

On the Correlation Between Knowledge and Satisfaction in Pre-Professional Pharmacy Advising

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This manuscript assesses the relationship between perceptions of advising effectiveness and actual knowledge related to gaining admission into North Dakota State University's Doctor of Pharmacy program. The survey developed by Shields (1995) and revised by Davis, Haugen and Friesner (2015) was used to measure satisfaction with advising. This survey was supplemented with a series of items that characterize knowledge of the NDSU Doctor of Pharmacy admissions process. Using descriptive and inferential statistics, we find that overall advising satisfaction was statistically associated with specific knowledge questions. However, no statistically significant association exists between advising satisfaction and knowledge of the admissions process.

The “quality” of academic advising is characterized by two primary constructs: student satisfaction and student responsibility (Metzer, 1989; Light, 2001). An accessible and friendly advisor who builds a rapport with students will be able to provide general information, encouragement and frank assessments of student readiness for admission to professional programs, in a manner that students perceive as useful and welcome. Advisors can assist students in learning more about the various health care professions by encouraging their membership in pre-health professions clubs, directing them to relevant literature on the profession, introducing them to individual practitioners, or organizing activities or course experiences in the health care setting (Gordon, 1996). Hunter and White (2004) added that academic advising can help students to shape meaningful learning experiences, thus encouraging achievement of educational, career, and life goals. As a result, students are more likely to be satisfied with their advising experience. The second construct, student responsibility, characterizes the degree to which students implement the guidance provided by their academic advisor(s), and by extension place themselves on a trajectory that leads to academic success.

Many students enter college with the dream of becoming a healthcare provider. Careers in healthcare offer a variety of options to students. Whether they are interested in becoming a pharmacist, physician, or physical therapist; healthcare offers a plethora of options based on how involved in direct patient care one wants to be, and in what setting they choose to practice. The healthcare industry is projected to add more jobs—over 4 million—than any other industry between 2012 and 2022, according to the U.S. Bureau of Labor Statistics (Bureau of Labor Statistics, 2014). Health professions however are unique among entry-level college degree programs in that many of these programs not only have pre-professional admission requirements but also (to ensure adequate clinical training sites can be provided) competitive admissions

processes (Haugen, Davis, & Friesner, 2015). Within pre-professional health programs, an intermediate measure of academic success is successful admission to the professional program of the student's choosing. Hence, academic advising for these students focuses directly (and indirectly) on preparing students for the admission process. This paper defines readiness for admission as its primary measure of successful, "systematic academic progress" (Kramer and Gardner, 1977). Hence, any assessments of the quality of pre-professional health care academic advising, inclusive of student satisfaction and student responsibility indicators, must be framed within this general goal. In a recent paper, Davis, Haugen, and Friesner (2015) adapted Shield's (1995) SERVQUAL methodology to measure the quality of academic advising within the context of a pre-professional Doctor of Pharmacy curriculum. The authors created a 13 question, 28 item survey which captures the most salient features of service quality, inclusive of both student satisfaction and (self-reported) student readiness to take responsibility for their academic development. They identified two underlying drivers of quality advising: short term advising needs and long term academic planning.

According to Kelley (2008), the assessment of academic advising is not as advanced as that of classroom learning. Historically, measurement of advising outcomes focused on student satisfaction with the advisor or advising system rather than on student success. Although student satisfaction is important (Propp and Rhodes, 2006), evaluating the effectiveness of advising efforts requires significantly more than gauging student satisfaction. Hemwall and Trachte (2003) suggested that viewing advising as a learning process allows assessment of specific outcomes that can be linked to student achievement. Thus, investigating the relationship between advising and student achievement can reveal how advising helps students develop the skills and knowledge necessary for success (Young-Jones, Burt, Dixon, and Hawthorne, 2013). Noticeably absent from their analysis is a measure of actual student knowledge about the admissions process. Such knowledge is important, both as a final measure of actual (rather than perceived) readiness for admission, but also as a means to better understand perceptions of advising quality, whether characterized as student satisfaction and student responsibility or as short term advising needs and long term academic planning. More pragmatically, an understanding of student knowledge about the admissions process provides crucial feedback to professional advisors on adjusting the content and delivery of advising services to improve advising outcomes. While many colleges of pharmacy interview students as part of their admission's requirement, most schools require each student to achieve a minimum pre-pharmacy GPA and PCAT score to be considered for an interview (Chisholm, 1999), placing high importance on quality academic advising. Since admission requirements, both across health professions and within a single health profession, vary across programs, a pragmatic approach also requires (as an initial pilot study) that such an analysis be conducted within the context of a single institution. This facilitates future work to generalize the results of the pilot study to other academic settings.

This manuscript assesses both perceptions and actual knowledge related to gaining admission into North Dakota State University's (NDSU's) Doctor of Pharmacy program. Entry requirements are similar (but not identical) to the vast majority of courses required for admission at other Doctor of Pharmacy programs in the U.S., as well as other post-graduate health professions programs (medicine, physician assistant, dentistry, etc.). The survey developed by Shields (1995) and revised by Davis, Haugen, and Friesner (2015) is used to measure satisfaction with advising. This survey was supplemented with a series of items that characterize the respondent's knowledge of the NDSU Doctor of Pharmacy admissions process. Descriptive and inferential statistics were used to assess the relationship between advising satisfaction and knowledge of the admissions process.

The remainder of this paper proceeds as follows. The next section describes the empirical methodology, inclusive of survey design, sampling, and data analysis, used to assess the advising satisfaction-knowledge relationship. The third section contains the empirical results, while the fourth section discusses those results. The final section concludes the paper by summarizing its key findings, identifying major study limitations, and providing some directions for future research.

METHODOLOGY

The Setting

The Doctor of Pharmacy program at North Dakota State University (NDSU) consists of two components. The first component, known as “pre-professional” studies, consists of approximately 76-77 academic credits, and takes students either two or three years to complete (see https://www.ndsu.edu/pharmacy/pharmd/prepharm_curriculum/ for the actual list of “core” pre-pharmacy courses). These credits cover the biological (i.e., anatomy and physiology, cell biology), physical (i.e., chemistry, mathematics, physics, etc.), and social (i.e., communications, economics, etc.) sciences that form a foundation for the science and practice of pharmacy.

