The Development and Validation of the Interprofessional Attitudes Scale: Assessing the Interprofessional Attitudes of Students in the Health Professions

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Abstract

Purpose

No validated tools assess all four competency domains described in the 2011 report *Core Competencies for Interprofessional Collaborative Practice* (IPEC Report). The purpose of this study was to develop and validate a tool based on the IPEC Report core competency domains that assesses the interprofessional attitudes of students in the health professions.

Method

In 2012, an interprofessional team of students and two of the authors developed and administered a survey to students from four colleges and schools at the University of Utah Health Sciences Center (Health, Medicine, Nursing, and Pharmacy). The authors randomly split the responses with complete data into two independent subsets: one for exploratory factor analysis (EFA), the other for confirmatory factor analysis (CFA). They performed these analyses to validate the tool, eliminate redundant questions, and identify subscales. Their analyses focused on aligning tool subscales with the IPEC Report core competencies and demonstrating good construct validity and internal consistency reliability.

Results

Of 1,549 students invited, 701 (45.3%) responded. The EFA produced a 27-item scale, with five subscales: teamwork, roles, and responsibilities; patient-centeredness; interprofessional biases; diversity and ethics; and community-centeredness (Cronbach alpha coefficients: 0.62 to 0.92). The CFA indicated that the content of the five subscales was consistent with the EFA model.

Conclusions

The Interprofessional Attitudes Scale (IPAS) is a novel tool that, compared with previous assessment instruments, better reflects current thinking about interprofessional competencies. IPAS should prove useful to health sciences institutions committed to training students to work collaboratively in interprofessional teams.

Medical education in the United States has changed dramatically since the 1970s when the newly chartered Institute of Medicine (IOM) identified the education of health professionals as one of its six primary areas of concern.[1] The roles of the physician and of other clinicians have also changed since then, particularly in response to two IOM reports: the 2001 *Crossing the Quality Chasm: A New Health System for the 21st Century*[2] and the 2003 *Health Professions Education: A Bridge to Quality*.[3] These reports identified major problems in the U.S. health care system, including health professionals working in "silos" as opposed to patient-centered teams.[2] To overcome these problems and meet the needs of the 21st-century health system, the 2003 IOM report identified the ability to deliver patient-centered care as a member of an interdisciplinary team as one of the educational goals for all health professionals.[3] As described in a 2010 World Health Organization report,[4] preparing a "collaborative practice-ready health workforce" is also a global goal for interprofessional education (IPE), defined as "when two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes."

In response to the need to establish IPE core competencies, the 2011 *Core Competencies for Interprofessional Collaborative Practice* report (herein referred to as the IPEC Report)[5] defined four interprofessional core competency domains: values/ethics for interprofessional practice; roles/responsibilities; interprofessional communication; and teams and teamwork.[5] The IPEC Report also identified "the need for assessment instruments to evaluate interprofessional competencies"[5] as a key challenge to implementing IPE competencies.

Few standardized, validated instruments for assessing IPE competencies or related attitudes exist. The Readiness for Interprofessional Learning Scale (RIPLS)[6] and the extended RIPLS[7] represent two well-established tools for assessing interprofessional attitudes; however, these and other tools were developed before the IPEC Report and do not cover the full range of interprofessional competencies. In this article, we describe the results of our efforts to develop and validate an interprofessional attitudes scale using items derived from the extended RIPLS[7] and items added to better cover the four IPEC Report core competency domains.[5] We administered a survey to a large and diverse group of health professional students in 2012 and analyzed the survey data using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to validate the instrument and

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establish subscales that correspond to the IPEC Report core competencies.

Method

Survey development and deployment

In 2012, an interprofessional group of students and faculty (including two of the authors: J.N. and D.K.B.) developed a survey to assess interprofessional attitudes among health professional students. Respondents were recruited from the four schools and colleges composing the University of Utah Health Sciences Center (UUHSC). At the time, the IPE curriculum was undergoing significant changes and expansion, and the survey was used to obtain data regarding students' attitudes towards interprofessionalism and IPE early on in the IPE curriculum redevelopment.

