

# Development and Testing of an Instrument to Assess Behavioral Professionalism of Pharmacy Students<sup>1</sup>

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The purpose of this project was to develop and test an instrument to assess pharmacy students' behavioral aspects of professionalism. An instrument was constructed to represent seven dimensions of behavioral professionalism. The instrument was reviewed by 90 experiential coordinators and preceptors from 49 pharmacy schools. The instrument was then revised to 37 items. It was piloted with Purdue pharmacy students and preceptors during Spring 1998. Exploratory factor analysis resulted in reduction to 25 items representing four factors: responsibility, interpersonal/social skills, communication skills, and appearance. A revised instrument was administered to 994 student/preceptor pairs from 17 pharmacy schools in Summer 1998. Factor analysis confirmed the original factors. The resulting reliability estimates were 0.95, 0.95, 0.88, and 0.83, respectively. The instrument appears to have content validity as assessed by experts, reliability and a factor structure as indicated by two analyses. Further refinement and testing could lead to a comprehensive measure of professionalism with potential use throughout pharmacy curricula, and within other disciplines and professions.

## INTRODUCTION

Professionalism may be defined as the extent to which an occupation or a member of that occupation exhibits the characteristics of a profession. Many studies have been undertaken to determine the level of professionalism of pharmacists and pharmacy students(1-7). Most instruments designed to assess professionalism have measured it based on classic literary characteristics of professions, such as: specialized knowledge of techniques, self-imposed and enforced values and behavior, altruism, professional associations and identity, prestige, socially vital function, autonomy, specialized client relationship, intellectual base (including commitment to liberal arts, continuing education, and research), unique socialization of student members, legal recognition through licensure, complete equivalence of members, practicality, and terminal occupation(8). For example, the more autonomous subjects felt, the more "professional" they were; the more professional associations they belonged to, the more "professional" they were, and so on.

Professionalism, however, has also been described as the advocacy of a set of attitudes and behaviors believed to be appropriate to a particular occupation. Parsons wrote that "professions must function as professionals within certain limited areas of ascribed competence (functional specificity) and within these areas his attitude should be guided by norms of professional behavior (affective neutrality) rather than by his emotions....."(9). He also described a characteristic of "collectivity orientation" which implies a sense of the common

needs in precedence over selfish needs. This latter description was used as the working definition of professionalism for the American Pharmaceutical Association-Academy of Students of Pharmacy/American Association of Colleges of Pharmacy-Council of Deans (APhA-ASP/AACP-COD) Task Force on Professionalization: displaying values, beliefs and attitudes that put the needs of another person above your personal needs(10). It has also been written that:

"Professionalism is displayed in the way pharmacists conduct themselves in professional situations. This definition implies a demeanor that is created through a combination of behaviors, including courtesy and politeness when dealing with patients, peers, and other health care professionals. Pharmacists should consistently display respect for others and maintain appropriate boundaries of privacy and discretion. Whether dealing with patients or interacting with others on a health care team, it is important to possess-and display-an empathetic manner."(11)

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Recent literature has suggested that if the mission of the profession of pharmacy is for practitioners to provide pharmaceutical care, then the socialization process of students becoming professionals needs to be improved to instill the necessary values, beliefs, attitudes, skills, knowledge, and professionalism into current and future pharmacists(7,10,11). Currently, many schools and colleges of pharmacy are struggling with the challenges of how to improve and strengthen this professional socialization process, as well as recognize professionalism in the recruitment and admissions processes and instill it through educational and extracurricular programs. These efforts beg the question of how to properly assess professionalism so an institution knows if its efforts toward improving professional socialization of its students are successful.

Of the instruments that exist to measure professionalism (based on classic, or "structural" characteristics described above), none empirically measure how professionals conduct themselves, or the behavioral aspects of professionalism such as those described by Chalmers(11). Behavioral professionalism could be defined as "behaving in a manner to potentially achieve optimal outcomes in professional tasks and interactions."(12)

Development and validation of an instrument to reliably assess behavioral professionalism of pharmacy students would be useful for schools and colleges of pharmacy. Data collected from such an instrument may enable educators to evaluate students' levels of behavioral aspects of professionalism as they enter, progress through, and exit a curriculum. A validated instrument of this sort could be especially useful to reliably and consistently evaluate students during experiential components of curricula and other professional performance-based activities, such as service-learning programs and pharmacy practice laboratories. In addition, the instrument could serve as the basis for further development of a more comprehensive instrument to measure aspects of the professional socialization process.

The purpose of this project was to construct and test an instrument to measure the behavioral professionalism of pharmacy students. Specific objectives included:

- Construct and test a practical and reliable instrument to measure behavioral aspects of professionalism of pharmacy students participating in experiential rotations.
- Compare experiential program preceptors' scores of their students from this instrument with students' scores of themselves from the same instrument (self-assessment).
- Compare preceptors' scores of their students based on students' demographic variables.
- Compare preceptors' scores of their students based on preceptors' demographic variables.

The first objective served as the main objective and purpose of the study. The second objective served to establish external validity of the constructed instrument. The third and fourth objectives were research objectives designed to generate specific hypotheses for subsequent study. This project was intended to be more hypothesis-generating than hypothesis-testing.

## METHODS AND RESULTS

This project was developed and implemented through several phases over the course of a two-year period: Phase I, Instrument development; Phase II, Expert review of instrument and first instrument revision; Phase III, Pilot test of instrument and second instrument revision; and Phase IV, Large scale

administration and testing of instrument and third instrument revision. Project development was overseen by a faculty advisory committee. Since the development of each phase was dependent on the results from the previous phase, this section presents brief descriptions of the first two phases and discusses the last two in more detail.

### Phase I: Instrument Development

After an extensive review of the literature was conducted, a variety of student evaluation forms were collected from 18 schools of pharmacy, a hospital pharmacy, and a medical school(13,14). Items relating to professional behavior from these instruments and suggestions from the literature were extracted, pooled and categorized. A 38-item instrument was created from this pool of items believed to represent seven dimensions: standards, responsibility, competence, maturity, initiative, appearance and interpersonal relations/communication skills.

### Phase II: Expert Review and First Revision of Instrument

Ninety experiential program coordinators and preceptors from 49 schools of pharmacy served as reviewers for instrument items. Reviewers were asked to rate each item based on their perceptions of the item's importance in measuring professional behavior of pharmacy students participating in experiential rotations. After analysis of reviewers' responses, almost all of the 38 items were reworded for greater clarity, one was removed because of redundancy, two were combined, and a new item was added. The resulting instrument to be used in the pilot study contained 37 items.

To complete formatting of the instrument, a previously used Likert-type rating scale was added for each item. Ratings were on a 1 - 5 scale, with 1 unsatisfactory and 5=excellent(15,16). An "N" rating was also used, "not enough evidence to evaluate." Two versions of the instrument were created: one for students (to be used as a self-assessment) and one for their preceptors in order to evaluate students' behavior. The only differences between them were the user instructions and the color.