Students who complete this coursework (and satisfy other, related requirements), may apply for admission to the “professional” component of the Doctor of Pharmacy program, which lasts another four years. During the professional component, students build upon their pre-professional studies, with specific foci on the knowledge, skills and abilities necessary to practice pharmacy. The latter includes both advanced applications in the science of drug development and delivery (pharmacology, medicinal chemistry, physical pharmacy, kinetics, etc.) as well as the science of therapy (i.e., various applications of therapeutics, pharmacy administration, evidence-based practice, drug literature evaluation, etc.). Practical (vocational) and experiential skill development is strategically placed throughout the first three years of the professional curriculum (i.e., Introductory Pharmacy Practice Experiences, or IPPEs), while the final year is entirely experiential in nature (i.e., Advanced Pharmacy Practice Experiences, or APPEs). At the end of these 6-7 years, the student graduates from NDSU with a Bachelor of Science in Pharmaceutical Sciences degree and a Doctor of Pharmacy degree. The latter qualifies students to sit for national and state licensure requirements, and ultimately to practice as a registered pharmacist.

The crux of this paper focuses on the pre-professional component of the curriculum. In recent years, students at NDSU who have been admitted to the professional component of the Doctor of Pharmacy program typically have on average, a grade point average between 3.60 and 3.70 in their primary pre-professional pharmacy coursework, a cumulative score on the Pharmacy College Admissions Test (PCAT) that ranks in the 66 percentile or higher, apply as a sophomore if they are on the two year track or as a junior if on the three year track, and have a backup plan in place if they are not accepted into the professional program that year. These characteristics are examples of a pre-professional pharmacy student who demonstrates “readiness” for pharmacy school. These students have obtained the crucial knowledge about the admissions process needed to gain admission into the professional program.

The primary goal of pre-professional academic advising in this context is to prepare pre-professional pharmacy students for this process. Advising begins when a student registers for courses as a first-year student and continues in Pharmacy Practice 189: Skills for Academic Success. All first-year students at NDSU (who have earned 24 or fewer college credits), and who have declared an interest in the professional pharmacy program, are required to complete this 1 credit, 8-week course. The course is taught by faculty and staff affiliated with the Doctor of Pharmacy program and covers basic study and time management skills that are necessary to become a professional pharmacy student. Perhaps more importantly, approximately 30 percent of the course content is devoted to preparing students for the admissions process. Instructors cover the pre-professional curricula, admissions criteria, informal curricular requirements, and preparing a backup plan if not admitted. At the end of the course, students have a complete understanding of the admission requirements. They have a plan (approved by the instructor and their academic advisors) that maps out all required pre-professional pharmacy courses and the semester in which they are to be completed. Students also have a “backup plan” which covers a contingency course of action should a student fail to be admitted into the professional component of the NDSU Doctor of Pharmacy program. Cumulatively, students in the pre-professional program should have a comprehensive understanding of the admission requirements by the end of their first eight weeks at NDSU. This understanding is subsequently reinforced through regular meetings with the student’s advisor, through participation in the pre-professional pharmacy student study group, and through

participation in various pharmacy-related student organizations sponsored by the NDSU School of Pharmacy.

Hypothesis Development

The central premise of this manuscript is to assess the relationship between what pre-professional pharmacy students actually know about the pharmacy admissions process and their overall satisfaction with advising. The previous discussion indicates that all students should have a detailed understanding of the requirements of admissions process after their first eight weeks at NDSU. They also have met with their academic advisors on multiple occasions, and should be able to conceptualize their satisfaction with advising services offered to them. Various studies conducted within the pharmacy literature suggest only a tenuous link between student competencies and perceptions (for example, see Naughton and Friesner, 2012). Moreover, if a directional relationship exists, it may be possible for the relationship to be positive or negative since students may develop false expectations, exhibit over or under-confidence, or misinterpret information about the admissions process. Advisors may also provide students meaningful feedback that students do (if positive) or do not (if negative) want to hear. Hence, we assume a null of ignorance and postulate the following:

H₀: No relationship (or correlation) exists between student advising satisfaction and actual knowledge of the admissions process.

H_A: Not H₀.

Instrument Design

Actual admissions knowledge and advising satisfaction are measured via survey techniques. The survey used in this study is provided in the paper's appendix, and it consists of three sections. The first section collects basic student demographic information, including a student's grades, the frequency with which students sought out advising, and the questions asked during advising appointments. We define "academic" readiness as having a "core" grade point average in excess of 3.50. We define "professional" readiness as the appropriate use of advising, perceived readiness for pharmacy school, the development of a backup plan if not accepted into pharmacy school, and commitment to pharmacy as an academic major.

The second section utilizes Davis, Haugen, and Friesner's (2015) items to assess perceptions of advising quality. The perceived support and basic needs questionnaires incorporated a Likert scale from 1 to 5 (where 1 = *Strongly Disagree* and 5 = *Strongly Agree*). The constructs identified by Davis, Haugen and Friesner (2015) are used as baseline scales characterizing overall perceived advising quality. To ensure that these constructs remain valid in the current research setting, Davis, Haugen, and Friesner's (exploratory factor analysis) methodology is also re-applied to the current data. If that methodology indicates that the components of advising satisfaction are different in the current data, the original scale formulations and the new, alternative scales will be correlated with actual knowledge to ensure generalizability. That is, we repeat all empirical analyses twice using both methods of scale development.

