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Assessing and analyzing change in attitudes in the classroom

Rochelle E. Tractenberg*, Ranjana Chaterji, and Aviad Haramati

Georgetown University School of Medicine, Washington, DC, USA

Abstract

We explore three analytic methods that can be used to quantify and qualify changes in attitude and similar outcomes that may be encountered in the educational context. These methods can be used or adapted whenever the outcome of interest is change in a generally unmeasurable attribute, such as attitude. The analyses we describe focus on: (1) change in total ‘attitude score’; (2) item-level changes in attitudes towards different topics; and (3) ‘attitude shift’ that is defined based on a qualified change algorithm. In our example data, the total-score approach gives a general index to the level of positive attitude; the item-level approach gives the median level of positive attitude and indicates items with the most positive/negative attitude (i.e., items to target in future iterations). The qualified change approach provides an objective measure of whether a shift in attitude has occurred. Each analysis is described with its advantages and disadvantages using the data from a survey of 70 preclinical first and second year medical students before and after an elective 11-week interactive seminar (22 contact hours) which introduced elements of complementary and alternative medicine (CAM) into programmed medical school training. When assessing changes that are more qualitative than quantitative, any of these methods can be employed to derive either descriptive or inferential statistics. The methods are straightforward and are appropriate when measurements are imperfect, ratings are subjective and differences are not necessarily absolute

Introduction

The scholarship of teaching and learning (SOTL) is a generally new area of research and should be subjected to the same rigorous review and criteria as ‘traditional’ research (Mettetal, 2001). However, the outcomes in SOTL research are sometimes less amenable to traditional analytic methods, such as comparisons of means, because the outcomes are less traditional. For example, a comparison of means would not be an appropriate method to evaluate academic portfolios or changes in qualitative outcomes. In order to facilitate reliable, unbiased and interpretable analysis of more qualitative outcomes, three simple analytic methods are described here.

Curricular reform and SOTL efforts are underway throughout K-12, higher education, and professional-level contexts. One setting where changes in the curriculum are actively being pursued is the integration of complementary and alternative medicine (CAM) into progressive medical schools (Eisenberg *et al.*, 1998). Recent attention has been focused on

*Corresponding author. Department of Neurology, 7 East Main, M7202 Georgetown University Hospital, 3800 Reservoir Rd. NW, Washington, DC 20008. ret7@georgetown.edu.

how best to integrate these concepts into an academic program (leading to the M. D.) that has been fixed for a generation (see Kreitzer *et al.*, 2002, for review), as well as how to carry out clinical research into those treatments and approaches that are considered part of, or representative of, CAM (Jonas & Linde, 2002; Berman & Straus, 2004). Although the success of the integration of these elements into medical school training is of great interest in both the planning of new programs and further development/refinement of existing ones, little attention has been devoted to the assessment of the impact of these programs on their intended audiences. In this respect, integration of CAM into an established curriculum can be considered representative of the general curriculum-modification situation, and so provides a concrete basis for our exploration of analytic methods for assessing change in student attitudes.

With the exception of clinical research into the efficacy of CAM techniques or products, CAM evaluations tend to be surveys of what clinicians know about methods (e.g., Hyodo *et al.*, 2003; Lie & Boker, 2004; Kurtz *et al.*, 2003; Dooley *et al.*, 2004), of how comfortable patients are with CAM (Sharples *et al.*, 2003; Lafferty *et al.*, 2004; Pucci *et al.*, 2004), or of how interested students or faculty would be in learning more about CAM (Brokaw *et al.*, 2002; Kreitzer *et al.*, 2002; Dutta *et al.* 2003; Wetzel *et al.*, 2003). In the present study, the impact of integrating CAM-based elements into a medical school curriculum, as reflected in self-reported attitudes towards CAM, was the outcome of interest. Three analytic methods that can be employed in order to assess changes in attitudes were explored.

Although extensive work has been done to facilitate the analysis and modeling of rating scales (including for attitudes; see Embretson & Reise, 2000 for review), two important factors limit their applicability to the problem of assessing the impact of changes in school curricula. First, the newer analytic methods are highly technical in terms of mathematics and related modeling techniques, requiring extensive programming skill or special software (or both). Secondly, and more restrictively, they are based on rigorous assumptions and underlying theoretical constructs pertaining to the data, neither of which is necessarily reflected in the context of assessing whether a true change in ‘attitude’ has taken place. For example, the survey evaluated here was designed to assess attitudes, not to ‘measure’ attitude or its change, nor to test or build a psychological theoretic model. Therefore, we eschewed an appeal to more formal analytic methods (i.e., item response theory) in favor of simple nonparametric and qualifying-change approaches to the assessment of changes in attitude.