### Phase III: Pilot Test and Second Instrument Revision

It was determined that Purdue University pharmacy preceptors and their students participating in experiential rotations during Spring semester 1998 would serve as a convenience sample to pilot the instrument. The instrument was included with other rotation evaluation materials and distributed to these subjects by the Office of Experiential Programs. They were instructed to complete the instrument at the same time they completed other end-of-rotation evaluations. Preceptors were asked to rate their respective students' behavioral professionalism based on their observations over the course of the rotation. Students were asked to evaluate their own behavioral professionalism based on their performance over the course of the same rotation.

Frequencies and descriptive statistics were calculated for student and preceptor responses to instrument items. Of the 156 pairs of instruments distributed, 121 (78 percent) student instruments and 132 (85 percent) preceptor instruments were returned. Most students received ratings of 3 or higher for each item, both in the self-assessments and preceptors' assessments. The overall student mean rating was  $3.96 \pm 0.45$ ; preceptors' overall mean rating for students was  $4.09 \pm 0.70$ . Mean scores were reported, as opposed to total scores, because of items' missing values.

Independent *t*-tests were conducted on student and preceptor demographic variables to determine if any significant differences existed among the groups for preceptors' mean ratings. No significant differences were found between female and male students, female and male preceptors, or retail and institutional rotation sites (although it approached significance – students in retail sites had higher mean ratings than students in institutional sites). Students enrolled in the BS program had a significantly higher overall mean rating than students enrolled in the PharmD program. In addition, a paired *t*-test was conducted comparing students' mean ratings with their respective preceptors' mean ratings (*i.e.*, students' self-assessment versus preceptors' assessment of their students). Preceptors gave their students significantly higher mean ratings than students gave themselves. All analyses were conducted with SPSS PC+, version 7.5, software(17).

The question arose if all of the observations were truly independent. The answer was no; six preceptors completed forms on two students each (N=12), two preceptors completed forms on three students each (N=6), and one preceptor completed forms on five students (N=5). These 23 observations (17 percent of the 132 preceptor responses) were removed temporarily from the data set and the *t*-tests were recalculated. The only notable change was seen in the test involving student gender. Female students (N=74) had significantly higher mean ratings (overall mean =  $4.20 \pm 0.71$ ) than male students (N=35,  $3.91 \pm 0.61$ ) when nonindependent observations were removed from the data set. All other tests resulted in slightly more or less significance, but not enough to change the status of the original significance tests.

Exploratory factor analysis, using Principal Components Analysis (PCA) as the method of component (factor)<sup>3</sup> extraction(18), was conducted on both sets of preceptors' data. A total 114 (86 percent of 132) cases were examined in the original data set (*i.e.*, nonindependent observations included). These cases were complete, *i.e.*, there were no missing observations or "N" ratings for these cases. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was calculated to determine the "factorability" of the data. This is a standard default test of the SPSS program. The value was 0.951; values of 0.6 and above are required for good factor analysis(19).

Eigenvalues, the amounts of variance accounted for by each of the extracted factors for the entire instrument, were calculated as part of the PCA factor extraction process. Eigenvalues for factors greater than 1.00 indicate a strong factor of the instrument. PCA on these data extracted three components that had eigenvalues greater than 1.00. These three components explained approximately 76 percent of the variance of preceptors' mean ratings.

Factor analytic techniques also produce a factor matrix, which indicates the relationship between each item on the instrument and the extracted factors with weighted coefficients, or factor loadings. Unfortunately, it is difficult to identify meaningful factors from this matrix because most factors are correlated with many items and there is usually no readily identifiable pattern. To better interpret item-factor solutions, a process called rotation is employed. Rotation transforms the factor matrix into a more simple structure. Rotation redistributes the explained variance for each factor in an attempt to maximize high correlations and minimize low correlations. There are several rotation methods classified into two categories: orthogonal and oblique. Orthogonal rotation is used when scale items are not highly correlated; oblique rotation is used when scale items are highly correlated. A complete expla-

nation of these techniques is beyond the scope of this document(20).

Since all items in this data set were highly correlated with one another, it was decided to use oblique rotation. Seventeen items loaded most strongly on Factor 1; fifteen loaded most strongly on Factor 2; and five items loaded most strongly on Factor 3. To determine the nature of the extracted factors, items within each were reviewed for their similarities and differences. The factors seemed to represent "responsibility" (Factor 1), personal characteristics (Factor 2), and communication skills (Factor 3) but the distinctions were not clear and several items seemed to overlap or "not quite fit," both conceptually and with their factor loadings. Re-examination of the initial components and respective variances showed that a fourth factor had an eigenvalue of 0.96 although PCA did not initially extract it as a primary factor. The next most explanatory factor's eigenvalue dropped to 0.75. It was decided to rerun the factor analysis, this time programming PCA to extract four factors and determine if the items loading on four factors were more easily interpretable.<sup>4</sup> The resulting four-factor structure was much more interpretable. The four factors were named: responsibility (Factor 1), interpersonal relations/social skills (Factor 2), communication skills (Factor 3), and appearance (Factor 4).

Interscale correlation coefficients of these four factors were also calculated. Factor 1 correlated with Factors 2, 3, and 4 with coefficients of 0.757, 0.741, and 0.502, respectively. Factor 2 correlated with Factors 3 and 4 with coefficients of 0.725 and 0.660, respectively. The correlation coefficient for Factors 3 and 4 was 0.523.

Exploratory factor analysis was also conducted on the data set with nonindependent observations removed (N=100). PCA extracted four factors from this data set that accounted for approximately 77 percent of the total variance. Oblique rotation of these data produced identical results as the original data set with the exception of one item.

Reliability analyses for both data sets were conducted on all instrument items together and the four subscales, represented by the items loading on the four factors. None of the items, if deleted from the instrument, would drastically reduce the overall Cronbach's alpha coefficient of 0.986. The subscale represented by the fourteen items loading on Factor 1 had an overall Cronbach's alpha of 0.972; the Factor 2 subscale (13 items) had an alpha of 0.973; Factor 3 (seven items) = 0.950; and Factor 4 (two items) was 0.969. Reliability analyses conducted on the data set with nonindependent observations removed were not very different from the previous analyses. Cronbach's alpha coefficients for the entire scale and four subscales were, respectively, 0.985, 0.970, 0.970, 0.949 and 0.971.

**Pilot Instrument Revision.** The exploratory factor analyses and general review of the data were used to guide revision of the instrument for large-scale administration (Phase IV). Exploratory factor analysis is useful not only for determining if underlying factors exist in a particular measurement instrument, but also to identify instrument items that "did not perform as well," or may be less definitive of the overall construct being measured (*i.e.*, items that

<sup>3</sup> The term "factor" will be used throughout this section as the concepts of components and factors in factor analysis are the same; they are just calculated differently depending on the factor analytic technique used.

<sup>4</sup> Factor analysis is a flexible statistical method that allows the user to try various techniques to determine which one produces the most logical interpretation of one's data.