In the final section, students are asked to analyze seventeen statements about the NDSU Doctor of Pharmacy admissions process and respond whether those statements are accurate (or true), might be accurate (more information is required to provide a definitive response), or are inaccurate (or false). The survey has a relatively even mix of accurate (items 2, 5, 8, 9, 12, 15 and 17) and inaccurate (items 1, 4, 6, 7, 10, 11, and 16) responses, with slightly fewer statements that may or may not be accurate (items 3, 13, and 14). Actual knowledge was assessed using both the proportion of correct responses over the entire set of items, as well as binary indicators of whether or not students correctly responded to specific items. Participants were also given the opportunity for additional comments.

Data Analysis Methodology

Davis, Haugen, and Friesner (2015) used exploratory factor analysis methods to identify the underlying constructs that characterize advising satisfaction. More specifically, their analysis used principal components extraction with Varimax rotation to identify latent themes within the data (Hair, et

al., 2006). Their analysis identified one dominant factor and one secondary factor (whose eigenvalue was slightly less than the traditional cutoff of one for a “significant” latent factor). The second measured long run advising needs (the mean of the survey items “My advisor has assisted me in developing a long-term education plan,” “After meeting with my advisor, I feel like I am better prepared to gain admission into the professional program,” “My advisor helps me make important decisions,” and “Next semester, I plan to meet with my advisor to discuss any career planning course scheduling or other advising issues”). All other items were captured by the first, primary construct measuring immediate advising needs (Davis, Haugen, and Friesner, 2015). As noted above, the current analysis constructs advising satisfaction scales in two ways. The first is to simply take the means of the questions that Davis, Haugen and Friesner (2015) identified as loading onto a specific latent factor/construct. This implicitly assumes that their data is comparable to those used in the current study. Second, we apply their methodology to the new data and use whatever scales are identified by that methodology.

After described the methodology to characterize overall advising satisfaction and presented our measures of knowledge about the admissions process, testing of the null hypothesis can be implemented in a straightforward fashion. The relationship between the total knowledge metric and the overall advising satisfaction constructs can be characterized using Pearson and Spearman correlations. Analysis of Variance and Kruskal-Wallis tests can be used to assess mean differences in each of the advising satisfaction metrics (whether the overall scales or specific satisfaction questions) across students who did, and did not, answer specific knowledge-oriented questions correctly. Analysis of variance and Kruskal-Wallis tests can also be used to assess mean differences in advising satisfaction based on students who fit into specific demographic categories. In all cases, a 5 percent significance level is employed. All data analysis were conducted using the IBM SPSS Statistics Version 23 software package.

Sampling Design and Procedures

This survey was administered late in the fall of 2015 to the entire universe of pre-professional pharmacy students currently enrolled at North Dakota State University (387 students). The survey was timed to be delivered to the pre-pharmacy students after they had met with their advisor for advising on spring registration. Participants who completed the survey consisted of pre-pharmacy college students ranging from freshmen to juniors, including traditional students and non-traditional students, and transfer students ($N=100$; 26 percent response rate). Participants were able to utilize a web link, sent to them via email, to complete the survey. This email was initially sent out on November 18, 2015. It was subsequently sent out again on December 17, 2015, along with a reminder and link being placed on the pre-pharmacy Facebook page on December 16, 2015, and December 23, 2015. After giving their informed consent, they received a questionnaire that could be completed in approximately 10 minutes (no time limit was imposed). The NDSU Institutional Research Board approved the methods used in this study.

RESULTS

Advising Satisfaction Scales

Appendix 2 contains the results from the replication of the Davis, Haugen, and Friesner (2015) factor analysis. The reader is referred to the aforementioned manuscript for the details of their methodology. Both the KMO measure of sampling adequacy and the Bartlett test of sphericity indicate that the data are amenable to factor analysis. Principal component extraction yields one “significant” eigenvalue (whose value is 6.407) that explains approximately 58 percent of the variation in the data. The next largest eigenvalue is 0.874. Thus, while the data is generally consistent with the Davis, Haugen, and Friesner (2015) study (who extracted two eigenvalues with magnitudes 6.642 and 0.936, respectively, explaining 60.378 and 8.505 percent of variation in the data, respectively), the data in the current study more strongly supports the extraction of a single latent factor of advising effectiveness, rather than two latent factors. Within the current data, factor loadings for each satisfaction item load onto the latent factor with loading weights in excess of 0.500, indicating that all survey items contribute meaningfully to the latent

factor. Hence, we construct a single advising effectiveness scale using the mean of all satisfaction items. This variable is identified as “Scale” in the forthcoming results. Given the general similarity in eigenvalue extraction, it is also reasonable to create the two alternative scales measuring immediate advising needs (denoted as “SRScale”) and long run planning needs (denoted as “LRScale”), as constructed in the Davis, Haugen, and Friesner (2015) study. As noted in the final table of Appendix 2, regardless of scale development, the inter-item correlation matrices and Cronbach’s alpha values indicate high degrees of internal reliability.

Descriptive Statistics

Table 1 contains the names, descriptions and descriptive statistics (means and standard deviations for quantitative variables, sample proportions for binary variables) for each of the variables used in the analysis. Each of the advising scales exhibit mean values of between 4.670 and 4.710 (on a five-point scale), with standard deviations of between 0.427 and 0.477, suggesting high overall levels of advising satisfaction.

Over the 17 knowledge items, students correctly addressed, on average, 9.630 of the 17 items. The questions most frequently answered incorrectly include items 10 (an ethics exam is administered on interview day; sample proportion: 0.100) and 3 (the PCAT exam is as important as grades earned in core courses; sample proportion: 0.140). Items most frequently answered correctly include 8 (interviews evaluate communication skills; sample proportion: 0.950) and 16 (personal and religious values impact the odds of acceptance; sample proportion: 0.900).

Of the 100 students returning a completed survey, 47 percent reported a grade point average between 3.50 and 4.00; a statistic that is generally consistent with the underlying student population, as well as previously discussed admission statistics. Students report, on average, 1.480 conversations with her/his advisor via email, 1.080 office visits, and 0.080 telephone conversations. The mean number of issues discussed in a given meeting is 2.860. The most commonly reported topics of discussion include academic planning (sample proportion: 0.980) and course scheduling (sample proportion: 0.790). The most infrequently reported topics of discussion include other non-academic issues (sample proportion: 0.030), stress management (sample proportion: 0.050) and general non-academic issues (sample proportion: 0.060).

