.8 vs. 14.6 ± 10.9) subscales.

Table 5. Theory of Planned Behavior and Professional Commitment Subscale Summated Scores

			Range of Possible Scores		Student Scores	
Subscale	Number of Items	Mean (SD)	Low	High	Low	High
Attitude	15	33.9 (8.5)	-45	45	-2	45
Subjective Norm	5	12.8 (2.6)	-15	15	0	15
Perceived behavioral control	7	16.2 (3.9)	-21	21	0	21
Professional commitment	10	17.9 (7.7)	-30	30	-22	30

Significant differences between GPAs were identified in the attitude ($p = 0.044$), perceived behavioral control ($p = 0.043$), and professional commitment ($p = 0.017$) subscales. Subscale scores were reflective of student GPAs. Students with a GPA ≥ 3.75 had a more positive attitude score than students who had a GPA ≤ 2.75 (35.6 ± 7.7 vs. 31.5 ± 10.0). This pattern also was noted for the perceived behavioral control subscale (16.8 ± 3.7 vs. 13.5 ± 5.8). Students with a GPA > 3.25 had a more positive score on the professional commitment subscale than students with a GPA < 2.75 (18.8 ± 6.9 vs. 14.8 ± 6.3).

Other variables included application to the PharmD program at Purdue University or another program. There were significant differences in the attitude ($p = 0.001$), subjective norm ($p = 0.029$), perceived behavioral control ($p = 0.005$), and professional commitment ($p = 0.001$) subscales. Students who had applied to Purdue University School of Pharmacy had higher attitude (34.6 ± 7.3 vs. 24.6 ± 16.2), subjective norm (13.0 ± 2.3 vs. 11.0 ± 5.0), perceived behavioral control (16.5 ± 3.5 vs. 12.8 ± 6.8), and professional commitment (18.5 ± 6.8 vs. 9.9 ± 13.8) scores. For the variable of application to a different PharmD program, there was a significant difference for the attitude subscale ($p = 0.014$). Students who had applied to another pharmacy school had a more positive attitude score than students who had not (39.6 ± 5.8 vs. 33.3 ± 8.6).

DISCUSSION

A review of the pharmacy literature regarding pharmaceutical care emphasized a patient-centered model, and, therefore, individuals selected for admission to pharmacy school should possess attitudes and behavioral traits to adopt patient-focused care successfully.[6,9] For future professionals to provide patient-centered care, an assessment of attitudes and intention to perform patient-centered services is necessary. Work experience is a factor influencing prepharmacy and professional student attitudes.[8,10,13,14]

The first objective of the study was to assess prepharmacy students' perceptions of the professional role of pharmacists prior to students' enrollment in pharmacy school using the theory of planned behavior and professional commitment constructs. Theory of planned behavior questions resulted in average scores between 2 and 3 (agree to strongly agree) on the majority of questions, demonstrating student knowledge of the professional roles of pharmacists. Approximately 60% of the students responded strongly agree to all questions. Prior work experience and acquired background knowledge may have educated students about future involvement in patient-centered care tasks. Students were well-informed of the range of potential activities in which they could engage as pharmacists prior to entering the professional program.

Professional commitment section results also provided average scores between 2 and 3 (agree to strongly agree) on the majority of questions. A study by Fjortoft and colleagues found that employment status did not influence students' levels of professional commitment.[15] Although not exhibited by the Fjortoft study, students employed in pharmacy-related positions have opportunities to interact with employers and work colleagues to gain knowledge about the profession, which could affect the students' level of professional commitment.[15,27] Students who had work experience may have a better understanding of the responsibilities of the profession, which increased the response scores. Students were committed to the profession regardless of employment experience.

Because this study focused on prepharmacy students, the attitudes and perceptions of the students may have had implications for teaching in the prepharmacy and pharmacy curriculum. Basic expectations of the professional role may have been established prior to entering the professional program. These expectations could have impacted students' willingness to learn information provided in the pharmacy curriculum on the professional role of pharmacists. There could have been implications if students were less willing to understand and accept responsibilities and expectations of the professional role. Because approximately 87% (N = 75) of students had paid work experience in the community/retail or hospital setting, employed pharmacists could influence student expectations of future roles. For example, communication skills could be affected if students were to observe decreased willingness of pharmacists to provide patient education. In the professional curriculum, students are taught the importance of counseling patients on the use, expectations, and indications of their medication. If students work in practice settings with a decreased emphasis on counseling, students may not regard communication as an important aspect of patient education due to the discrepancy between educational expectations and practice experiences.