**Table I. Frequencies of students' demographic variables and comparisons based on preceptors' mean ratings**

| Variable                                   | Category       | N <sup>a</sup> | Percent | Mean ± SD <sup>b</sup> | F-value | Significance         |
|--|----------------|----------------|---------|------------------------|---------|----------------------|
| Gender                                     | Male           | 203            | 34.0    | 4.22 ± 0.64            | 4.375   | 0.038 <sup>c</sup>   |
|  | Female         | 392            | 65.7    | 4.33 ± 0.55            |         |                      |
|  | missing        | 2              | 0.3     |                        |         |                      |
| Age  | 19 – 22        | 50             | 8.4     | 4.41 ± 0.54            | 1.382   | 0.247                |
|  | 23             | 164            | 27.5    | 4.29 ± 0.57            |         |                      |
|  | 24 – 25        | 174            | 29.1    | 4.24 ± 0.60            |         |                      |
|  | 26 – 53        | 186            | 31.2    | 4.34 ± 0.57            |         |                      |
|  | missing        | 23             | 3.9     |                        |         |                      |
|  |                |                |         |                        |         |                      |
| GPA  | 2.00 - 2.5     | 30             | 5.0     | 3.94 ± 0.82            | 4.198   | 0.006 <sup>c,d</sup> |
|  | 2.51 - 3.0     | 138            | 23.1    | 4.36 ± 0.52            |         |                      |
|  | 3.01 - 3.5     | 248            | 41.5    | 4.29 ± 0.59            |         |                      |
|  | 3.51 - 4.0     | 115            | 19.3    | 4.36 ± 0.50            |         |                      |
|  | missing        | 66             | 11.1    |                        |         |                      |
| English as 1st language                    | Yes            | 521            | 87.3    | 4.29 ± 0.57            | 0.402   | 0.526                |
|  | No             | 51             | 8.5     | 4.35 ± 0.59            |         |                      |
|  | missing        | 25             | 4.2     |                        |         |                      |
| Ethnicity/ Race                            | Asian/P.I.     | 63             | 10.6    | 4.36 ± 0.55            | -/976   | 0.432                |
|  | Black          | 11             | 1.8     | 4.14 ± 0.88            |         |                      |
|  | Hispanic       | 3              | 0.5     | 4.64 ± 0.06            |         |                      |
|  | White          | 500            | 83.8    | 4.28 ± 0.58            |         |                      |
|  | Foreign        | 7              | 1.2     | 4.24 ± 0.73            |         |                      |
|  | Other          | 10             | 1.7     | 4.63 ± 0.43            |         |                      |
|  | missing        | 3              | 0.5     |                        |         |                      |
| Expected Degree                            | BS             | 206            | 34.5    | 4.31 ± 0.59            | 0.100   | 0.904                |
|  | PharmD         | 372            | 62.3    | 4.28 ± 0.58            |         |                      |
|  | Post-BS PharmD | 18             | 3.0     | 4.30 ± 0.55            |         |                      |
|  | missing        | 1              | 0.2     |                        |         |                      |
| Expected Graduation Year                   | 1998           | 102            | 17.1    | 4.28 ± 0.61            | 2.508   | 0.082                |
|  | 1999           | 428            | 70.0    | 4.27 ± 0.59            |         |                      |
|  | 2000           | 72             | 12.1    | 4.44 ± 0.50            |         |                      |
|  | missing        | 5              | 0.8     |                        |         |                      |
| Rotation practice setting                  | Clinic         | 58             | 9.7     | 4.02 ± 0.64            | 3.739   | 0.005 <sup>c,f</sup> |
|  | Chain          | 132            | 22.1    | 4.40 ± 0.53            |         |                      |
|  | Independent    | 85             | 14.2    | 4.25 ± 0.67            |         |                      |
|  | Hospital       | 246            | 41.2    | 4.30 ± 0.57            |         |                      |
|  | Otherg         | 72             | 12.1    | 4.31 ± 0.50            |         |                      |
|  | missing        | 4              | 0.7     |                        |         |                      |
| Type of functions most often performed     | Distributive   | 282            | 47.2    | 4.36 ± 0.58            | 2.952   | 0.032 <sup>c,h</sup> |
|  | Clinical       | 230            | 38.5    | 4.22 ± 0.53            |         |                      |
|  | Administrative | 39             | 6.5     | 4.16 ± 0.69            |         |                      |
|  | Otherg         | 37             | 6.2     | 4.29 ± 0.65            |         |                      |
|  | missing        | 9              | 1.5     |                        |         |                      |
| Amount of rotation experience              | None           | 348            | 58.3    | 4.32 ± 0.57            | 1.044   | 0.353                |
|  | < 8 weeks      | 160            | 26.8    | 4.24 ± 0.59            |         |                      |
| Amount of pharmacy work experience         | None           | 64             | 10.7    | 4.22 ± 0.60            | 0.702   | 0.496                |
|  | Moderate       | 240            | 40.2    | 4.29 ± 0.55            |         |                      |
|  | Extensive      | 290            | 48.6    | 4.32 ± 0.60            |         |                      |
|  | missing        | 3              | 0.5     |                        |         |                      |
| Pharmacy organization level of involvement | None           | 77             | 12.9    | 4.34 ± 0.56            | 3.425   | 0.033 <sup>c,i</sup> |
|  | Moderate       | 357            | 59.8    | 4.24 ± 0.60            |         |                      |
|  | Extensive      | 156            | 26.1    | 4.40 ± 0.55            |         |                      |
|  | missing        | 7              | 1.2     |                        |         |                      |
| Leadership position                        | Yes            | 294            | 49.2    | 4.31 ± 0.58            | 0.417   | 0.519                |
|  | No             | 294            | 49.2    | 4.28 ± 0.59            |         |                      |
|  | missing        | 9              | 1.5     |                        |         |                      |