Students also report a number of elements in their backup plans, which are consistent with the elements emphasized by advisors. The most frequently reported elements include reapplying the NDSU’s program the following year (sample proportion: 0.870), apply to other pharmacy schools (sample proportion: 0.670) and change one’s major (sample proportion: 0.540). Only 3 percent or fewer of students report no need, no intent nor no existence of a backup plan.

Correlation Analysis

Table 2 contains Pearson (Panel A) and Spearman (Panel B) correlations between the advising satisfaction scales and the overall student knowledge scores. The signs, magnitudes and statistical significance of the parametric (Pearson) and non-parametric (Spearman) correlations are similar; hence, we focus primarily on the Pearson correlations. The student knowledge score is not correlated with any satisfaction scale at any reasonable significance level. In fact, the largest correlation (in absolute value) is 0.030, between the knowledge score and the immediate advising needs satisfaction scale. As expected, the three advising satisfaction scales are all highly correlated, positive and statistically different from zero, with Pearson correlations of 0.830 or higher. Thus, we fail to reject our study’s null hypothesis.

Analysis of Mean Differences

Table 3 supplements Table 2 by assessing mean differences in the single, cumulative advising satisfaction scale based on whether a student answered a particular content question correctly or incorrectly. Analysis of variance and Kruskal-Wallis (non-parametric analysis of variance) tests indicate that, with the exception of question 6 (letters of reference are required in the pharmacy admissions process), no mean differences exist in overall advising satisfaction and knowledge of the admissions

process. With regard to question 6, students who answered the question incorrectly reported slightly higher mean satisfaction levels (4.790) compared to those students who answered the questions correctly (4.590).

Tables 4 and 5 replicate the analysis of Table 3, disaggregating the single advising satisfaction scale with short run (Table 4) and long run (Table 5) advising satisfaction scales. The results are highly consistent with the overall scale. In Table 4, with the exception of knowledge item number 6, no statistically significant differences exist in SRScale based on knowledge of the admissions process. Within question 6, students who incorrectly answered the reference letter question exhibited higher mean satisfaction scores (4.800) compared to those who correctly answered the question (4.610).

Table 5 examines the long run advising satisfaction scale, and again finds that students who answered question 6 incorrectly had higher mean satisfaction scores (4.770) compared to those who correctly answered the question (4.550). One interesting difference between Table 5 and Tables 3 and 4 lies in an analysis of students who correctly or incorrectly answered question 12 (job shadowing experience is unnecessary for admission). While parametric analysis of variance only suggests significance at the 10 percent level (prob. 0.052), the Kruskal-Wallis test indicates that at the 5 percent level (prob. 0.029) that students answering this question incorrectly had higher mean long run planning satisfaction scores (4.800) compared to those who answered the question incorrectly (4.610).

Table 6 characterizes mean differences in a student's knowledge of the admissions process by student demographics, advisor use, and backup plans. At the 5 percent significance level, both parametric and non-parametric analysis of variance test identify no mean differences in student knowledge across any student-specific characteristic. Thus, what a student knows, or does not know, about the admissions process is consistent across student sub-types. At the 10 percent level, parametric analysis of variance suggests that students who discuss possible involvement in pharmacy organizations (means: 10.570 versus 9.480), as well as those who discuss the admissions process with their advisor (means: 10.000 versus 9.330) answer approximately one more question correctly than their counterparts.

DISCUSSIONS AND CONCLUSIONS

Discussion

The primary purpose of this paper is to present a pilot study examining whether a significant relationship exists between student satisfaction with advising services and actual knowledge about the admissions process – a crucial outcome-oriented measure of effective advising in a health professions setting. Our conclusions are fourfold. First, pre-professional pharmacy students are largely satisfied with the quality of advising services they receive from NDSU's pre-professional pharmacy advisors.

Second, students are generally knowledgeable about NDSU's pharmacy admissions process, as they are able to answer nearly 10 of 17 possible questions about the process correctly. Third, there are several content-oriented questions that students answered incorrectly, and which may require greater emphasis by professional advisors. Students commonly misinterpret the importance given to the PCAT exam relative to grades earned in required pre-professional pharmacy courses. This is not surprising, given that the PCAT exam is a much higher stakes assessment, over which students feel that they have less control. Grades earned in courses are earned a longer time frame (not a single day) and over multiple assessments. Hence, students may misinterpret (and over-emphasize) the relative importance of the PCAT exam because of these considerations. Students also falsely believe that the pharmacy program required a test of one's ethics as a part of the admissions process. This is an artifact of the program's history. Until approximately 2011, the pharmacy program used the Defining Issues Test (DIT: <http://ethicaldevelopment.ua.edu/dit-and-dit-2/>); a test of reasoning in ethical decision-making as a part of its admissions process. In 2012, the program replaced the DIT with the Health Sciences Reasoning Test (HSRT: <http://www.insightassessment.com/Products/Products-Summary/Critical-Thinking-Skills-Tests/Health-Sciences-Reasoning-Test-HSRT>); a test that measures critical thinking in health-related contexts. Despite the fact that the change was made nearly five years ago (and has been emphasized by the program repeatedly in open forums), the perception of the HSRT as an ethics test remains.

Lastly, we find virtually no empirical evidence to suggest a link between student advising satisfaction and their preparation for the admissions process. Thus, satisfaction and knowledge, the two core elements of effective advising, appear to be a distinct phenomenon in the NDSU pre-professional pharmacy program. Moreover, what few statistically significant ties between advising satisfaction and actual knowledge exist are negative in nature. Students who have less knowledge exhibit higher advising satisfaction scores. The implication for practice improvement is that advisors should work to alleviate gaps in student knowledge without the concern that student satisfaction with their advising (even in situations where advisors must give students “bad news”) will decline.