The survey included questions to collect demographic data and 26 items based on the extended RIPLS (five-point Likert scale: 1 = strongly disagree, 5 = strongly agree),[7] with minor wording modifications (e.g., "health care professionals" was changed to "health professionals/students" or "health sciences students"). The survey also included 16 new items covering the competency domains from the IPEC Report that were not covered by the extended RIPLS. Two of the authors (J.N. and D.K.B.) with experience in survey design helped create the survey. Four UUHSC students from different disciplines assessed the survey for content coverage and clarity. The University of Utah institutional review board granted the study exempt status, and the deans of the four UUHSC colleges and schools approved its dissemination to their respective students.

In March 2012, electronic survey invitations were sent by e-mail using Qualtrics (Provo, Utah) to 1,549 UUHSC undergraduate and graduate students (colleges and schools targeted are shown in Supplemental Digital Figure 1, which acts as the CONSORT flow diagram, at http://links.lww.com/ACADMED/A281). Students from these programs learn and practice in settings that range from a tertiary care academic medical center to rural health clinics. Invitations made clear the voluntary and anonymous nature of the survey and included an informed consent document. No incentives for participation were provided. No invalid (i.e., "bounce-back") e-mail addresses were identified by the survey software. Students had three weeks to complete the survey.

Statistical analysis

Data were analyzed using SPSS version 20 and Analysis of Moment Structures (AMOS) version 20 (IBM, Armonk, New York) for the EFA and CFA analyses, respectively. Descriptive statistics (means, standard deviations, and percentages) were used to describe the demographic characteristics of the sample. Because of the large sample size and small number of missing data (23 responses total), we chose to use listwise deletion of responses as it would be unlikely that such a small number of deletions would alter outcomes.

To undertake independent EFA and CFA, we randomly split the total sample into two independent subsets: one for EFA (n = 342), the other for CFA (n = 336). At least 10 responses per initial item were included in the EFA.[8]

Exploratory factor analysis. We used an a priori framework based on the extended RIPLS[7] with 16 items related to the IPEC Report competencies, giving an initial pool of 42 items. We conducted an item analysis by examining item means, standard deviations, interitem correlation matrix, and item–total correlations. Structural validity of the scale was then examined using EFA. Because all of the items were associated with interprofessional attitudes, we assumed that potential factors related to IPE were correlated, and we conducted principal axis factoring (PAF) analysis with an Oblimin rotation with the factor pattern matrix to determine the goodness-of-fit of our model. We evaluated assumptions regarding matrix identity and sampling adequacy using the Bartlett test of sphericity and the Kaiser–Meyer–Olkin (KMO) test. Items were considered for deletion if their correlations with other items within their potential factor were too high ($>|0.80|$) or too low ($<|0.20|$); if they had factor loadings greater than 0.30 on more than one factor; if their measures of sampling adequacy values were less than 0.70; or if they were wordy, unclear, or awkward compared with items with similar content. With each item deletion, we generated and evaluated a new EFA model for the best theoretical and statistical fit.

The number of factors to be retained in the final solution was determined by examining the scree plot, then using the "eigenvalues > 1" criterion.[8] To be retained in the final solution, a factor needed to have at least three items loading greater than 0.30 on that factor with no loadings of those items on other factors. A key criterion was that all items loading on a given factor make intuitive sense as being related statements given our interest in mapping factors to the IPEC Report core competencies. Interfactor correlations for the final model were examined to determine the extent of correlations among factors.

Internal consistency reliability for each retained factor was assessed using Cronbach alpha coefficients. Because this was an initial development of the tool, alpha coefficient values greater than or equal to 0.60 were considered acceptable.[9,10]

Confirmatory factor analysis. To undertake the CFA, we began with the a priori framework generated by the EFA using data from the other subset of the randomly split sample (n = 336). Both first- and second-order CFA models were examined. We used a second-order model to verify the links between factors and their items identified in the EFA and to evaluate the extent to which the identified factors represented the overarching construct, which we defined as being attitudes toward interprofessional collaboration.