**Table I. (con't) Frequencies of students' demographic variables and comparisons based on preceptors' mean ratings**

| Variable   | Category  | N <sup>a</sup> | Percent | Mean ± SD <sup>b</sup> | F-value | Significance |
|--|-----------|----------------|---------|------------------------|---------|--------------|
| University/ College organization level of involvement          | None      | 285            | 47.7    | 4.30 ± 0.60            | 0.006   | 0.994        |
|  | Moderate  | 226            | 37.9    | 4.29 ± 0.56            |         |              |
|  | Extensive | 74             | 12.4    | 4.29 ± 0.61            |         |              |
|  | missing   | 12             | 2.0     |                        |         |              |
| Leadership position  | Yes       | 108            | 18.1    | 4.36 ± 0.55            | 1.373   | 0.242        |
|  | No        | 494            | 79.4    | 4.28 ± 0.59            |         |              |
|  | missing   | 15             | 2.5     |                        |         |              |
| Religious organization level of involvement                    | None      | 305            | 51.1    | 4.29 ± 0.59            | 1.704   | 0.183        |
|  | Moderate  | 223            | 37.4    | 4.33 ± 0.54            |         |              |
|  | Extensive | 55             | 9.2     | 4.15 ± 0.70            |         |              |
|  | missing   | 14             | 2.3     |                        |         |              |
| Leadership position  | Yes       | 61             | 10.2    | 4.22 ± 0.60            | 0.869   | 0.352        |
|  | No        | 518            | 86.8    | 4.31 ± 0.59            |         |              |
|  | missing   | 18             | 3.0     |                        |         |              |
| Community service/ volunteer organization level of involvement | None      | 312            | 52.3    | 4.30 ± 0.58            | 0.162   | 0.850        |
|  | Moderate  | 238            | 39.9    | 4.29 ± 0.60            |         |              |
|  | Extensive | 31             | 5.2     | 4.35 ± 0.47            |         |              |
|  | missing   | 16             | 2.7     |                        |         |              |
| Leadership position  | Yes       | 45             | 7.5     | 4.43 ± 0.48            | 2.103   | 0.157        |
|  | No        | 532            | 89.1    | 4.29 ± 0.59            |         |              |
|  | missing   | 20             | 3.4     |                        |         |              |

<sup>a</sup> Based on 597 students who returned forms.

<sup>b</sup> Based on 647 preceptors who returned forms whose respective students also returned forms.

<sup>c</sup> Significant at P = 0.05.

<sup>d</sup> Significant LSD values between 2.0-2.5 and 2.51-3.0, 3.01-3.5, and 3.51-4.0 were 0.001, 0.003, and 0.001, respectively.

<sup>e</sup> Examples included: long-term care, industry, association, hospice, home health care.

<sup>f</sup> Significant LSD values between clinic and chain, hospital and other were 0.001, 0.007, and 0.015, respectively. Sig. LSD value between chain and independent = 0.049.

<sup>g</sup> Examples included: if respondent marked more than one box, compounding, quality control, direct patient care, research.

<sup>h</sup> Significant LSD values between distributive and clinical = 0.011.

<sup>i</sup> Significant LSD value between moderate and extensive = 0.014.

loaded similarly on more than one factor). Twelve items fit the latter criteria and were reviewed with respect to their content and whether or not their removal from the instrument would substantially compromise the instrument's conceptual integrity. It was determined that the remaining 25 items would be comprehensively representative of behavioral professionalism. To complete the instrument revision, these 25 items were randomly scrambled (removed from their original categorical order) and renumbered to ensure that the resulting factor structure of this revised instrument, after testing, would not have been influenced by a categorical organization of the items (see Appendix).

#### Phase IV: Large-Scale Administration and Testing of Instrument

This phase of the project occurred in four stages: recruitment of subjects, creation of demographic instruments and modification of cover letters, coordination of instrument distribution and collection, and analysis of data. These stages are described below.

**Recruitment of Subjects, Creation of Demographic Instruments, and Modification of Cover Letters.** Several reviewers from Phase II of the project, representing seventeen schools, volunteered their students and preceptors participating in experiential rotations during the summer of 1998 to com-

plete the instrument. This response yielded a potential sample size of approximately 1000 students and their preceptors. Demographic instruments were created for students and preceptors in order to collect data on a larger number of independent variables and explore their relationships with scores on the behavioral professionalism instrument. Cover letters were modified slightly from the pilot test so that each school's students and preceptors would receive a unique cover letter explaining instructions pertaining to the return of the instruments and noting the assistance of the school's coordinator, who was mentioned by name.

**Distribution and Collection of Instruments.** Plans were made with each school's experiential coordinator to determine how many instruments would be needed and when and how the instruments would be distributed and collected. The number of pairs of instruments needed at each school varied from twelve to 150. Collection dates also varied widely: from mid-June to late August. Some schools' instruments were sent directly to the students and preceptors and were returned via self-addressed, stamped envelopes. Others were sent in bulk to the experiential coordinators to distribute as they deemed appropriate and returned in bulk to the investigator.

Similarly to the pilot study, subjects were asked to complete the instruments near the end of the students' rotations.

**Table II. Frequencies of preceptors' demographic variables and comparisons based on preceptors' mean ratings**

| Variable                          | Category           | N <sup>a</sup> | Percent | Mean ± SD <sup>b</sup> | F-value | Significance         |
|-----------------------------------|--------------------|----------------|---------|------------------------|---------|----------------------|
| Gender                            | Male               | 367            | 56.7    | 4.27 ± 0.56            | 1.795   | 0.181                |
|                                   | Female             | 278            | 43.0    | 4.24 ± 0.69            |         |                      |
|                                   | missing            | 2              | 0.3     |                        |         |                      |
| Year of original pharmacy license | 1951-1969          | 60             | 9.3     | 4.53 ± 0.53            | 9.445   | 0.001 <sup>b,c</sup> |
|                                   | 1970-1979          | 200            | 30.9    | 4.30 ± 0.56            |         |                      |
|                                   | 1980-1989          | 196            | 30.3    | 4.26 ± 0.64            |         |                      |
|                                   | 1990-1998          | 183            | 28.3    | 4.08 ± 0.64            |         |                      |
|                                   | missing            | 8              | 1.2     |                        |         |                      |
| Advanced education                | Yes                | 254            | 60.0    | 4.35 ± 0.58            | 26.046  | 0.001 <sup>b</sup>   |
|                                   | No                 | 388            | 39.2    | 4.10 ± 0.65            |         |                      |
|                                   | missing            | 5              | 0.8     |                        |         |                      |
| Years precepted                   | < 6 months         | 104            | 16.1    | 4.19 ± 0.66            | 3.183   | 0.008 <sup>b,d</sup> |
|                                   | 6 mos-< 2 yrs      | 59             | 9.1     | 4.15 ± 0.59            |         |                      |
|                                   | 2-5 yrs            | 171            | 26.4    | 4.17 ± 0.61            |         |                      |
|                                   | 6-10 yrs           | 143            | 22.1    | 4.30 ± 0.62            |         |                      |
|                                   | 11-19 yrs          | 96             | 14.8    | 4.24 ± 0.66            |         |                      |
|                                   | >20 yrs            | 67             | 10.4    | 4.48 ± 0.46            |         |                      |
| Ethnicity/race                    | Asian/P.I.         | 15             | 2.3     | 4.58 ± 0.36            | 1.371   | 0.233                |
|                                   | Black              | 10             | 1.5     | 4.09 ± 0.66            |         |                      |
|                                   | Hispanic           | 5              | 0.8     | 4.57 ± 0.43            |         |                      |
|                                   | White              | 607            | 93.8    | 4.24 ± 0.62            |         |                      |
|                                   | Foreign            | 3              | 0.5     | 4.44 ± 0.00            |         |                      |
|                                   | Other              | 4              | 0.6     | 4.31 ± 0.36            |         |                      |
|                                   | missing            | 3              | 0.5     |                        |         |                      |
| English as 1st language           | Yes                | 629            | 97.2    | 4.24 ± 0.62            | 1.667   | 0.197                |
|                                   | No                 | 16             | 2.5     | 4.44 ± 0.37            |         |                      |
|                                   | missing            | 2              | 0.3     |                        |         |                      |
| Practice setting                  | Clinic             | 48             | 7.4     | 4.10 ± 0.67            | 5.086   | 0.001 <sup>b,f</sup> |
|                                   | Chain              | 137            | 21.2    | 4.41 ± 0.55            |         |                      |
|                                   | Independent        | 88             | 13.6    | 4.25 ± 0.69            |         |                      |
|                                   | Hospital           | 261            | 40.3    | 4.15 ± 0.61            |         |                      |
|                                   | Other <sup>e</sup> | 111            | 17.2    | 4.33 ± 0.60            |         |                      |
|                                   | missing            | 2              | 0.3     |                        |         |                      |

Rates of return of completed instruments ranged from 26 to 91 percent across all seventeen schools. A total of 994 pairs of instruments were distributed. Overall response rates were 597 (approx. 60 percent) for students and 647 (approx. 65 percent) for preceptors.

