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## Development and validation of IMAQ: Integrative Medicine Attitude Questionnaire

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### Abstract

**Background:** Complementary/alternative medicine and integrative medicine (CAM/IM) are increasingly used in the U.S. We set out to develop and validate a brief questionnaire measuring health care provider and medical student attitudes regarding these approaches to healthcare.

**Methods:** IMAQ is a 29-item, 7-point Likert scale rated instrument, developed from focus groups consisting of faculty, fellows, visiting residents, and medical students at a university based integrative medicine program. Respondents included 111 (of 574 contacted) internal medicine physicians on an academic medical center CME list and 85 healthcare providers (mostly physicians) attending an American Holistic Medical Association Annual Conference (296 attending). Cohorts were selected for expected differences in attitudes toward CAM/IM.

**Results:** Factor analysis demonstrated that a 2 factor solution best explained the variance in responses (38%). Factor 1 ("openness to new ideas and paradigms") explained 26% of variance with loadings ranging from 0.79 to 0.3, with factor 2 ("value of both introspection and relationship to patient") contributing an additional 12% of the explained variance with loadings ranging from 0.69 to 0.42. Both factors demonstrated adequate reliability. Factor 1 had a Cronbach's alpha of 0.91, while factor 2 was 0.72. As expected, AHMA conference attendees scored higher ( $F = 120.00$ ,  $p < 0.001$ ) than the internists on the IMAQ, supporting the construct validity. Although 63% of the AHMA subjects, and only 32% of the internists were female, analysis revealed that gender did not explain the score differences ( $F = 2.6$ ,  $p > 0.05$ ).

**Conclusions:** Analysis of the IMAQ provided evidence of its reliability and validity in measuring attitudes toward CAM/IM, specifically openness to new ideas and paradigms, and the value of relationship to self and patient. Initial findings support use of the IMAQ in measuring attitudes of students and practitioners towards CAM/IM interventions as a first step in understanding willingness to use these approaches to healing. It is our desire that this preliminary instrument will continue to be refined as the field of CAM/IM matures.

### Background

The use of complementary and alternative medicine

(CAM)/integrative medicine (IM) in the U.S. is growing. By 1997, yearly visits to "alternative" practitioners had

increased to 629 million visits, exceeding total visits to all primary care physicians [1]. Estimated expenditures for alternative medicine professional services rose 45.2% between 1990 and 1997 and were conservatively estimated at \$27 billion out-of-pocket, surpassing the 1997 out-of-pocket expenditures for all U.S. hospitalizations [1]. Usage of CAM/IM does not appear to be confined to any well-circumscribed socioeconomic group, and is common in underserved populations [2]. Most US medical schools now offer course work addressing CAM/IM [3]. In several studies, medical students consistently expressed interest in gaining more exposure to these health care approaches [4,5]. The preliminary data indicate these curricular changes affect not only knowledge of CAM, but also medical student attitudes toward CAM [6].

The Consortium of Academic Health Centers for Integrative Medicine, representing top level medical educators in the U.S., expects to establish programs of integrative medicine in 20% of US medical schools within the next few years [7]. It is important to clarify the definitions of CAM and IM. The Cochrane Collaboration defines CAM as "a broad domain of healing resources that encompasses all health systems, modalities, and practices and their accompanying theories and beliefs, other than those intrinsic to the politically dominant health system of a particular society or culture in a given historical period. CAM includes all such practices and ideas self-defined by their users as preventing or treating illness or promoting health and well-being. Boundaries within CAM and between the CAM domain and that of the dominant system are not always sharp or fixed" [8]. Although integrative medicine often includes CAM, IM also encompasses a philosophical model focused on prevention, wellness, and healing that goes beyond simply inserting CAM modalities into the conventional, disease-focused model of medicine [9]. IM operates from the premise that a primary responsibility of practitioners is prevention, and that whenever possible, simple, safe, cost-effective treatments should precede more invasive, risky, expensive ones. A humanistic, relationship-centered, partnership approach to care is adopted. IM practitioners emphasize providing hope, education and therapeutic approaches that match an individual's world-view. Thus, IM focuses on wellness in both patient and provider at biological, psychological, social, and spiritual levels while integrating the safest and most effective of conventional and CAM therapies. IM posits a synergistic effect of such a holistic approach that fosters healing.

Despite growing interest and increasing availability of course work in CAM at most US medical schools, research to date has not yet examined practitioner and medical student attitudes toward CAM and IM in particular using validated instruments. Our goal was to develop a reliable,

psychometrically sound self-report questionnaire capable of measuring healthcare provider and student IM values, to provide educators with a useful tool for sensibly implementing, evaluating, and revising curricula in CAM/IM. Attitude is one critical component shaping the way that medical students will ultimately practice medicine [10]. Despite the close relationship between CAM/IM, the purpose of this questionnaire is to assess IM in particular.