As with the EFA, several criteria were used to determine whether an item would be retained in the CFA model. The path coefficients between an item and its predicted subscale from the EFA needed to be statistically significant ($P < .05$). Modification indices generated from the structural parameters presented in the CFA were used as guidelines to identify additional statistically significant and theoretically meaningful paths not hypothesized in the EFA. These modification indices are typically used in CFA to provide suggestions for model modifications that are likely to result in a better fit of the model.[8,11]

To assess the quality of the model fit to the data, we used the normed χ^2 goodness-of-fit test (χ^2/df); root mean square error of approximation (RMSEA); and various incremental (normed

fit index and comparative fit index), predictive (expected cross-validation index [ECVI], Akaike information criteria [AIC]), and absolute (goodness-of-fit index [GFI]) fit indices.[11] A minimum standard of normed χ^2 value between 2 and 3, values of at least 0.90 for the incremental and absolute fit indices, and a maximum value of 0.08 for the RMSEA were set.[12,13] The hypothesized values for both the ECVI and AIC needed to be smaller than the independence models.[11]

On determining the CFA model and comparing it to our EFA solution, we finalized the number of factors and examined each item that loaded on them. On the basis of the item loadings and their content, we named the factors that represent the subscales for the tool.

Results

Sample characteristics

The overall response rate was 45.3% (701/1,549; see Supplemental Digital Figure 1 for the CONSORT flow diagram at http://links.lww.com/ACADMED/A281). A total of 23 responses were excluded from analysis: 7 because of missing data regarding discipline of study and 16 because the surveys were incomplete and could not be used for the intended EFA and CFA modeling. The final sample included 678 respondents.

Table 1 compares the respondent characteristics that were used for the EFA and CFA analyses. Of the 678 respondents included in the final analyses, 410 (60.6%) were female, 541 (82.2%) were Caucasian, and 264 (38.9%) were from the School of Medicine. Of respondents, 520 (76.7%) had at least one experience in IPE. We found no statistically significant differences in demographics between the EFA and CFA samples (see Table 1), nor did we find statistically significant differences between the respondents and the cohort of students invited to participate.

Exploratory factor analysis

We analyzed the factor structure using PAF with an Oblimin rotation. Both the Bartlett test of sphericity ($\chi^2 = 11{,}515$, $P < .001$) and the KMO test (0.92) indicated that the correlation matrix was factorable. The final result of the EFA was a scale that we named the Interprofessional Attitudes Scale (IPAS).

Table 1

Comparison of the Characteristics of Respondents to a Survey About Interprofessional Attitudes, by Factor Analysis Type, 2012 (n = 678)

Characteristic	EFA, n (% of 342)	CFA, n (% of 336)	Total, n (% of 678)[a]	*P* value[b]
Gender				.89
Male	134 (39.2)	133 (39.7)	267 (39.4)	
Female	208 (60.8)	202 (60.3)	410 (60.6)	
Racial/ethnic identity				.59[c]
White, Caucasian	272 (81.4)	269 (83.0)	541 (82.2)	
Other	62 (18.6)	55 (17.0)	117 (17.8)	
Black	5 (1.5)	5 (1.5)	10 (1.5)	
East Asian	15 (4.5)	9 (2.8)	24 (3.6)	
Southeast Asian	10 (3.0)	7 (2.2)	17 (2.6)	
South Asian	2 (0.6)	3 (0.9)	5 (0.8)	
Pacific Islander	1 (0.3)	3 (0.9)	4 (0.6)	
Native American, Alaska Native	1 (0.3)	2 (0.6)	3 (0.5)	
Hispanic, Latino/Latina	13 (3.9)	11 (3.4)	24 (3.6)	
Middle Eastern, Western Asian	3 (0.9)	4 (1.2)	7 (1.1)	
More than one	12 (3.6)	11 (3.4)	23 (3.5)	
Age				.33
13–22	14 (4.1)	7 (2.1)	21 (3.1)	
23–32	230 (67.3)	239 (71.3)	469 (69.3)	
33–42	65 (19.0)	54 (16.1)	119 (17.6)	
43–52	21 (6.1)	23 (6.9)	44 (6.5)	
53–62	10 (2.9)	12 (3.6)	22 (3.2)	
63–72	2 (0.6)	0 (0.0)	2 (0.3)	
University of Utah college/school				.92
College of Health	43 (12.6)	42 (12.5)	85 (12.5)	
College of Nursing	100 (29.2)	95 (28.3)	195 (28.8)	
College of Pharmacy	70 (20.5)	64 (19.0)	134 (19.8)	
School of Medicine	129 (37.7)	135 (40.2)	264 (38.9)	
How often do you interact with patients during your clinical activities?				.56
Never	41 (12.1)	35 (10.5)	76 (11.3)	
Less than once a month	18 (5.3)	23 (6.9)	41 (6.1)	
Once a month	8 (2.4)	7 (2.1)	15 (2.2)	
2–3 times a month	36 (10.7)	28 (8.4)	64 (9.5)	
Once a week	34 (10.1)	33 (9.9)	67 (10.0)	
2–3 times a week	37 (10.9)	52 (15.6)	89 (13.2)	
Daily	164 (48.5)	156 (46.7)	320 (47.6)	