**Analysis.** After collection of instruments, data were entered and analyzed. Descriptive statistics were calculated for all data, ANOVAs and a paired *t*-test were performed ( $P = 0.05$ ). Post hoc Least-Significant Difference (LSD) tests were conducted for those ANOVAs comparing more than two means. Exploratory factor analysis was conducted on preceptors' responses and multiple regression was performed to identify demographic variables that predicted students' scores based on preceptors' responses. All analyses were conducted with SPSS PC+ software.

**Results.** Table I presents student frequency and mean comparison information. For most variables, respondents' demographics were similar to the pilot study sample population and the national pharmacy student population. National statistics show approximately 64 percent women, 36 percent men; an age range of 18 – 54 (no breakdown available); mean GPAs

from 2.90 to 3.57; 65 percent white, 19 percent Asian or Pacific Islander, eight percent black, three percent Hispanic, two percent foreign, and one percent other ethnicity/race; 46 percent BS, 44 percent PharmD, and 10 percent post-BS PharmD program enrollments(21). No national statistics were available for other student demographic variables, nor any of the preceptor variables.

Significant differences among student demographic variables included: (i) female students were rated significantly higher by preceptors than males; (ii) students in the 2.0 - 2.5 GPA group were rated significantly lower than students in any other GPA groups; (iii) students in a clinic pharmacy rotation scored significantly lower than students in any other pharmacy setting; (iv) students in community independent pharmacies scored significantly lower than those in community chain pharmacies; (v) students who performed distributive functions most often scored significantly higher than those students who performed primarily clinical functions; and (vi) those students with a moderate level of pharmacy organization involvement scored significantly lower than those with extensive involvement.

Table II presents preceptor frequency and mean comparison information. The amount of demographic information col-

**Table II. (con't) Frequencies of preceptors' demographic variables and comparisons based on preceptors' mean ratings**

| Variable                               | Category           | N <sup>a</sup> | Percent     | Mean ± SD <sup>b</sup> | F-value | Significance         |
|--|--------------------|----------------|-------------|------------------------|---------|----------------------|
| Type of functions most often performed | Distributive       | 258            | 39.9        | 4.32 ± 0.59            | 6.180   | 0.001 <sup>b,h</sup> |
|  | Clinical           | 240            | 37.1        | 4.13 ± 0.65            |         |                      |
|  | Administrative     | 97             | 15.0        | 4.23 ± 0.58            |         |                      |
|  | Other <sup>g</sup> | 47             | 7.3         | 4.47 ± 0.57            |         |                      |
|  | missing            | 5              | 0.8         |                        |         |                      |
| School                                 | A                  | 52             | 8.0         | 4.30 ± 0.62            | 2.404   | 0.002 <sup>b,i</sup> |
|  | B                  | 61             | 9.4         | 4.19 ± 0.65            |         |                      |
|  | C                  | 17             | 2.6         | 3.73 ± 0.70            |         |                      |
|  | D                  | 12             | 1.9         | 4.31 ± 0.60            |         |                      |
|  | E                  | 33             | 5.1         | 4.58 ± 0.41            |         |                      |
|  | F                  | 24             | 3.7         | 4.09 ± 0.68            |         |                      |
|  | G                  | 47             | 7.3         | 4.17 ± 0.69            |         |                      |
|  | H                  | 43             | 6.6         | 4.15 ± 0.68            |         |                      |
|  | I                  | 40             | 6.2         | 4.31 ± 0.56            |         |                      |
|  | J                  | 16             | 2.5         | 4.50 ± 0.43            |         |                      |
|  | K                  | 52             | 8.0         | 4.23 ± 0.61            |         |                      |
|  | L                  | 40             | 6.2         | 4.12 ± 0.61            |         |                      |
|  | M                  | 14             | 2.2         | 3.96 ± 0.72            |         |                      |
|  | N                  | 26             | 4.0         | 4.34 ± 0.55            |         |                      |
|  | O                  | 37             | 5.7         | 4.14 ± 0.59            |         |                      |
|  | P                  | 8              | 1.2         | 4.06 ± 0.72            |         |                      |
| Q                                      | 125                | 19.3           | 4.38 ± 0.55 |                        |         |                      |

<sup>a</sup> Based on 647 preceptors who returned forms.

<sup>b</sup> Significant at P = 0.05.

<sup>c</sup> Significant LSD values between 1951-69 and all other groups: 0.010, 0.003, and 0.001, respectively, and between 1990-98 and all other groups: 0.001, 0.001, and 0.004, respectively.

<sup>d</sup> Significant LSD values between 2-5 years and 6-10 years = 0.043, and between 20 years or more and all other groups except 6 months or less: 0.001, 0.001, 0.043, and 0.012, respectively.

<sup>e</sup> Examples include: high school wellness center, veterinary teaching hospital, long-term care, nuclear, home infusion, no-pharmacy clinic.

<sup>f</sup> Significant LSD values between clinic and chain = 0.003, clinic and other = 0.029, chain and hospital = 0.001, hospital and other = 0.011.

<sup>g</sup> Examples include: teaching/precepting, compounding, total patient care, regulatory science/clinical research, consulting.

<sup>h</sup> Significant LSD values between clinical and distributive = 0.001, clinical and other = 0.001, and administrative and other = 0.026.

<sup>i</sup> Significant LSD values between school C vs. schools A, B, E, G, I, J, K, N, and Q: 0.027, 0.005, 0.001, 0.040, 0.006, 0.002, 0.011, 0.006, and 0.001, respectively; school E vs. schools A, B, C, F, G, H, K, L, M, O and P: 0.003, 0.038, 0.001, 0.041, 0.003, 0.003, 0.002, 0.013, 0.001, 0.003, 0.002, and 0.030, respectively; school Q vs. B, E, F, G, L, M, and O: 0.043, 0.035, 0.045, 0.033, 0.013, 0.028, and 0.035, respectively; and between school J vs. schools L and M: 0.044 and 0.039.

lected from preceptors was not as extensive as that for students; the data collected, however, had similar breakdown percentages to the pilot study sample population.