## Methods

A project approval form was submitted to the University of Arizona IRB Human Subjects Committee and received exemption from full review.

### Item Development and Content Validity

The first step in IMAQ development involved focus groups consisting of faculty, fellows, visiting residents, and medical students working or training at a university based program in integrative medicine. Participants scored each proposed item and recommended modifications or elimination by systematic review resulting in numerical estimation [11]. Domain identification was first performed by conducting a literature review using the term "integrative medicine" and searching Medline, PsychInfo, AMED. Domains derived from the nascent literature in the field of integrative medicine [12], and included concepts such as:

- Innate healing ability of the body
- Role of placebo in healthcare
- Clinical importance of intuition
- Provision of hope to patients
- Healing as distinct from curing or fixing
- Relationship-centered/Patient-oriented care
- Role of spirituality of patients and practitioners
- End-of-life care as an opportunity for healing
- Significance of physician self-exploration (personal growth) and modeling of healthy lifestyles for patients
- Synergy and additive nature of using multiple medical systems
- Usefulness of evidence beyond RCT
- Indications and risks of representative alternative therapies

Importance of lifestyle counseling (nutrition, physical activity, mind/body techniques)

In the next step, two of the authors (IRB and CDS) then generated items to capture these themes. For judgment-quantification the items were again presented to the same focus groups. Participants scored each item for concordance or lack thereof with the values of IM and determined whether or not the concordant items were essential. They rated content relevance using a 4-point Likert-type scale where 1 = irrelevant, 2 = unable to assess relevance without item revision, 3 = relevant but needs minor alteration and 4 = very relevant and succinct. After further revision, the same focus groups reevaluated the resulting items for content validity. This process was repeated until all items received a ranking of 3 or higher.

### **Reliability and Validity Testing**

#### *Subject Eligibility*

Eligible subjects were health care providers able to speak and read English. All subjects were at least 18 years old and provided consent by the return of the questionnaires while participating in the AHMA conference or via mail.

A heterogeneous sample of subjects was recruited from two sources. Subjects were either health care professionals (primarily physicians  $n = 153$ ) at the 2000 annual conference of the American Holistic Medical Association (AHMA) or physicians on a continuing medical education roster (a university-sponsored CME program) identifying themselves as general internists. The rationale for subject selection was the expected difference in the groups' attitudes regarding CAM/IM. All participants had either attended or requested information about regarding conferences held in the state of Arizona.

### **Instrument**

#### *Integrative Medicine Attitude Questionnaire*

The Integrative Medicine Attitude Questionnaire (IMAQ) was designed as a brief (33 items) questionnaire that measures health care provider attitudes regarding IM cross-sectionally and over time. The IMAQ uses a modified Likert format and a seven-point scale (Appendix 1—see Additional file 1). Participants absolutely agreeing with a "positive" statement, or absolutely disagreeing with a "negative" statement, were given scores of "7." Conversely, those participants absolutely disagreeing with a "positive" statement or absolutely agreeing with a "negative" statement received scores of "1." A total "integrative medicine attitude" score is created by summing the responses to each item (about half of the items are reverse coded).

## **Results**

### **Recruitment Procedures**

In the summer, 2000, questionnaires were distributed at an AHMA conference where 296 were in attendance. Enrollee roster listed 154 as MD/DO, 4 as PA, 1 as FNP. Only these health care practitioners were asked to complete the questionnaire. Despite the enrollee roster, and our requests, the IMAQ was also completed by other nurses ( $n = 5$ ), medical students ( $n = 12$ ) and physician assistants ( $n = 5$ ). Twenty-eight percent of the total attendees (85) completed and returned the questionnaire (to a lock-box). Because there was no suitable concurrent local conference to capture our other desired cohort, questionnaires were mailed to 564 internists on the CME list (Of 574 on list, 10 were residing outside of the U.S. and were not contacted, 28 were returned address unknown). The mailing included the same instructions explaining the purpose of the study, consent form, and stamped, addressed return envelope. Twenty-percent of these were completed and returned. Demographics included gender, profession, and year completing professional school, and percentage of practice dealing with alternative and conventional medical care.