Another objective of the study was to determine the association between prepharmacy students' perceptions of the professional role of pharmacists and student demographics. There were significant differences associated with gender and 2 subscales, subjective norm ($p = 0.014$) and professional commitment ($p = 0.000$). Female students had a more positive score than male students for the subjective norm and professional commitment subscales. Fjortoft and colleagues reported no significant differences between male and female students in the professional commitment development, which could have been due to the combination of variables used in the multiple regression analysis to define levels of professional commitment.[15] The results of this study indicate female students had a

stronger professional commitment to pharmacy; however, further investigation is needed to determine the professional commitment differences based on gender regarding the professional role of pharmacists and the intent to provide patient-centered care.

Over 85% of respondents had a GPA $\geq$ 3.0 on a 4.0 scale. Significant differences between GPAs also existed in the attitude ($p = 0.000$), subjective norm ($p = 0.030$), perceived behavioral control ($p = 0.011$), and professional commitment ($p = 0.000$) subscales. Cline and colleagues reported that participants with higher GPAs had a greater likelihood to apply to pharmacy school compared to students with lower GPAs.[8] A higher GPA could propel a student to discover more about the requirements of the profession. Students who feel their grades are too low may decide not to apply to the professional program, which could affect their attitude toward patient-centered care.

Students who considered their paid employment closely related to or somewhat related to their pharmacy studies had more positive scores for attitude ($p = 0.010$), subjective norm ($p = 0.008$), and perceived behavioral control ($p = 0.006$). Perceptions among students differed, based on whether their work experiences related to their pharmacy studies. Their work experience appeared to influence the formation of their perceptions and its relationship to their pharmacy studies.

There were significant differences in the perceived behavioral control subscale ($p = 0.011$) and the professional commitment subscale ($p = 0.043$) for those who had not received a wage or salary. The perceived behavioral control result could be due to the nature of their unpaid employment. Employment areas varied among students and included: community pharmacies, hospitals, nursing homes, churches, and laboratory research. Students could address a variety of challenges based upon their unpaid work experience and beyond typical pharmacy practice. In addition, the students could have been allowed to develop skills and abilities of personal interest rather than what would be required for a paid position, such as a pharmacy technician. Because time spent at the site was without payment, the difference in professional commitment could be due to the level of dedication students had to discover to increase further their knowledge about the pharmacy or health profession, as well as interacting with others.

Students with more than 3 months of unpaid employment may have a greater commitment to the profession ($p = 0.024$). Gaither found that pharmacists with higher levels of professional commitment were less inclined to leave the profession.[28,29] Pharmacists' commitment to their profession will be tested frequently by the likelihood of increased future demands on time and resources.[30] Results provide encouraging evidence that students with unpaid employment experience exhibited higher levels of professional commitment. This finding suggests that unpaid pharmacy work experience may facilitate students' development of professional commitment. ACPE has updated the accreditation standards to include unpaid introductory pharmacy practice experiences (IPPEs) that should include relevant experiences in community and institutional practice settings to allow students to assume direct patient care responsibilities, within regulation guidelines.[5] Our study suggests that students do gain professional commitment from unpaid experiences; however, more research is needed since IPPEs are involuntary unpaid employment, and this study evaluated voluntary unpaid employment.

Limitations

Regarding instrument development, there are several areas which could have limited the interpretation of the results. Although the theory of planned behavior items had been used in a previous survey instrument, determining whether all aspects of the subscale were addressed adequately is difficult.[20] Because each subscale did not contain an equal number of questions, the variation of score distribution also could have influenced the results. The investigators attempted to control bias by obtaining feedback about the questions prior to distribution. Several students completed only certain sections of the survey instrument, suggesting that it may have been too long.

Over 85% of respondents had a GPA $\geq$ 3.0 on a 4.0 scale. This could indicate that students with a lower GPA may not have felt as compelled to complete the survey instrument or apply to pharmacy school as those with higher GPAs. Students may have indicated an inflated GPA on the questionnaire due to the questionnaire being anonymous, and GPA is a measure that most students attempt to improve.