Regarding preceptor data, significant differences included: (i) preceptors licensed between 1951-1969 gave significantly higher scores than all other license year groups; similarly; (ii) those licensed from 1990-98 gave significantly lower scores than all other groups; (iii) those with advanced education gave significantly lower scores than those without; (iv) those having precepted students for six to ten years gave significantly higher scores than those who had precepted between two and five years; (v) those who had precepted for 20 years or more gave significantly higher scores than all other groups except those precepting six months or less; (vi) preceptors practicing in clinic and hospital pharmacies gave significantly lower scores than preceptors in both chain and "other" pharmacies; (vii) those preceptors who perform clinical functions most often gave significantly lower scores than those who perform distributive or "other" functions; and (viii) those who perform primarily administrative functions gave significantly lower scores than those who perform "other" functions.

There were also significant differences among schools: preceptors from school C gave significantly lower scores than preceptors from nine other schools; preceptors from school E gave significantly higher scores than preceptors from eleven

other schools; preceptors from school Q gave significantly higher scores than preceptors seven other schools; and preceptors from school J gave significantly higher scores than those from schools L and M. The paired *t*-test between students' overall mean rating (4.25 ± 0.47) and their respective preceptors' overall mean rating (4.30 ± 0.58) was not statistically significant (*P*=0.192, *N*=515 complete pairs of student/preceptor instruments).

Similarly to the pilot study, there were some nonindependent observations in the sample. Six preceptors completed three instruments each (*N*=18) and 39 completed two each (*N*=78) for 96 total non-independent observations (14.8 percent of the entire sample). Again, all analyses were run with the entire data set and also with these observations removed to determine if any differences existed. Most tests changed very little from the original data set, but a few that were significant became insignificant: students in independent pharmacies were no longer statistically different than those in chain pharmacies; those performing primarily distributive functions were no longer statistically different than those performing clinical functions; and the overall F-value for the ANOVA for pharmacy organization level of involvement was no longer significant. Changes in ANOVAs for preceptor data included: those preceptors with six to ten years of precepting experience no longer had significantly different scores than those with two to five

**Table III. Oblique rotation fourfactor pattern matrix from principal component analysis of preceptors' mean ratings<sup>a</sup>**

| Item number and descriptor                       | Factor 1<br>Interpersonal/<br>Social skills | Factor 2<br>Responsibility | Factor 3<br>Communication<br>skills | Factor 4<br>Appearance |
|--|---|----------------------------|-------------------------------------|------------------------|
| 21. Diplomatic                                   | <b>0.865</b>                                | 0.005                      | -0.002                              | -0.003                 |
| 4. Empathetic                                    | <b>0.864</b>                                | -0.146                     | 0.111                               | 0.001                  |
| 11. Respectful                                   | <b>0.843</b>                                | -0.003                     | -0.006                              | 0.010                  |
| 17. Nonjudgmental                                | <b>0.821</b>                                | 0.004                      | -0.001                              | -0.001                 |
| 20. Cooperative                                  | <b>0.776</b>                                | 0.200                      | -0.178                              | 0.005                  |
| 15. Accepts and applies constructive criticism   | <b>0.749</b>                                | 0.176                      | 0.002                               | -0.114                 |
| 16. Puts others' needs above his/her own         | <b>0.644</b>                                | 0.293                      | -0.002                              | -0.002                 |
| 13. Demonstrates accountability                  | <b>0.579</b>                                | 0.253                      | 0.005                               | 0.002                  |
| 5. Behaves in an ethical manner                  | <b>0.508</b>                                | -0.005                     | 0.155                               | 0.351                  |
| 10. Maintains confidentiality                    | <b>0.406</b>                                | 0.006                      | 0.008                               | 0.356                  |
| 8. Uses time efficiently                         | 0.108                                       | <b>0.844</b>               | -0.001                              | -0.008                 |
| 9. Self-directed in undertaking tasks            | -0.005                                      | <b>0.830</b>               | 0.176                               | -0.008                 |
| 7. Punctual                                      | -0.207                                      | <b>0.786</b>               | -0.233                              | 0.478                  |
| 1. Reliable and dependable                       | 0.010                                       | <b>0.683</b>               | -0.00 <sup>b</sup>                  | 0.187                  |
| 22. Follows through with responsibilities        | 0.221                                       | <b>0.637</b>               | 0.005                               | 0.004                  |
| 3. Produces quality work                         | 0.251                                       | <b>0.609</b>               | 0.005                               | -0.003                 |
| 25. Demonstrates a desire to exceed expectations | -0.002                                      | <b>0.597</b>               | 0.305                               | 0.009                  |
| 14. Prioritizes responsibilities effectively     | 0.344                                       | <b>0.575</b>               | 0.138                               | -0.166                 |
| 19. Active learner                               | -0.004                                      | <b>0.512</b>               | 0.446                               | -0.001                 |
| 18. Communicates assertively                     | -0.006                                      | 0.001                      | <b>0.949</b>                        | -0.004                 |
| 24. Demonstrates confidence                      | -0.006                                      | 0.208                      | <b>0.775</b>                        | -0.002                 |
| 6. Communicates articulately                     | 0.003                                       | 0.008                      | <b>0.741</b>                        | 0.004                  |
| 12. Communicates using appropriate body language | 0.327                                       | -0.192                     | <b>0.543</b>                        | 0.236                  |
| 2. Practices personal hygiene                    | 0.002                                       | 0.001                      | 0.001                               | <b>0.871</b>           |
| 23. Wears appropriate attire                     | 0.005                                       | 0.002                      | 0.004                               | <b>0.833</b>           |

<sup>a</sup> Rotation converged in 9 iterations.

<sup>b</sup> Bold numbers under factors indicate heaviest loading items for that factor

years experience and those with 20 years or more experience no longer had significantly different scores than those with six to ten years, but did have significantly higher scores than those with six months or less; preceptors practicing in chain pharmacies gave significantly higher scores than those practicing in all other settings except "other"; those preceptors who performed "other" functions gave significantly higher scores than those who performed clinical and administrative functions, but there was no longer a significant difference between clinical and distributive.

The significant differences among schools changed somewhat: school C's scores were now significantly lower than schools H, L and O, in addition to the schools mentioned previously; school E's scores were significantly higher than school D, but no longer statistically different from school M, in addition to those mentioned previously; and school F's scores were significantly lower than schools J and Q. All other schools' differences remained the same as with the original data set. The paired *t*-test between students' overall mean rating ( $4.26 \pm 0.48$ ) and their respective preceptors' overall mean rating ( $4.32 \pm 0.58$ ) was not statistically significant ( $P=0.083$ ,  $N=450$  complete pairs of student/preceptor instruments).