### **Sample Demographics**

Seven-percent of the surveys completed were not usable due to missing data leaving a total of 196. The typical subject completed their professional training in 1979, and stated that their practice consisted of approximately 80% conventional medical care. Gender differed significantly by recruitment method ( $\chi^2 = 18.9$ ,  $p < .05$ ). That is, more females were obtained through recruitment at the AHMA conference than through the CME list mailing to internists (63% vs. 32%). AHMA attendees represented 42 states, and CME list internists represented 43 states and the District of Columbia. On all other demographic information, there were not any significant differences in the sample.

### **Initial Instrument testing**

The majority (93%) of subjects completed all thirty-three items. The mean total score was 177.90 (SD 24.71) out of a possible high score of 231. The overall mean score for scale items was 5.39 and ranged from 3.90 to 6.54, with individual items mean scores displayed in Table 1. Examination of the item means and standard deviations revealed that three items (4, 8, 9) demonstrated a potential floor effect while five items (16, 21, 22, 26, 33) a potential ceiling effect. These items were further evaluated relative to their relationship with the total scale and the other items during the internal consistency evaluation.

### **Reliability**

Internal consistency reliability of the IMAQ was examined by computing item-to-item correlations and Cronbach's alpha. The mean item to item correlation was .21 and

**Table 1: Item statistics; mean, standard deviations (sd), item to total scale correlation ( $r_{ii}$ ) and Cronbach's Alpha if item removed ( $\alpha$ ) from the scale.**

Item	Mean (sd)	$r_{ii}$	$\alpha$
1	3.97 (1.82)	0.49	0.89
2	3.86 (1.90)	0.38	0.89
3	4.96 (1.88)	0.51	0.89
4	1.98 (1.88)	0.03	0.90
5.	3.37 (2.00)	0.64	0.89
6	3.86 (1.73)	0.37	0.89
7	2.24 (1.49)	0.45	0.89
8	1.64 (1.10)	0.54	0.89
9	1.85 (1.37)	0.51	0.89
10	5.90 (1.70)	0.51	0.89
11	2.02 (1.28)	0.49	0.89
12	2.28 (1.78)	0.69	0.89
13	5.57 (1.42)	0.55	0.89
14	2.75 (1.91)	0.64	0.89
15	5.88 (1.23)	0.25	0.89
16	6.07 (1.25)	0.32	0.89
17	4.34 (1.79)	0.55	0.89
18	2.06 (1.40)	0.46	0.89
19.	3.12 (1.73)	0.61	0.89
20.	5.33 (1.38)	0.43	0.89
21	6.55 (0.68)	0.28	0.89
22	6.12 (1.06)	0.26	0.89
23	5.87 (1.30)	0.20	0.90
24	3.78 (1.61)	-0.09	0.90
25.	5.82 (1.36)	0.33	0.89
26.	6.10 (1.16)	0.30	0.89
27	3.20 (2.01)	0.76	0.88
28	5.07 (1.64)	0.61	0.89
29	2.52 (1.63)	0.52	0.89
30	5.56 (1.54)	0.32	0.89
31	3.94 (2.00)	0.10	0.90
32	4.74 (2.09)	0.74	0.88
33	6.04 (1.16)	0.47	0.89

ranged from  $-.32$  to  $.67$ . Due to the nature of the subscales proposed, several negative item-to-item correlations were expected and found to be present, but did not appear to severely impact the total Cronbach's alpha (.89). Only two items (4, 24) would have improved the Cronbach's alpha value if they were eliminated from the analysis. Item 4 (*Providing patient education in lifestyle modification is an inappropriate use of physician time*) had only 3 item to item correlations that were above the mean none of which were above  $.28$  and also had demonstrated a potential floor effect. Item 24 (*Alternative methods of healing are equally effective whether applied within the context of their respective healing systems or as isolated tools within conventional medicine-reverse coded*) while not demonstrating a potential floor or ceiling effect, did have extremely low item to item correlation with only two above  $.20$ . Consequently, both of these items were dropped from the scale and further analysis. Test-retest reliability evaluations are

critical when the goal of the tool is to measure change overtime but we decided to confine our examination to internal consistency estimates initially as it was not considered advisable to administer the tool repeatedly prior to further refinement.