Limitations

The primary limitation of this study is that it was a pilot study conducted during a single semester, at a single academic institution, in a single health professions program. The usual limitations of such studies, especially those related to external generalizability, apply here. Replications of this study in other health professions programs, at different points in time, and at different universities, may find disparate results. While our study is unique in its focus and hypotheses, it is, therefore, vital that our results be viewed as exploratory, until future studies establish the generalizability (or lack of generalizability) of the current results.

A second limitation of the current study is that the formation of advisor satisfaction was slightly different than what was found previously in the literature. Future studies that examine advising satisfaction in more generalizable contexts would provide valuable insights into the most empirically valid and reliable means with which to characterize student satisfaction with advising.

Third, the data used in this analysis was derived from low-stakes, self-reported survey data. The self-reported nature of the data, combined with a marginally useful response rate (just under 30 percent), suggests that response bias may be a concern. Future research that used different data collection methods, and in a higher-stakes environment, may find more meaningful results.

Conclusion

In this paper, we assessed the relationship between student knowledge provided by academic advisors and their satisfaction with advising. We find no evidence to suggest that there is any meaningful relationship between these two outcomes of successful advising.

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TABLE 1
DESCRIPTIVE STATISTICS

<u>Variable</u>	<u>Description</u>	<u>Mean</u>	<u>Std. Dev.</u>
Student Satisfaction Scales			
SRScale	Scale Measuring Short Run Advising Needs	4.710	0.428
LRScale	Scale Measuring Long Run Academic Planning Needs	4.670	0.477
Scale	Combined Advising Satisfaction Scale	4.700	0.427
Student Knowledge of the Admissions Process			
Score	Student's cumulative knowledge of the NDSU pharmacy admissions process	9.630	2.003
Binary Indicators of Correctly Answering a Specific Question			
Q1c	Core classes are the only classes that matter to be accepted into NDSU's professional program.	0.550	0.500
Q2c	The admission committee considers grades earned in non-core classes when making admission decisions.	0.430	0.498
Q3c	The PCAT score is just as important as grades earned in core classes.	0.140	0.349
Q4c	NDSU's pharmacy admissions process will allow you to take the PCAT as many times as you would like.	0.560	0.499
Q5c	Core classes must be completed by the time you apply to NDSU's professional program.	0.650	0.479
Q6c	You need reference letters along with the application.	0.450	0.500
Q7c	The pharmacy admission committee uses the highest subsection scores from all of your PCAT exams to compile your composite score.	0.380	0.488
Q8c	NDSU Pharmacy admissions interviews are used to evaluate my communication skills.	0.950	0.219
Q9c	NDSU Pharmacy admissions interviews are used to evaluate my teamwork skills.	0.830	0.378

Q10c	NDSU's pharmacy program requires applicants to take an ethics exam on interview day.	0.100	0.302
Q11c	If you receive an invitation to pharmacy interview day, you will be accepted into the professional pharmacy program.	0.570	0.498
Q12c	NDSU's pharmacy program accepts applicants who do not have pharmacy job shadow or work experience.	0.680	0.469
Q13c	If you have violated the College's conduct policy, you will not be admitted into NDSU's pharmacy program.	0.490	0.502
Q14c	NDSU Pharmacy admissions interviews are used to evaluate my ability to express empathy.	0.310	0.465
Q15c	NDSU Pharmacy admissions interviews are used to evaluate my self awareness.	0.810	0.394
Q16c	My personal values and religious beliefs will impact my chances of gaining admission to NDSU's pharmacy program.	0.900	0.302
Q17c	The admissions committee gives preference to North Dakota residents and North Dakota University System students.	0.830	0.378
Student Demographics			
GPA4	Binary variable indicating that a student's grade point average is between 3.5 and 4.0	0.470	0.502
AdNPhone	Number of times a student has telephoned her/his advisor	0.080	0.307
AdNEmail	Number of times a student has emailed her/his advisor	1.480	0.785
AdNMeet	Number of times a student has met in person with her/his advisor	1.080	0.394
NoIssues	Number of issues a student discussed with an advisor	2.860	1.247
Binary Indicators of Topics Discussed with an Advisor			
Curric	Curricular planning and course scheduling	0.790	0.409
AcPlan	Academic planning	0.980	0.141
Intern	Internship opportunities	0.220	0.416
Study	Study Tips	0.140	0.349
Orgs	Student organizations	0.140	0.349
Admission	Admissions process	0.450	0.500
Stress	Stress management tips	0.050	0.219
NonAcad	Non-academic issues	0.060	0.239
Other	Other issues	0.030	0.171
Binary Indicators of Student Backup Plans			
BUOSchl	Apply to other pharmacy programs	0.670	0.473
BURAp	Reapply to NDSU's pharmacy program	0.870	0.338
BUChgM	Change major	0.540	0.501
BUDIntend	No backup plan exists, but the student intends to create one	0.030	0.171
BUDNeed	No backup plan exists, and the student doesn't feel the need to create one	0.030	0.171
BUDHave	No backup plan exists	0.030	0.171
Number of Observations		100	

**TABLE 2
BASIC CORRELATIONS**

Panel A: Pearson Correlations

	Score	SRScale	LRScale	Scale
Score	-	0.030	-0.005	0.017
SRScale	0.030	-	0.830	0.974
LRScale	-0.005	0.830	-	0.935
Scale	0.017	0.974	0.935	-

Panel B: Spearman Correlations

	Score	SRScale	LRScale	Scale
Score	-	-0.014	-0.057	-0.028
SRScale	-0.014	-	0.792	0.941
LRScale	-0.057	0.792	-	0.923
Scale	-0.028	0.941	0.923	-

Italicized font indicates two-sided statistical significance at the 5% level or better.