Additionally, the sample selected (ie, second-year preprofessional students) was a "convenience" sample. The majority of students enrolled in the course selected would not have had a prior degree. There was no randomization or control group used in the study. Although the study results cannot be generalized to other student populations beyond Purdue University, the results could be helpful to public, midwestern, research-based colleges and universities with similar student populations.

Because the study was conducted the week before interview invitation letters were mailed by the Purdue University School of Pharmacy, students may have responded more positively to the questions posed in the hope that doing so would improve their chances of being accepted into the program. To address this limitation, students were asked to complete the survey instrument anonymously and provided with a disclosure statement that they were not

obligated to participate and that responding to the survey would not impact their admissions status.

Future Research

The theory of planned behavior measures used in this study in conjunction with the professional commitment measures could be used as potential screening methods for pharmacy school applicants. However, scores on such measures first must be linked to adequate or desirable levels of such attitudes. Further testing of measures should include validation with a number of "ideal pharmacist" characteristics. The scores of potential applicants could be compared to these scores, and the differences and/or similarities could be used as support in modifying curriculum. Educators also could revise course content to include more information and activities for students on topics related to lower scores identified by the survey instrument.

Traditional admission criteria, such as GPA and recommendation letters, provide a restricted view of potential success in pharmacy school. Characteristics such as professional commitment, confidence, and adaptive attitude were evaluated in a study by Auburn University during informal interactions with multiple pharmacy school faculty and staff members, in addition to self-assessment questions to improve candidate assessment for pharmacy school admission.[31] Future research could focus on developing a more complete inventory of attitudes and personality traits prevalent among successful patient-centered care practitioners. These types of data could provide information not only for admission decisions, but also for instruction in colleges and schools of pharmacy to advance the practice of pharmacy.

Further studies need to be conducted to evaluate students' perceptions of the role of pharmacists and to validate constructs in the model. A nationwide survey instrument for prepharmacy students, as well as one for students throughout the entire educational curriculum, could be used to ascertain changes in perceptions among prepharmacy and pharmacy students. A cross-sectional view of specific levels (eg, P1 through the P4years) within the curriculum also could provide useful information at individual colleges concerning the impact of pharmacy experiences and educational courses upon students' perceptions. Dependent upon findings from future studies, faculty members could modify course curriculum and content to coordinate with goals such as professional commitment and attitudes toward the profession. Further research also could be conducted using the instrument to examine the influence of implemented interventions on students' perceptions.

CONCLUSION

The primary purpose of the study was to evaluate prepharmacy students' perceptions of the professional role of pharmacists, and their association with student demographics and work experience. GPA and application to pharmacy school were associated with significant differences for the theory of planned behavior and professional commitment subscales. Employment related to pharmacy studies show a significant difference for the theory of planned behavior subscales as well. The study results have implications for evaluating, modifying, and developing admissions criteria and professional curricula at colleges and schools of pharmacy. The interaction between pharmacy practice and education encourages discretion in the selection of students to occupy a limited number of spaces in schools or practice sites. The use of attitudinal and perceptional measures may be 1 method, in addition to others, to assist admissions committees in the selection of potential pharmacy students and future practitioners.