Exploratory factor analysis was conducted on both sets of preceptor data (with and without nonindependent observations). A total 590 (91 percent of 647) cases were examined in the complete data set (*i.e.*, nonindependent observations

included). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.975. Similarly to the pilot sample data, all items in this data set were positively correlated with one another and had significant *P* values of 0.001. This time, PCA extracted only two components (as opposed to three with the pilot sample data) that explained approximately 67 percent of the total variance.

Oblique rotation was conducted. Eleven items loaded on Factor 1 and fourteen items loaded on the second factor. Similar to the pilot sample analysis, review of the items loading on each factor was not easily interpretable. Factor 1 seemed to represent responsibility and communication skills, while Factor 2 seemed to represent personal characteristics. Because the distinctions were not clear and several items seemed to overlap or "not quite fit" with their respective factors, the total variance table was re-examined to see if extracting a different number of factors might be appropriate. The next three factors, in descending order, had eigenvalues of 0.896, 0.842 and 0.542. Since there was a significant decrease from the fourth to the fifth eigenvalue, it was decided to program PCA to extract four factors, as had been done with the pilot sample. The four-factor oblique rotation factor matrix is shown in Table IV. The items loading on the four factors were the same as those in the pilot study.

The interscale correlation coefficient calculations yielded Factor 1 correlating with Factors 2, 3, and 4 with coefficients

of 0.741, 0.703, and 0.653, respectively; Factor 2 correlating with Factors 3 and 4 with coefficients of 0.688 and 0.547, respectively; and, Factors 3 and 4 correlating at the level of 0.500.

The results of EFA conducted on preceptor data without non-independent observations (N=542) were very similar to those of the complete set. Item correlation coefficients were fairly high and all had significant *P* values less than of 0.001. PCA initially extracted two factors from this data set that accounted for approximately 66 percent of the total variance. Oblique rotation loaded twelve items on Factor 1 and thirteen items on Factor 2. The factor-item matches were identical to those with the other data set with the exception of one item. When programmed to extract four factors, the factor-item matches were identical with the exception of three items.

Similarly to the pilot sample, reliability analyses for both data sets were conducted on all instrument items together and the four subscales. None of the items, if deleted from the instrument, would drastically reduce the overall Cronbach's alpha coefficient of 0.973. The subscale represented by the ten items loading on Factor 1, "interpersonal/social skills," had a Cronbach's alpha of 0.949; the Factor 2 subscale (nine items), "responsibility," had an alpha of 0.948; Factor 3 (four items), "communication skills," had an alpha of 0.875; and the alpha of Factor 4 (two items), "appearance," was 0.844. Reliability analyses conducted on the data set with non-independent observations removed were not very different from the previous analyses. Cronbach's alpha coefficients for the entire scale and four subscales were, respectively, 0.972, 0.947, 0.949, 0.877 and 0.829.

Multiple regression was conducted on both data sets to determine if any of the demographic variables, or combinations of, could be used to predict preceptors' mean ratings of their students' behavioral professionalism. Pearson correlation coefficients calculated for each demographic variable with preceptors' mean rating were not very high; thus, it was decided to conduct multiple regression using only the independent variables that had significant correlations and those that were significant from the ANOVA tests: GPA, student gender, rotation practice setting, student functions performed most often, preceptor license year, preceptor education, years precepted, preceptor practice setting, preceptor functions performed most often, and school. The stepwise method of linear regression was employed. This is probably the most commonly used method and is a combination of two other procedures, the forward and backward methods(22).

This method produced three different models for both data sets: Model 1 included preceptor license year as the only variable, Model 2 included this variable and student gender, and Model 3 included these two and student function. Although all three models had significant F-values, they only explained 4.0 percent, 5.1 percent and 6.3 percent (from the original data set), respectively, and 2.7, 4.1 and 5.4 percent (from the data set without non-independent observations), respectively, of the variance in preceptors' mean ratings. Several other regression methods were employed for exploratory purposes, but none produced substantially different results from the stepwise method. It was determined not to explore the regression further because of the weak association of the independent variables with the dependent variable and the small squared correlation coefficients.

## DISCUSSION AND CONCLUSION

The Behavioral Professionalism Assessment instrument seems,

preliminarily, to be psychometrically sound based on measures of internal consistency, factor analysis, and interscale correlations. It was difficult to compare factorial and other statistical results of this study to other empirically or theoretically developed instruments for several reasons. First, classic instruments developed to measure professionalism were based on structural characteristics of professions and were self-reported based on respondents' perceptions(3,23). Secondly, items measuring professional behavior from other instruments, described in the Methods section, were most often part of larger instruments used to evaluate student performance during experiential rotations and had not been factor-analyzed. Lastly, the instrument developed and tested by Thomas et al combined a traditional professionalism scale with three other scales measuring students' professionalism, attitudes toward clinical pharmacy practice, and motivation to learn(7). This instrument was also self-administered and based on respondents' perceptions. Comparisons based on observations, however, of the conceptual factors from the Behavioral Professionalism Assessment form with "professional behavior competencies" found on other pharmacy schools' experiential evaluation tools were similar with regard to interpersonal and communication skills, level of responsibility, and professional appearance.

Although the main purpose of this study was to design and test an instrument to practically and reliably assess behavioral professionalism, some interesting differences among student and preceptor respondents were found. Since these data were somewhat complicated with inclusion, then exclusion, of non-independent responses in the statistical analyses, significant differences among student and preceptor demographic groups should be interpreted with caution. One can conclude from these, albeit mixed, results is that the majority of significant differences in students' scores were based on characteristics of the preceptors assessing the students, rather than the students themselves. These data and results were not explored further since it was a secondary objective of the study. Future research may include a more thorough exploration of these observations.

In summary, it was determined that the four phases of the project served their purposes and were successful in achieving in their objectives. Additional limitations in the methods and results are discussed below.

## Limitations

Although the majority of limitations were found in Phase IV, there were minor concerns from the first three phases. First, there is always a limitation when creating a new instrument that some prior literary references or similar projects were missed or the items chosen to represent this concept may not have truly represented its entire domain of dimensions. The greatest limitation from Phase II of the study was that experts from the areas of professionalism and professional behavior who have created their own instruments were not involved in the review process. Additionally, the reviewers utilized represented only 49 (61 percent) of the 80 schools of pharmacy in the U.S.; most likely not all types of practice settings or practitioners/preceptors were represented equally. From Phase III, the exploratory factor analysis conducted was a somewhat subjective process; other investigators might have interpreted and manipulated the data differently. Additionally, instrument items were in a non-labeled categorical order and not randomly mixed on the instrument.

From Phase IV, results from demographic comparisons cannot be generalized to all pharmacy students and preceptors

because of the moderate representation of these respondents compared to national demographics. Additionally, the respondents were essentially "volunteers" and were participating in summer rotations. No attempts were made to contact non-responders to assess potential bias, actively recruit other pharmacy schools for participation in the study, or assess whether students and preceptors participating in summer rotations are somehow "different" than those who participate in rotations during the regular school year.

The entire data set from Phase IV may have been skewed by the relative number of respondents from each school; no weighting scheme was used in analysis of these data. Also, it cannot be assured that those preceptors who completed the instrument for their students were truly those pharmacists and others in the supervisory capacity who spent the most time with the students.