**Factorial Validity/Convergent Validity**

The thirty-one items were subjected to factor analysis to examine the factorial validity of the scale using principal component extraction and varimax rotation using an Eigen value over one as the criteria. The assumption underlying item development was the creation of sufficient items to cover each concept revealed during domain identification, but the major approach to factor analysis in this study was exploratory, to determine the underlying structure. More than one factor was obtained with the initial factor analysis run, but the solution obtained did not conceptually fit with the proposed domains and many

**Table 2: Factor variance explained, Eigen value, and item factor loadings for the final solution**

Item	Factor Loadings	Variance explained
<b>Factor 1: Openness</b>		26%
It is ethical for physicians to recommend therapies to patients that involve the use of subtle energy fields in and around the body for medical purposes (i.e. Reiki, Healing touch, Therapeutic touch, etc.)	0.79	
Physicians should avoid recommending botanical medicines based on observations of long-term use in other cultures and systems of healing, because such evidence is not based on large randomized controlled trials.	0.78	
Physicians should warn patients to avoid using botanical medicines (herbs) and dietary supplements until they have undergone rigorous testing such as is required for any pharmaceutical drug	0.74	
Massage therapy often makes patients "feel" better temporarily, but does not lead to objective improvement in long-term outcomes for patients	0.73	
Healing is not possible when a disease is incurable	0.73	
Therapeutic touch has been completely discredited as a healing modality	0.70	
It is irresponsible for physicians to recommend acupuncture to patients with conditions like chemotherapy-related nausea and vomiting or headache	0.66	
The physician's role is primarily to promote the health and healing of the physical body	0.65	
Information obtained by research methods other than randomized controlled trials has little value to physicians	0.61	
The spiritual beliefs and practices of patients play no important role in healing	0.59	
It is not desirable for a physician to take therapeutic advantage of the placebo effect	0.57	
Chiropractic is a valuable method for resolving a wide variety of musculoskeletal problems	0.57	
A patient is healed when the underlying pathological processes are corrected or controlled	0.52	
Patients whose physicians are knowledgeable of multiple medical systems and complementary and alternative practices, in addition to conventional medicine, do better than those whose physicians are only familiar with conventional medicine	0.52	
The spiritual beliefs and practices of physicians play no important role in healing	0.49	
Physicians knowledgeable of multiple medical systems and complementary and alternative practices, in addition to conventional medicine, generate improved patient satisfaction	0.48	
End of life care should be valued as an opportunity for physicians to help patients heal profoundly	0.47	
The physician's role is primarily to treat disease, not to address personal change and growth of patients	0.44	
It is appropriate for physicians to use intuition as a <u>major</u> factor in determining appropriate therapies for patients	0.42	
The physician's role is primarily to promote the health and healing of the physical body	0.41	
The innate healing capacity of patients often determines the outcome of the case regardless of treatment interventions	0.36	
<b>Factor2: Relationships</b>		12%
Physicians who strive to understand themselves generate improved patient satisfaction	0.69	
A strong relationship between patient and physician is an extremely valuable therapeutic intervention that leads to improved outcomes	0.65	
Physicians who model a balanced lifestyle (i.e. Attending to their own health, social, family and spiritual needs, as well as interests beyond medicine) generate improved patient satisfaction	0.62	
Counseling on nutrition should be a major role of the physician towards the prevention of chronic disease	0.56	
Quality of life measures are of equal importance as disease specific outcomes in research	0.56	
Physicians who strive to understand themselves provide better care than those who do not.	0.56	
Physicians should be prepared to answer patient's questions regarding the safety, efficacy, and proper usage of commonly used botanical medicines such as Saw Palmetto, St. John's Wort, Valerian, et	0.42	
Instilling hope in patients is a physician's duty	0.42	

items cross-loaded on more than one factor. Further examination of the items and the structure, revealed that a two factor solution made the most conceptual sense and explained an acceptable amount of variance (38%) in the responses. Two additional items (30– *In non-emergent situations it is generally preferable to try interventions believed to be effective and known to have minimal side effects, prior to using those known to be effective but that have significant side effects;* & 31– *Patients whose physicians model a balanced lifestyle (i.e. Attending to their own health, social, family and spiritual needs, as well as interests beyond medicine) tend to do no*

*better than those whose physicians' lives revolve primarily around their work.*-reverse code) were eliminated due to cross-loadings and lack of conceptual clarity.

The final solution accepted demonstrated good factor loading on both factors (Table 2). The first factor was made up of 20 items with factor loadings of .36 to .79, which explained 26% of the variance. Factor two consisted of the remaining eleven items explaining an additional 12% of the variance. Examination of the items revealed that factor one was a combination of items that

helped appraise openness to new ideas and paradigms and thus was labeled "openness." Factor two items were concerned with the value of health professional's introspective relationships, and the interactions between patients and their providers, and thus was labeled "relationship." Using the results of this exploratory factorial analysis further testing was carried out to determine reliability and validity of the proposed two factors.

### **Revised Instrument Testing**

#### *Reliability*

The  $\alpha$  was recomputed on the revised total scale and the newly formed subscales with marginal improvement to .92 on the total scale and .91 on factor on the openness scale. The relationship subscale which had the fewest items did have an acceptable reliability (.72), but it was considerably lower than the total score alpha. Based on the reliability results further testing was indicated as to the validity of the newly formed subscales.