**TABLE 3
ANALYSIS OF ADVISING SATISFACTION BY KNOWLEDGE ITEM**

Descriptive Statistics for Scale Based on Students who:

Variable	Answered Question Incorrectly			Answered Question Correctly			ANOVA	Kruskal-Wallis
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	Prob.	Prob.
Q1c	45	4.630	0.489	55	4.750	0.365	0.178	0.382
Q2c	57	4.630	0.475	43	4.780	0.341	0.087	0.138
Q3c	86	4.690	0.434	14	4.740	0.397	0.693	0.747
Q4c	44	4.670	0.379	56	4.720	0.464	0.553	0.173
Q5c	35	4.670	0.426	65	4.710	0.430	0.664	0.267
Q6c	55	4.790	0.346	45	4.590	0.492	0.021	0.024
Q7c	62	4.730	0.381	38	4.650	0.495	0.387	0.617
Q8c	5	4.550	0.630	95	4.710	0.417	0.415	0.886
Q9c	17	4.610	0.488	83	4.720	0.415	0.351	0.541
Q10c	90	4.720	0.417	10	4.510	0.496	0.141	0.075
Q11c	43	4.690	0.467	57	4.700	0.398	0.856	0.545
Q12c	32	4.800	0.366	68	4.650	0.448	0.108	0.101
Q13c	51	4.640	0.446	49	4.760	0.402	0.165	0.138
Q14c	69	4.720	0.413	31	4.640	0.458	0.358	0.204
Q15c	19	4.650	0.470	81	4.710	0.419	0.556	0.352
Q16c	10	4.730	0.400	90	4.690	0.432	0.822	0.907
Q17c	17	4.730	0.349	83	4.690	0.443	0.760	0.860

TABLE 4
ANALYSIS OF ADVISING SATISFACTION BY KNOWLEDGE ITEM

**Descriptive Statistics for Scale Based on
Students who:**

Classification Variable	Answered Question Incorrectly			Answered Question Correctly			ANOVA	Kruskal- Wallis
	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Prob.</u>	<u>Prob.</u>
Q1c	45	4.630	0.489	55	4.750	0.365	0.178	0.382
Q2c	57	4.630	0.475	43	4.780	0.341	0.087	0.138
Q3c	86	4.690	0.434	14	4.740	0.397	0.693	0.747
Q4c	44	4.670	0.379	56	4.720	0.464	0.553	0.173
Q5c	35	4.670	0.426	65	4.710	0.430	0.664	0.267
Q6c	55	4.790	0.346	45	4.590	0.492	0.021	0.024
Q7c	62	4.730	0.381	38	4.650	0.495	0.387	0.617
Q8c	5	4.550	0.630	95	4.710	0.417	0.415	0.886
Q9c	17	4.610	0.488	83	4.720	0.415	0.351	0.541
Q10c	90	4.720	0.417	10	4.510	0.496	0.141	0.075
Q11c	43	4.690	0.467	57	4.700	0.398	0.856	0.545
Q12c	32	4.800	0.366	68	4.650	0.448	0.108	0.101
Q13c	51	4.640	0.446	49	4.760	0.402	0.165	0.138
Q14c	69	4.720	0.413	31	4.640	0.458	0.358	0.204
Q15c	19	4.650	0.470	81	4.710	0.419	0.556	0.352
Q16c	10	4.730	0.400	90	4.690	0.432	0.822	0.907
Q17c	17	4.730	0.349	83	4.690	0.443	0.760	0.860

TABLE 5
ANALYSIS OF ADVISING SATISFACTION BY KNOWLEDGE ITEM

**Descriptive Statistics for SRScale Based on
Students who:**

Classification Variable	Answered Question Incorrectly			Answered Question Correctly			ANOVA	Kruskal- Wallis
	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Prob.</u>	<u>Prob.</u>
Q1c	45	4.630	0.494	55	4.780	0.357	0.094	0.273
Q2c	57	4.660	0.474	43	4.790	0.349	0.121	0.230
Q3c	86	4.710	0.430	14	4.720	0.432	0.924	0.917
Q4c	44	4.680	0.393	56	4.740	0.455	0.504	0.184
Q5c	35	4.680	0.434	65	4.730	0.427	0.578	0.260
Q6c	55	4.800	0.360	45	4.610	0.483	0.031	0.040
Q7c	62	4.750	0.377	38	4.660	0.500	0.305	0.445
Q8c	5	4.570	0.589	95	4.720	0.421	0.446	0.787
Q9c	17	4.620	0.507	83	4.730	0.411	0.331	0.511
Q10c	90	4.740	0.416	10	4.510	0.500	0.120	0.039
Q11c	43	4.710	0.444	57	4.720	0.419	0.894	0.893
Q12c	32	4.790	0.375	68	4.680	0.448	0.199	0.251
Q13c	51	4.650	0.462	49	4.780	0.384	0.143	0.188
Q14c	69	4.730	0.418	31	4.670	0.454	0.519	0.338
Q15c	19	4.680	0.449	81	4.720	0.425	0.673	0.318
Q16c	10	4.710	0.404	90	4.710	0.433	>0.999	0.805
Q17c	17	4.760	0.353	83	4.700	0.443	0.596	0.671