Although the study had good external validity because of the use of the instrument in different settings, different rotations/programs, and with different students and preceptors, these aspects could have inadvertently contributed to greater variability than what is optimal for scale development. In general, it was decided that the study limitations have the greatest impact on the comparison results among students and preceptors, which were not the true focus of the study. Future testing with the instrument will help to determine if these limitations were truly detrimental to development of the instrument.

#### APPLICATIONS AND FUTURE RESEARCH

Many recommendations can be made from the experience of conducting this project. This section discusses applications of this project and ideas for future research.

One application of the 25-item instrument would be its immediate use to measure students' behavioral professionalism as they participate in experiential rotations, as was done with this project. The instrument could be reformatted to put items in their original categorical order with each section marked to ease completion. It would most likely be used in conjunction with other student evaluation forms to provide a more complete assessment of the students' performance during the rotation. Results from the instrument could be incorporated into the students' overall grade for the rotation or could be used more for qualitative dialogue and feedback between the student and preceptor, or both. It would be extremely beneficial to use the instrument prior to the end of the rotation; this would allow students to know what behavior was expected of them and where their strengths and weaknesses lie with regard to specific attributes. Subscales of the instrument could also be used. If preceptors wanted to focus on students' interpersonal relations/social skills, for example, they could use that subscale on its own or in conjunction with other measures.

The instrument and/or its subscales could also be used in other performance areas of curricula. Many schools utilize professional laboratories and recitation-type courses where students are active participants in the learning process. The instrument could be used in those environments similarly to its use for assessing students' performance during experiential rotations. In some classroom environments, use of certain subscales would be more appropriate than use of the entire instrument as some attributes would not be applicable. However, if use of the entire instrument was desired over one or two of the subscales, "N" ratings could be given to those attributes that are not applicable to the situation.

Multiple opportunities exist for research with this instru-

ment and in the area of professionalism. Students' scores from this instrument could be compared to their scores from other experiential rotation assessments to determine if any correlations exist. Other interesting comparisons might be made with scores from other measures, such as pharmacy school application and corresponding interview scores. Collection of more detailed demographic information from students and preceptors to compare with might also be of interest. It would be interesting to discover some independent characteristics possessed by students and/or preceptors that could help predict preceptors' mean ratings of students with this instrument.

To further develop of the instrument, the 25-item version should be tested with several other professional education environments in the manner as was done in this study to determine if the same results would be produced. In this case, it would be important to conduct confirmatory factor analysis (with a large sample) to determine if the factor structure from the former exploratory factor analysis holds true. It would also be important to answer these questions: are the reliabilities as high? Is the form still easy to use and interpret? These tests would serve to strengthen the instrument's external validity. Additionally, it would be important to establish other types of validity, such as convergent and divergent, by administering this instrument (or certain items from the instrument) concurrently with other instruments that measure similar and dissimilar constructs, respectively. After additional data have been collected and analyzed, a revised instrument with ten to twelve items could be introduced.

Good scales and instruments take years to develop. This project has laid the foundation for a career's worth of testing, modifying, and improving. Based on strong positive results from this project, this instrument will serve as a solid platform upon which to build a stream of research.

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## APPENDIX. ITEMS FROM 25-ITEM INSTRUMENT

### Item Numbers and Descriptors

1. Student is reliable and dependable, *i.e.*, can be counted on to fulfill responsibilities and meet expectations.
  2. Student practices personal hygiene, *i.e.*, maintains personal health and grooming habits acceptable to practice setting.
  3. Student produces quality work, *i.e.*, tasks and assignments are complete, accurate, and meet their respective objectives.
  4. Student is empathetic, *i.e.*, demonstrates appreciation of others' positions; attempts to identify with others' perspectives; demonstrates consideration towards others.
  5. Student behaves in an ethical manner, *i.e.*, acts in patients' best interests; acts in accord with the profession's and/or practice site's code of ethics.
  6. Student communicates articulately, *i.e.*, clearly communicates thoughts; uses appropriate terminology and vocabulary for intended audience.
  7. Student is punctual, *i.e.*, arrives at practice site and meetings early or on time; meets deadlines for completion of tasks and responsibilities.
  8. Student uses time efficiently, *i.e.*, allocates and utilizes appropriate amounts of time to fulfill responsibilities; utilizes others' time wisely.
  9. Student is self-directed in undertaking tasks, *i.e.*, after initial instruction of tasks/assignments/responsibilities, initiates activities to complete them; self-motivated; functions independently; seeks additional tasks after completing originals.
  10. Student maintains confidentiality, *i.e.*, engages in discussions or other activities involving patient- and/or site-specific information for purposes of fulfilling professional responsibilities only; maintains confidential nature of patient- and/or site-specific documents.
  11. Student is respectful, *i.e.*, demonstrates regard for patients, superiors, colleagues, other personnel, and property; acts in a manner that shows recognition that he/she is a guest at the practice site as a professional student.
  12. Student communicates using appropriate body language, *i.e.*, utilizes gestures and mannerisms that enhance formal and informal communication.
  13. Student demonstrates accountability, *i.e.*, holds oneself liable for tasks/ duties/responsibilities that he/she is responsible; does not blame others for mistakes or mishaps, nor avoids responsibilities.
  14. Student prioritizes responsibilities effectively, *i.e.*, organizes and approaches multiple tasks and assignments in a manner to produce desired outcomes.
  15. Student accepts and applies constructive criticism, *i.e.*, responds openly and positively to feedback; modifies behavior if necessary.
  16. Student puts others' needs above his/her own, *i.e.*, demonstrates an attitude of service by taking the necessary time and actions to help others; gives of oneself to benefit others.
  17. Student is nonjudgmental, *i.e.*, demonstrates an attitude of open-mindedness towards others and situations; does not "stereotype" others or prejudice situations.
  18. Student communicates assertively, *i.e.*, actively and appropriately engages in dialogue or discussion; not afraid to provide his/her viewpoint.
  19. Student is an active learner, *i.e.*, seeks knowledge; asks questions; searches for information; takes responsibility for own learning.
  20. Student is cooperative, *i.e.*, non-argumentative; willing and helpful.
  21. Student is diplomatic, *i.e.*, is fair and tactful in all dealings with patients, superiors, colleagues, and other personnel.
  22. Student "follows through" with responsibilities, *i.e.*, if task is left incomplete or problem is not resolved, student seeks aid or explains situation to parties who can follow-up on task or problem.
  23. Student wears appropriate attire, *i.e.*, adheres to dress code (written or unwritten); attire is acceptable to practice setting.
  24. Student demonstrates confidence, *i.e.*, acts and communicates in a self-assured manner, yet with modesty and humility.
  25. Student demonstrates a desire to exceed expectations, *i.e.*, goes "above and beyond the call of duty"; attempts to exceed minimal standards and requirements for tasks/assignments/responsibilities.
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