REFERENCES

1. Austin Z, Collins D, Remillard A, Kelcher S, Chui S. Influence of attitudes toward curriculum on dishonest academic behavior. *Am J Pharm Educ.* 2006;70(3):Article 50.
2. Draugalis JR, DiPiro JT, Zeolla MM, Schwinghammer TL. A career in academic pharmacy: opportunities, challenges, and rewards. *Am J Pharm Educ.* 2006;70(1):Article 17.
3. Maine LL. 2002 Report of the board of directors to the AACP House of Delegates. *Am J Pharm Educ.* 2002;66(Supp):1S-7S.
4. Penna RP. Report of the board of directors. *Am J Pharm Educ.* 2001;65(Supp):1S-6S.
5. Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree, Accreditation Council for Pharmacy Education. www.acpe-accredit.org/standards/default.asp. Accessed September 8, 2010.
6. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm.* 1990;47(3):533-543.
7. Educational Outcomes 2004, Center for the Advancement of Pharmaceutical Education Outcomes, American Association of Colleges of Pharmacy. http://www.aacp.org/resources/education/Documents/CAPE2004.pdf. Accessed September 8, 2010.
8. Cline RR, Mott DA, Schommer JC. Relationship between attitudes, demographics, and application decisions among prepharmacy students: an exploratory investigation. *Am J Pharm Educ.* 1999;63(4):394-401.
9. Odedina FT, Segal R, Helper CD. Providing pharmaceutical care in community practice: differences between providers and nonproviders of pharmaceutical care. *J Soc Admin Pharm.* 1995;12(4):170-180.
10. Anderson DC, Sheffield MC, Hill AM, Cobb HH. Influences on pharmacy students' decision to pursue a doctor of pharmacy degree. *Am J Pharm Educ.* 2008;72(2):Article 22.
11. Chisholm MA, Wade WE. Factors influencing students' attitudes toward pharmaceutical care. *Am J Health-Syst Pharm.* 1999;56(22):2330-2335.
12. Chisholm MA, Martin BC. Development of an instrument to measure student attitudes concerning pharmaceutical care. *Am J Pharm Educ.* 1997;61(4):374-379.
13. Siracuse MV, Schondelmeyer SW, Hadsall RS, Schommer JC. Assessing career aspirations of pharmacy students. *Am J Pharm Educ.* 2004;68(3):Article 75.

14. Lobb WB, Shah M, Kolassa EM. Factors influencing the selection of a major: a comparison of pharmacy and nonpharmacy undergraduate students. *J Pharm Teach.* 2004;11(2):45-63.
15. Fjortoft NF, Lee MWL. Developing and testing a model of professional commitment. *Am J Pharm Educ.* 1994;58(Winter):370-378.
16. Duncan-Hewitt WC. Designing admissions criteria: a framework. *Am J Pharm Educ.* 1996;60(2):109-121.
17. Ajzen I. The theory of planned behavior. *Organ Behav Hum Dev.* 1999;50(2):179-211.
18. American Association of Colleges of Pharmacy Commission to Implement Change in Pharmaceutical Education. Entry-level education in pharmacy: a commitment to change. *Am J Pharm Educ.* 1993;57(4):366-374.
19. Ajzen I. Constructing a TPB questionnaire: conceptual and methodological considerations. http://people.umass.edu/aizen/pdf/tpb.measurement.pdf. Accessed September 8, 2010.
20. Lawrence L, Sherman J, Adams E, Gandra S. Pharmacy students' perceptions of pharmaceutical care in retail and clinic settings. *Am J Pharm Educ.* 2004;68(1):Article 4.
21. Thomas SG, Beck DE, Janer A. Effect of a continuous community pharmacy practice experience on student attitudes, motivation, and communication skills. *Am J Pharm Educ.* 1997;61(2):125-131.
22. Beardsley RS, Kimberlin CL, Tindall WN. *Communication Skills in Pharmacy Practice.* 5th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2005.
23. Blau GJ. The measurement and prediction of career commitment. *J Occup Psychol.* 1985;58(4):277-288.
24. Blau GJ. Further exploring the meaning and measurement of career commitment. *J Vocat Behav.* 1988;32(3):284-297.
25. Nunnally JC. *Psychometric Theory.* 2nd ed. New York, NY: McGraw-Hill; 1978.
26. Wolfgang AP, Ortmeier BG. Career commitment, career plans, and job-related stress: a follow-up study of pharmacy students as pharmacists. *Am J Pharm Educ.* 1993;57(1):25-28.
27. Manasse HR, Stewart JR, Hall RH. Inconsistent socialization in pharmacy: a pattern in need of change. In: *Pharmacy Practice: Social and Behavior Aspects.* Baltimore, MD: University Park Press; 1981:27-36.
28. Gaither CA, Mason HL. A model of pharmacists' career commitment, organizational commitment and job withdrawal intentions. *J Soc Admin Pharm.* 1992;9(7):75-85.
29. Gaither CA, Mason HL. Pharmacists and career commitment, career withdrawal intention, and career change. *J Pharm Mark Manage.* 1994;8(1):187-205.
30. Cooksey JA, Knapp KK, Walton SM, Cultice JM. Challenges to the pharmacist profession from escalating pharmaceutical demand. *Health Affair.* 2002;21(5):182-188.
31. American Association of Colleges of Pharmacy. Honoring excellence in assessment. *Acad Pharm Now.* Apr/May/June 2009;25.