TABLE 6
ANALYSIS OF TOTAL SCORE

Dependent Variable: Score

<u>Classification Variable</u>	<u>Value</u>	<u>Sub-Sample N</u>	<u>Score Statistics by Group Mean</u>	<u>Std. Dev.</u>	<u>ANOVA Prob.</u>	<u>Kruskal-Wallis Prob.</u>
GPA4	0	53	9.360	2.104	0.151	0.092
	1	47	9.940	1.858		
BUOschl	0	33	9.610	2.207	0.934	0.818
	1	67	9.640	1.912		
BUREAp	0	13	10.380	1.710	0.146	0.161
	1	87	9.520	2.028		
AdNPhone	0	93	9.690	1.989	0.518	0.370
	1	6	9.000	2.366		
AdNEmail	0	7	10.000	1.291	0.696	0.592
	1	49	9.730	2.177		
	2	33	9.300	1.960		
	3	11	9.910	1.758		
AdNMeet	0	2	9.000	2.828	0.391	0.346
	1	90	9.590	1.988		
	2	6	9.670	2.160		
	3	2	12.000	1.414		
Curric	0	21	9.670	2.008	0.925	0.962
	1	79	9.620	2.015		
AcPlan	0	2	11.000	-	0.331	0.222
	1	98	9.600	2.014		
Intern	0	78	9.710	1.908	0.483	0.590
	1	22	9.360	2.341		
Study	0	86	9.550	2.033	0.304	0.401
	1	14	10.140	1.791		
Orgs	0	86	9.480	2.033	0.058	0.068
	1	14	10.570	1.555		
Admission	0	55	9.330	2.019	0.095	0.077
	1	45	10.000	1.942		
Stress	0	95	9.620	2.022	0.847	0.767
	1	5	9.800	1.789		
NonAcad	0	94	9.600	2.007	0.501	0.513
	1	6	10.170	2.041		
Other	0	97	9.590	2.019	0.231	0.132
	1	3	11.000	0.000		
NoIssues	1	11	9.640	2.378	0.232	0.253
	2	31	9.390	2.140		
	3	33	9.760	1.659		
	4	17	9.060	2.076		
	5	3	11.000	1.732		
	6	4	11.000	1.633		
	7	1	13.000	-		

APPENDIX 1
2015 PRE-PHARMACY ADVISING ASSESSMENT

Q1 I consent and agree to participate in the survey.

1. Agree and Continue (1)
2. Decline to Participate in the Study (2)

Q3 Which of the following responses most closely approximates your cumulative grade point average (GPA)?

3. 4.0 (1)
4. 3.5 (2)
5. 3.0 (3)
6. 2.5 (4)
7. 2 (5)
8. 1.5 (6)

Q6 What is your backup plan? (check all that apply)

1. apply to other pharmacy schools (1)
2. reapply to NDSU's pharmacy school a 2nd time (2)
3. change majors (3)
4. I don't have a backup plan (6)
5. I don't have backup plan but intend to create one (4)
6. I don't need a backup plan (5)

Q7 Approximately how many times this semester were you in contact with your adviser? (check all that apply)

	Number of Times Contacted			
	Never (1)	1-3 (2)	4-6 (3)	7+ (4)
By phone (1)	7.	8.	9.	10.
By email (2)	11.	12.	13.	14.
By face to face appointments (3)	15.	16.	17.	18.

Q8 Please identify all the reason(s) you sought assistance from your academic adviser this semester. (check all that apply)

19. curriculum guidance (1)
20. academic planning (2)
21. internship options (3)
22. study tips (4)
23. more information about student organizations (5)
24. more information about the admission process (6)
25. stress management (7)
26. non-academic issues (8)
27. other (9) _____

Q16 Evaluate each of the following statements for accuracy as they relate to the pharmacy admission process.

	no (1)	maybe (2)	yes (3)
Core classes are the only classes that matter to be accepted into NDSU's professional program. (1)	28.	29.	30.
The admission committee gives preference to North Dakota residents and NDUS students. (17)	31.	32.	33.
The admission committee considers grades earned in non-core classes when making admission decisions. (2)	34.	35.	36.
The PCAT score is just as important as grades earned in core classes. (3)	37.	38.	39.
NDSU's pharmacy admissions process will allow you to take the PCAT as many times as you would like. (4)	40.	41.	42.
Core classes must be completed by the time you apply to NDSU's professional program. (5)	43.	44.	45.
You need reference letters along with the application. (6)	46.	47.	48.
The pharmacy admission committee uses the highest subsection scores from all of your PCAT exams to compile your composite score. (7)	49.	50.	51.
NDSU Pharmacy admissions interviews are used to evaluate my communication skills. (8)	52.	53.	54.
NDSU Pharmacy admissions interviews are used to evaluate my teamwork skills. (9)	55.	56.	57.
NDSU's pharmacy program requires applicants to take an ethics exam on interview day. (10)	58.	59.	60.
If you receive an invitation to pharmacy interview day, you will be accepted into the professional pharmacy program. (11)	61.	62.	63.
NDSU's pharmacy program accepts applicants who do not have pharmacy job shadow or work experience. (12)	64.	65.	66.
If you have violated the College's conduct policy, you will not be admitted into NDSU's pharmacy program. (13)	67.	68.	69.
NDSU Pharmacy admissions interviews are used to evaluate my ability to express empathy. (14)	70.	71.	72.
NDSU Pharmacy admissions interviews are used to evaluate my self awareness. (15)	73.	74.	75.
My personal values and religious beliefs will impact my chances of gaining admission to NDSU's pharmacy program. (16)	76.	77.	78.

Q9 Please rate your advising experience.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
My adviser is accessible to me. (1)	79.	80.	81.	82.	83.
My adviser provides me with up-to-date information that I can use. (2)	84.	85.	86.	87.	88.
My adviser is knowledgeable about resources and services on campus. (3)	89.	90.	91.	92.	93.
My adviser takes an expressed interest in my questions and concerns. (4)	94.	95.	96.	97.	98.
My adviser encourages me to come by for help. (5)	99.	100.	101.	102.	103.
My adviser gives me accurate information about course requirements. (6)	104.	105.	106.	107.	108.
My adviser has assisted me in developing a long-term education plan. (7)	109.	110.	111.	112.	113.
After meeting with my adviser, I feel like I am better prepared to gain admission to the professional program. (8)	114.	115.	116.	117.	118.
My adviser helps me make important educational decisions (selecting elective courses, exploring academic majors/minors, etc) (9)	119.	120.	121.	122.	123.
I felt comfortable asking my adviser questions during the meeting. (10)	124.	125.	126.	127.	128.