Abbreviations: EFA indicates exploratory factor analysis; CFA, confirmatory factor analysis.
[a]Within each demographic characteristic, not all totals equal 678 because of missing data.
[b]χ^2 test used.
[c]χ^2 test was based on white, caucasian racial/ethnic identity versus other racial/ethnic identity.

This tool has 27 survey questions (items) that load into five factors (subscales). Each item had factor loadings greater than 0.30 on only one of the five factors (see Table 2). On examination of their content, we named these subscales on the basis of the relatedness of their items: teamwork, roles, and responsibilities; patient-centeredness; interprofessional bias; diversity and ethics; and community-centeredness. These subscales do not map in a one-to-one manner to the

Table 2

Factor Loading Results of an Exploratory Factor Analysis of the Interprofessional Attitudes Scale, 2012

Type of data	M (SD)	Loadings[a] TRR	PC	IB	DE	CC
Characteristic						
Eigenvalues	N/A	3.52	1.96	1.37	1.20	8.43
% of variance	N/A	13.05	7.26	5.08	4.13	31.23
Subscale item						
TRR1. Shared learning before graduation will help me become a better team worker.	3.94 (0.86)	**0.77**	0.10	0.03	–0.10	0.01
TRR2. Shared learning will help me think positively about other professionals.	4.04 (0.84)	**0.76**	–0.02	0.01	0.03	0.00
TRR3. Learning with other students will help me become a more effective member of a health care team.	4.08 (0.74)	**0.76**	0.06	–0.05	–0.05	–0.01
TRR4. Shared learning with other health sciences students will increase my ability to understand clinical problems.	4.15 (0.72)	**0.75**	0.00	–0.07	–0.06	0.05
TRR5. Patients would ultimately benefit if health sciences students worked together to solve patient problems.	4.33 (0.71)	**0.74**	0.02	0.08	–0.06	0.03
TRR6. Shared learning with other health sciences students will help me communicate better with patients and other professionals.	4.04 (0.79)	**0.72**	–0.08	0.06	0.16	–0.04
TRR7. I would welcome the opportunity to work on small group projects with other health sciences students.	3.68 (1.00)	**0.72**	–0.03	–0.03	–0.06	0.08
TRR8. It is not necessary for health sciences students to learn together.[b]	3.83 (0.95)	**0.71**	0.03	–0.07	0.07	–0.03
TRR9. Shared learning will help me understand my own limitations.	4.04 (0.79)	**0.63**	0.02	0.03	0.04	0.02
PC1. Establishing trust with my patients is important to me.	4.66 (0.54)	0.00	**0.91**	0.01	0.02	–0.06
PC2. It is important for me to communicate compassion to my patients.	4.59 (0.60)	0.03	**0.91**	–0.04	–0.07	0.02
PC3. Thinking about the patient as a person is important in getting treatment right.	4.63 (0.57)	0.01	**0.73**	–0.01	0.12	0.01
PC4. In my profession, one needs skills in interacting and cooperating with patients.	4.59 (0.66)	–0.02	**0.70**	0.03	0.01	0.07
PC5. It is important for me to understand the patient's side of the problem.	4.56 (0.59)	0.06	**0.70**	0.02	0.03	0.00
IB1. Health professionals/students from other disciplines have prejudices or make assumptions about me because of the discipline I am studying.	3.53 (0.91)	–0.06	–0.01	**0.94**	0.00	0.03
IB2. I have prejudices or make assumptions about health professionals/students from other disciplines.	2.89 (1.05)	–0.08	0.04	**0.60**	–0.11	0.02