#### *Discriminant Validity*

Further examination of the validity of the 29 item IMAQ was conducted by examining the ability of the instrument to discriminate between two groups with presumed differences in attitude toward CAM/IM. We selected AHMA conference attendees as a group clearly open to CAM/IM and a group of general internists from an academic medical center CME list as the group presumably less open to these values. It was anticipated that differences would be seen in all the scores but that there would be a greater difference between the two groups on total score and the openness subscale.

As expected, the total IMAQ score for the AHMA conference attendees was significantly ( $t = 12.05$ ,  $df = 191$ ,  $p < .001$ ) higher (194, SD 19) than for the CME list internists (160, SD 20). As mentioned earlier in the discussion of the sample 63% of the AHMA subjects were female, while only 32% of the internists were. Consequently, to determine the potential influence of gender on the openness and relationship subscales of the IMAQ, gender was used as a factor in the analysis. A  $2 \times 2$  ANOVA was run looking for both the main effect of conference attendance and gender but also looking for an interactive effect that potentially would influence responses to the IMAQ. As expected, AHMA conference attendees scored higher demonstrating more "openness" than the internists and ANOVA demonstrated significance ( $F = 42.27$ ,  $189$ ,  $p < .001$ ) supporting the construct discriminate validity. ANOVA analysis demonstrated that gender did not explain the differences between the groups either as a main effect ( $F = 3.20$ ,  $p > .05$ ) or as an interaction with type of conference attended ( $F = .27$ ,  $p > .05$ ). The same pattern of results was seen for the relationship subscale.

### **Discussion**

The final 29-item form of the IMAQ was found to be reliable and valid. The items demonstrated good internal consistency with the relationship subscale lower than that of the total score and openness subscale, but at an acceptable level for a new instrument. Further evaluation of the IMAQ will be expected to refine this subscale and increase the  $\alpha$ . The two-factor solution explained an acceptable level of variance especially considering the nature of the concept, attitudes towards use of CAM and integrative medicine. Given the diverse definitions and broad range of techniques available, it would be difficult for a single brief instrument to explain more variance in response. The IMAQ and its subscales were able to discriminate between those reasonably expected to be more open to integrative approaches (AHMA conference attendees) and a group of presumably less open, conventional internal medicine practitioners, demonstrating construct validity.

Given these findings, the IMAQ can be considered a valid instrument to determine differences in attitudes towards CAM/IM. Few instruments that attempt to measure attitudes have evaluated criterion validity, which seeks to establish the predictive and concurrent relationship of the instrument to an established criterion (gold standard). At this point no gold standard or well-established criterion exists for attitudes concerning alternative therapies and integrative medicine. Consequently, neither convergent or discriminant criterion validity were used to evaluate validity in the testing of the IMAQ.

Other issues in this validation study include the difference in recruitment procedures for the AHMA and conventional CME group samples. Replication studies should include more uniform sampling methods for all participants. Another potential limitation is the generalizability of the definition of IM used to generate items for this questionnaire. This tool is a preliminary instrument that will continue to evolve and be refined as research and education in the field of CAM/IM matures.

Nonetheless these initial findings support the use of the IMAQ in measuring attitudes of students and practitioners towards CAM/IM interventions as a first step in understanding willingness to use these approaches to healing. An instrument such as the IMAQ may serve educators in their attempts to evaluate, assess and adjust the impact of curricular interventions on attitudes toward CAM/integrative medicine.

Further testing is required to examine responsiveness (extent to which the instrument can detect change). At issue is whether these attitudes can be considered a changeable trait.

Plans include evaluation of medical students over time both to determine the reproducibility of the results (test-retest reliability) and to determine if the IMAQ and its subscales can detect changes in attitudes.

### Conclusions

The IMAQ shows promise as an assessment tool to measure attitudes concerning CAM/IM as defined here. We are not aware of any other comparable tool. One unique aspect of the initial test of the IMAQ is the examination of discriminant validity, or the ability to differentiate between those who readily embrace more integrative approaches and those of a general population of providers. The instrument was easy to use, with high completion rates when it was self-administered by subjects. Future work on the development of the instrument should focus on determining the responsiveness of the instrument to changes in attitudes over time that may result from the educational experience and/or exposure to CAM/IM.

### Authors Contributions

CS conceived of the study. CS, IB and PM participated in the design of this study. PM performed the statistical analysis. All authors read and approved the final manuscript.

### Competing Interests

None declared.

### Additional material

#### Additional File 1

*Integrative Medicine Attitude Questionnaire (IMAQ). Questionnaire items*

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