Q13 Additional Comments:

APPENDIX

**TABLE 1
DESCRIPTIVE STATISTICS**

<u>Variable</u>	<u>Description</u>	<u>Mean</u>	<u>Std. Dev.</u>
Accessible Information	My advisor is accessible to me	4.67	0.637
Knowledge	My advisor provides me with up-to-date information that I can use	4.78	0.416
Interest	My advisor is knowledgeable about resources and services on campus	4.72	0.668
Help	My advisor takes an expressed interest in my questions and concerns	4.71	0.518
Requirements	My advisor encourages me to come by for help	4.62	0.648
Plan	My advisor gives me accurate information about course requirements	4.77	0.446
Preparation	My advisor has assisted me in developing a long-term education plan	4.63	0.734
Decisions	After meeting with my advisor, I feel like I am better prepared to gain admission into the professional program	4.62	0.648
Comfort	My advisor helps me make important decisions (selecting elective courses, exploring academic majors/minors, etc.)	4.71	0.591
Return	I felt comfortable asking my advisor questions during the meeting	4.73	0.51
	Next semester, I plan to meet with my advisor to discuss any career planning course scheduling or other advising issues	4.72	0.451
Number of Observations		100	

TABLE 2
PRINCIPAL COMPONENTS FACTOR ANALYSIS WITH VARIMAX ROTATION

<i>Panel A: Eigenvalue Extraction using Principal Components</i>			
<u>Component</u>	<u>Eigenvalue</u>	<u>Percent of Variance Explained</u>	<u>Cumulative Percent Explained</u>
1	6.407	58.242	58.242
2	0.874	7.946	66.188
3	0.729	6.631	72.819
4	0.645	5.866	78.685
5	0.556	5.056	83.741
6	0.427	3.881	87.622
7	0.403	3.664	91.286
8	0.348	3.167	94.453
9	0.238	2.160	96.614
10	0.199	1.812	98.425
11	0.173	1.575	100.000
<i>Rotated Loadings</i>			
<u>Total</u>	<u>Percent of Variance Explained</u>	<u>Cumulative Percent Explained</u>	<u>Total</u>
6.407	58.242	58.242	6.407
<i>Panel B: Factor Matrices</i>			
<u>Variable</u>	<u>Factor 1</u>	<u>Communalities</u>	
Accessible	0.725	0.525	
Information	0.713	0.508	
Knowledge	0.599	0.359	
Interest	0.874	0.765	
Help	0.794	0.631	
Requirements	0.792	0.627	
Plan	0.552	0.305	
Preparation	0.771	0.594	
Decisions	0.838	0.703	
Comfort	0.873	0.763	
Return	0.792	0.627	

TABLE 3
SCALE AND ITEM CORRELATIONS

Panel A: Scale 1 Inter-Item Correlation Matrix

<u>Variable</u>	<u>Accessible</u>	<u>Inform.</u>	<u>Know.</u>	<u>Interest</u>	<u>Help</u>	<u>Require.</u>
Accessible	-	0.371	0.374	0.656	0.501	0.441
Information	0.371	-	0.466	0.591	0.436	0.595
Knowledge	0.374	0.466	-	0.463	0.405	0.494
Interest	0.656	0.591	0.463	-	0.721	0.582
Help	0.501	0.436	0.405	0.721	-	0.638
Requirements	0.441	0.595	0.494	0.582	0.638	-
Plan	0.406	0.359	0.240	0.459	0.402	0.354
Preparation	0.501	0.586	0.452	0.631	0.495	0.603
Decisions	0.710	0.477	0.406	0.712	0.632	0.587
Comfort	0.626	0.574	0.429	0.771	0.726	0.657
Return	0.449	0.529	0.408	0.643	0.600	0.630

Panel A, Continued: Scale 1 Inter-Item Correlation Matrix

<u>Variable</u>	<u>Plan</u>	<u>Prep.</u>	<u>Decisions</u>	<u>Comfort</u>	<u>Return</u>
Accessible	0.406	0.501	0.710	0.626	0.449
Information	0.359	0.586	0.477	0.574	0.529
Knowledge	0.240	0.452	0.406	0.429	0.408
Interest	0.459	0.631	0.712	0.771	0.643
Help	0.402	0.495	0.632	0.726	0.600
Requirements	0.354	0.603	0.587	0.657	0.63
Plan	-	0.381	0.402	0.378	0.416
Preparation	0.381	-	0.606	0.634	0.531
Decisions	0.402	0.606	-	0.710	0.677
Comfort	0.378	0.634	0.710	-	0.678
Return	0.416	0.531	0.677	0.678	-
Scale Mean	4.700				
Scale Std. Deviation	0.427				
Cronbach's Alpha	0.917				
F-Test [99,990]	11.976				
Probability Value	< 0.001				

Panel B: Scale 2 Inter-Item Correlation Matrix

<u>Variable</u>	<u>Accessible</u>	<u>Inform.</u>	<u>Know.</u>	<u>Interest</u>	<u>Help</u>	<u>Require.</u>	<u>Comfort</u>
Accessible	-	0.371	0.374	0.656	0.501	0.441	0.626
Information	0.371	-	0.466	0.591	0.436	0.595	0.574
Knowledge	0.374	0.466	-	0.463	0.405	0.494	0.429
Interest	0.656	0.591	0.463	-	0.721	0.582	0.771
Help	0.501	0.436	0.405	0.721	-	0.638	0.726
Requirements	0.441	0.595	0.494	0.582	0.638	-	0.657
Comfort	0.626	0.574	0.429	0.771	0.726	0.657	-
Scale Mean	4.670						
Scale Std. Deviation	0.477						
Cronbach's Alpha	0.884						
F-Test [99,594]	8.635						
Probability Value	< 0.001						

Panel C: Scale 2 Inter-Item Correlation Matrix

<u>Variable</u>	<u>Plan</u>	<u>Preparation</u>	<u>Decisions</u>	<u>Return</u>
Plan	-	0.381	0.402	0.416
Preparation	0.381	-	0.606	0.531
Decisions	0.402	0.606	-	0.677
Return	0.416	0.531	0.677	-
Scale Mean	4.710			
Scale Std. Deviation	0.428			
Cronbach's Alpha	0.779			
F-Test [99,297]	4.521			
Probability Value	< 0.001			