IB3. Prejudices and assumptions about health professionals from other disciplines get in the way of delivery of health care.	3.71 (0.98)	0.20	–0.02	**0.34**	0.13	–0.03
DE1. It is important for health professionals to respect the unique cultures, values, roles/responsibilities, and expertise of other health professions.	4.80 (0.48)	0.01	–0.05	–0.04	**0.88**	0.02
DE2. It is important for health professionals to understand what it takes to effectively communicate across cultures.	4.76 (0.51)	0.04	0.02	–0.04	**0.75**	0.11
DE3. It is important for health professionals to respect the dignity and privacy of patients while maintaining confidentiality in the delivery of team-based care.	4.89 (0.33)	–0.07	0.11	0.02	**0.71**	0.10
DE4. It is important for health professionals to provide excellent treatment to patients regardless of their background (e.g., race, ethnicity, gender, sexual orientation, religion, class, national origin, immigration status, or ability).	4.89 (0.34)	–0.04	0.17	0.00	**0.66**	0.02
CC1. It is important for health professionals to work with public health administrators and policy makers to improve delivery of health care.	4.59 (0.60)	–0.03	0.05	–0.02	0.00	**0.88**
CC2. It is important for health professionals to work on projects to promote community and public health.	4.60 (0.61)	0.03	–0.02	0.03	0.02	**0.85**
CC3. It is important for health professionals to work with legislators to develop laws, regulations, and policies that improve health care.	4.54 (0.67)	–0.04	–0.04	0.00	–0.04	**0.83**
CC4. It is important for health professionals to work with nonclinicians to deliver more effective health care.	4.53 (0.64)	0.04	0.04	0.03	0.00	**0.78**
CC5. It is important for health professionals to focus on populations and communities, in addition to individual patients, to deliver effective health care.	4.51 (0.63)	0.06	–0.04	–0.01	0.04	**0.72**
CC6. It is important for health professionals to be advocates for the health of patients and communities.	4.71 (0.52)	0.02	0.11	–0.01	0.16	**0.69**

Abbreviations: M indicates mean; SD, standard deviation; N/A, not applicable; TRR, teamwork, roles, and responsibilities; PC, patient-centeredness; IB, interprofessional bias; DE, diversity and ethics; CC, community-centeredness.
Note: Subscale item extraction method: principal axis factoring; rotation method: Oblimin with Kaiser normalization.
[a]Factor loading > 0.30 for each item in bold.
[b]TRR8 is reverse-coded for a positive correlation with items in the TRR subscale.

Table 3

Interfactor Correlations and Cronbach α Coefficients of an Exploratory Factor Analysis of the Interprofessional Attitudes Scale, 2012 (n = 342)

Subscale	k	M (SD)	Interfactor correlations: Pearson *r* (Cronbach α)[a]				
			TRR	PC	IB	DE	CC
Teamwork, roles, and responsibilities	9	4.02 (0.63)	(0.91)	—	—	—	—
Patient-centeredness	5	4.60 (0.50)	0.28[b]	(0.90)	—	—	—
Interprofessional bias	3	3.38 (0.74)	0.11[c]	0.08	(0.62)	—	—
Diversity and ethics	4	4.83 (0.36)	0.25[b]	0.47[b]	0.03	(0.87)	—
Community-centeredness	6	4.58 (0.52)	0.32[b]	0.43[b]	0.04	0.56[b]	(0.92)

Abbreviations: TRR indicates teamwork, roles, and responsibilities; PC, patient-centeredness; IB, interprofessional bias; DE, diversity and ethics; CC, community-centeredness; M, mean; SD, standard deviation.
[a]Cronbach α values are those in parentheses on the diagonal.
[b]$P < .01$.
[c]$P < .05$.

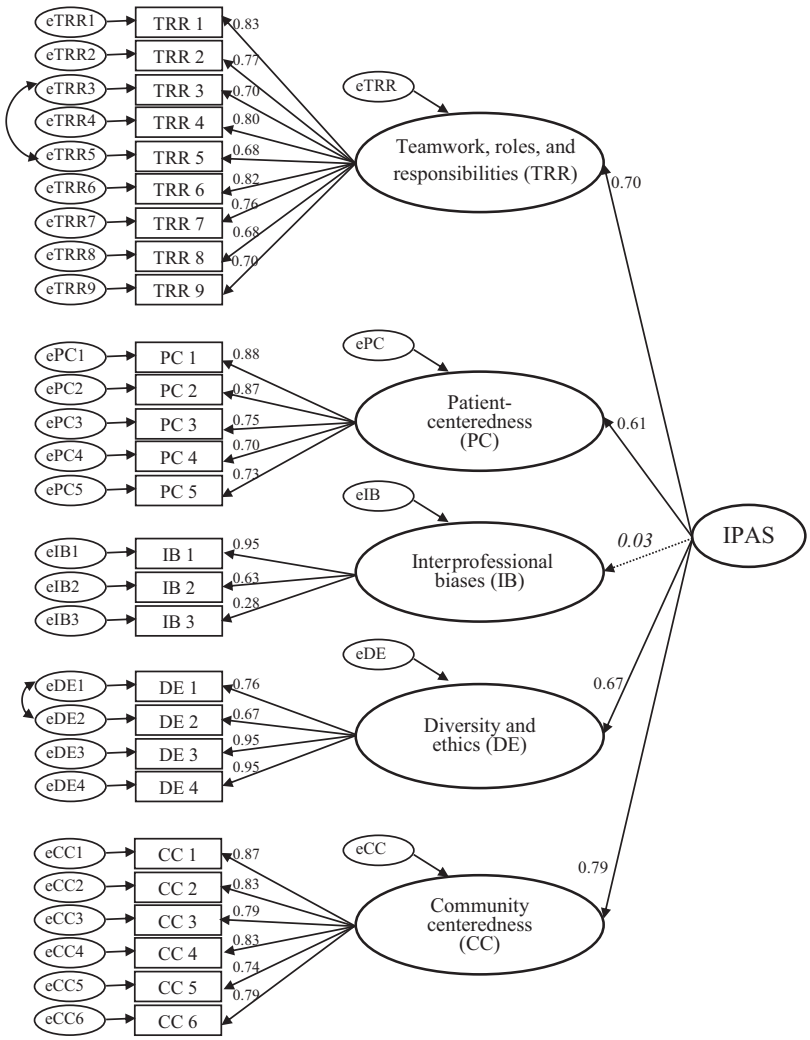

Figure 1 Confirmatory factor analysis model of the Interprofessional Attitudes Scale (IPAS), 2012. The values presented above the arrows from IPAS to its subscales are path coefficients; they represent the relationship between IPAS and its subscales. Two sets of items, TRR3 and TRR5, and DE1 and DE2, were significantly correlated; these correlations are represented as curved arrows. The path coefficient for the interprofessional biases subscale (0.03; $P = .61$) (see the dotted arrow) is low, indicating that this subscale did not load significantly on IPAS. See the text for more information.

four IPEC Report core competency domains. However, each of the four IPEC competency domains is represented by items in one or more of the IPAS subscales.

Cronbach alpha coefficients assessing internal consistency reliability for these five factors ranged between 0.62 and 0.92 (see Table 3). The Cronbach alpha of 0.62 for the interprofessional biases subscale was low but not surprising given the small number of items (k = 3) included.[8] We confirmed our assumption that potential factors would be correlated; the intersubscale correlations ranged from very low (0.03 between interprofessional biases, and diversity and ethics) to medium (0.56 between diversity and ethics, and community-centeredness).

Confirmatory factor analysis

The CFA indicated that all of the items loaded significantly ($P < .05$) on their respective factors specified in the EFA model with standardized regression coefficients ranging from 0.28 to 0.95 (see Figure 1). The modification indices indicated that only two minor additions to the resulting model were theoretically meaningful—that is, the correlation between error terms for two items on the teamwork, roles, and responsibilities subscale (TRR3 and TRR5) and two items on the diversity and ethics subscale (DE1 and DE2; see Figure 1).

The content of the five CFA subscales was consistent with the EFA model. The Cronbach alpha coefficients were between 0.61 and 0.92 (data not shown). The range of Pearson correlations for these subscales was between −0.04 and 0.56 (data not shown), similar to the result of the EFA model (between 0.03 and 0.56). Independent-samples *t* test results indicate that there is no statistically significant difference between the EFA and CFA models with regard to the mean value of responses on any subscale (see Table 4).

Goodness-of-fit statistics

Table 5 reports the second-order goodness-of-fit statistics for the IPAS. The normed χ^2 statistic (2.29) indicated a satisfactory fit of the model (desired range of values: 2–5). All of the incremental fit indices and GFI (0.86–0.93) were very close to or above the target level (0.90). The RMSEA coefficient (0.062; 90% confidence

Table 4

Comparison of Interprofessional Attitudes Subscales by Factor Analysis Type, 2012

Subscale	EFA, M (SD)	CFA, M (SD)	Independent-samples *t* tests		
			t	*df*	*P*
Teamwork, roles, and responsibilities	4.02 (0.63)	4.03 (0.62)	–0.23	676	.82
Patient-centeredness	4.60 (0.50)	4.62 (0.46)	–0.50	676	.62
Interprofessional biases	3.38 (0.74)	3.34 (0.71)	0.68	676	.50
Diversity and ethics	4.83 (0.36)	4.85 (0.36)	–0.46	676	.65
Community-centeredness	4.58 (0.52)	4.59 (0.51)	–0.30	676	.77

Abbreviations: EFA indicates exploratory factor analysis; CFA, confirmatory factor analysis; M, mean; SD, standard deviation.

interval: 0.056–0.068) was within acceptable limits.

Discussion

Until recently, a paucity of conceptual frameworks and tools existed for assessing IPE outcomes.[7,14] The 2011 IPEC Report provided such a framework in the form of interprofessional core competency domains, which we used to develop a tool to assess interprofessional attitudes. Our tool, IPAS, expands upon RIPLS, one of the most widely used IPE assessment instruments even though the reliability of its items and subscales has been challenged.[15,16] Our analysis using independent EFA and CFA modeling indicated that IPAS has good construct validity.

Table 5

Goodness-of-Fit Statistics for the Confirmatory Factor Analysis of the Interprofessional Attitudes Scale, 2012 (n = 336)

Solution	Result
Absolute fit indices	
χ^2 goodness of fit	724.66[a]
df	317
Normed χ^2 (χ^2/df)	2.29
Root mean square error of approximation (RMSEA) (90% confidence interval)	0.062 (0.056–0.068)
Goodness-of-fit index (GFI)	0.86
Incremental fit indices	
Normed t index	0.88
Comparative t index	0.93
Predictive fit index: Expected cross-validation index (ECVI)	
Hypothesized	2.53
Saturated	2.26
Independence	18.54
Akaike information criterion (AIC)	
Hypothesized	846.66
Saturated	756.00
Independence	6,210.88

[a]*P* < .001.

Previous work validating the original 19-item RIPLS using factor analysis methods resulted in three subscales—teamwork and collaboration; professional identity; and roles and responsibilities.[6] We retained 9 items from RIPLS, including 4 items from teamwork and collaboration and 5 items from professional identity. All loaded into the teamwork, roles, and responsibilities subscale in IPAS. Analysis of the 23-item extended RIPLS identified three subscales—teamwork and collaboration; sense of professional identity; and patient-centeredness.[7] We retained 14 items from the extended RIPLS in IPAS. Five items were from the extended RIPLS patient-centeredness subscale and loaded into the IPAS patient-centeredness subscale. Eight items were from the extended RIPLS teamwork and collaboration subscale and loaded into the IPAS teamwork, roles, and responsibilities subscale. We retained only 1 item from the extended RIPLS sense of professional identity subscale; it loaded into the teamwork, roles, and responsibilities subscale. The three subscales unique to IPAS are diversity and ethics, community-centeredness, and interprofessional biases. None of the RIPLS or extended RIPLS items loaded into these new subscales. Thus, IPAS covers a wider range of interprofessional attitudes than RIPLS using a 27-item scale, which most users can complete in less than 10 minutes.

IPAS is novel because it links the assessment of IPE to the IPEC Report core competencies.[7] Further, because most development and testing of IPE instruments to date has occurred outside the United States, IPAS is useful as a scale developed and validated at a large U.S. academic health center with a range of health professional programs. To make it widely available, we will submit IPAS to the online National Center for Interprofessional Practice and Education (nexusipe.org). The use of IPAS could allow educators to establish baseline attitudes toward IPE, compare attitudes among different groups, tailor IPE experiences to specific groups, and develop optimal IPE programs. In addition, IPAS could be used longitudinally for pre- and postintervention assessment. Validation for this purpose is needed, however, so our future plans include data collection at both the University of Utah and the University of New Mexico.

Strengths and limitations

Though our survey had a response rate of 45% (a response rate comparable to previous RIPLS analyses[16]), the sample size (678 usable responses) was sufficiently large to allow independent EFA and CFA. Moreover, the demographics of the respondents were representative of the entire student population invited to participate. A potential limitation, however, is that our analysis is based on data from a single educational institution. Although the participants from this institution represent diverse health professions, IPE and collaborative practice often involves an even greater number of professions. Future work will focus on evaluating IPAS at other institutions and in a broader range of health professions, including with students from the mental health professions, social work, speech pathology/disorders, occupational therapy, health promotion, and genetic counseling. Although we did not investigate differences among the professional groups we surveyed, future research should focus on attaining sufficient numbers of each profession in the sample so that item and subscale group comparisons can be made. Additionally, IPAS should be evaluated in postgraduate settings (e.g., residents and fellows), among practicing health professionals, and among faculty. Finally, although the survey was administered to a student body that had been exposed to very few formal IPE experiences,

responses to many of the items showed very favorable attitudes towards interprofessionalism. This "ceiling effect," which is also seen in other scales such as the RIPLS and the Interdisciplinary Education Perception Scale,[17] can make it difficult to detect changes in interprofessional attitudes in longitudinal studies. Thus, we may have to restructure some items and response formats to encourage a wider range of responses, such as using a 100-point slider bar instead of a traditional five-point Likert scale.

Whereas IPAS was designed to address all four core competency domains defined in the IPEC Report, the five subscales that we identified do not map directly to those core competencies. To a large degree, this reflects the overlapping nature of interprofessional competencies and the difficulty in designing a tool with subscales (based on statistical analyses) that can address specific interprofessional competencies. Of note, the interprofessional biases subscale did not correlate with any of the other subscales (see Figure 1), indicating that it assesses unique interprofessional attitudes. We chose to keep this subscale in IPAS because the attitudes it assesses impact several IPEC Report core competencies, such as roles/responsibilities, teams and teamwork, and values/ethics of interprofessional practice. Future efforts will focus on refining and developing additional IPAS items to assess the full range of interprofessional competencies described in the IPEC Report.

Finally, IPAS was not designed to directly assess interprofessional skills or the impact of IPE on health care delivery. Additional tools that complement IPAS, such as objective structured clinical exams and prospective outcomes studies, are needed to fully assess the effectiveness of an IPE program. Ultimately, a comparison of assessment tools should demonstrate a relationship between interprofessional attitudes and higher-order interprofessional outcomes (skills, behaviors, and competencies) that improve collaborative patient-centered care.

Conclusions

IPAS represents a novel tool for the assessment of interprofessional attitudes. Unlike prior scales, it was designed to incorporate the four core competency domains outlined in the 2011 IPEC Report.[5] Thus, IPAS offers a simple IPE assessment tool that reflects current thinking about interprofessional competencies and should prove useful to a range of health sciences institutions committed to training students to work in interprofessional teams.

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