To explore and demonstrate these approaches, we subjected the attitude-survey responses of 70 preclinical first and second year medical school students to each of three analytic methods. We report the results, describe how the methods drive the interpretation of the outcomes, and use these interpretations to quantify and qualify the changes in attitude towards complementary and alternative medicine as a result of participation in an elective course outlining mind-body medicine (MBM) techniques (which are part of CAM). The analytic methods focus on three ways to describe and summarize changes in Likert scale ratings (within any context). These methods are: (1) change in total ‘attitude score’; (2) item-level changes in attitudes towards different topics; and (3) ‘attitude shift’ defined based on an algorithm that was developed in order to characterize or qualify change according to

meaningful, objective, criteria (after Tractenberg *et al.*, 2000). Each analysis is detailed below using the data from a survey of this preclinical student cohort before and after an elective 11-week Mind and Body Medicine seminar (22 contact hours) developed for the CAM curriculum.

Methods

Seventy first and second year medical students volunteered to participate in an 11-week long Mind-Body Medicine (MBM) Skills Course that has been developed at Georgetown University School of Medicine to promote awareness of this type of CAM (Berman & Straus, 2004). Students participate in a weekly series of two-hour workshops targeting different mind-body interventions. These include meditation, relaxation, focused breathing, guided imagery, biofeedback, and physical movement. These approaches were selected both because they represent common therapies in general and also because they are believed to promote self awareness and self care, two elements from which pre-clinical medical students might benefit (see Gordon *et al.*, in review, for details). The MBM course has been offered in each of three semesters since its inception, and evaluations were administered before and after the course each semester. To facilitate our discussion of the analytic methods, we have collapsed across cohorts to form a single group.

Statistical methods

The same survey was administered before the first meeting and after the last meeting of the MBM class. Three analytic approaches (described below) were used to assess changes in attitude as reflected in answers to 21 Likert scale rated items. Each approach provides slightly different information. SPSS v 12.0 (2004; SPSS Inc., Cary NC) was used in all analyses and the overall Type I error rate (alpha) was set at 0.05 in each analytic approach. Adjustments to alpha were made where appropriate in order to preserve the overall Type I error rate within each analysis, and these are described below.

Change in total 'attitude score'

We 'scored' each of the 21 items so that high ratings reflected agreement and/or positive attitude and low ratings reflected disagreement and/or negative attitude toward each of the elements in the survey. Thus, a person with a high total score tended to strongly agree with statements like: 'The mind-body approach can have a profound effect on my own physical and emotional well-being' and 'I understand what self awareness means', whereas a person with a low total score disagreed with such statements (all 21 items appear in Tables 2–4). The total 'attitude score' is a general reflection of overall level of comfort with (attitude toward) the topics covered in the survey; analyzing the impact of the MBM class on this overall level would be an indicator of its 'effectiveness' at improving attitudes towards MBM or CAM in a general sense.

We summed the ratings over all items for the pre-MBM class and post-class assessments, and calculated each respondent's difference score. These difference scores were subjected to a nonparametric Wilcoxon signed ranks test, to determine whether median change in attitude 'score' for the students who took the MBM class was significantly different from zero. In

the assessment of change, the median (50th percentile) is the appropriate summary statistic for describing the group, rather than the mean, because of the ordinal rather than cardinal nature of the ratings (see Sheskin, 1997). If this signed ranks test is significant we could conclude that a significant change in attitude occurred between the first and second administrations of the survey.

Change in item-level 'attitude'

Rather than collapse across the 21 survey items, we calculated the change on each item's rating from before and after the 22-contact hour MBM class. This approach has the benefit of not obscuring differences in the types of changes that might occur in different dimensions of attitude toward CAM. For example, in the total-change approach a positive change on one item and a negative change on another would cancel each other out, resulting in the appearance of no change, when some change had clearly occurred. Similarly, if items are not of equal import, this method preserves the individual item-level information. Thus the item-level change analysis can give the amount of change in any given item (in terms of the median), as well as indicating exactly which of the survey attitude items were affected by participating in the MBM class.

Because change at the item level could be positive or negative but also had some ordinality, each of the item change scores was subjected to a Wilcoxon Signed-Ranks test (instead of the Sign test), to determine whether change in attitude for the group on the item was significantly more likely to be of one type (i.e., positive) than the other (i.e., negative). Because the same analysis was repeated within the same group 21 times, we employed an adjustment for multiple comparisons. The commonly-used Bonferroni adjustment creates a single adjusted alpha level (alpha divided by the total number of tests (Fleiss, 1986)) to control overall alpha. Instead of this conservative method, we employed the Holm adjustment (Holm, 1979), where ranked p-values are adjusted to determine their derived value relative to the fixed Type I error rate (alpha, 0.05 in all cases). Finding significant Wilcoxon results (adjusted $p < 0.05$ for any item) would suggest that significantly more people experienced a positive or negative change in attitude for any item, or that a significantly greater degree of one type of change than another was experienced on any item, or both. We would then know which items might, for example, be most susceptible to attitude shift while others may be less amenable to attitude change.

These nonparametric analyses are required for the evaluation of survey responses because it is unreasonable to assume that the difference between any two ratings is equivalent (i.e., Likert ratings for opinions cannot be considered strictly ordinal since the positive (agree) and negative (disagree) sides are symmetric and neither can be argued to be ranked 'higher' than the other). However, within each side of the scale the nature of the Likert rating is ordinal. As such, it is not possible to calculate a meaningful 'average' response (and nonparametric methods are ideally suited to situations like this (Sheskin, 1997)). We did calculate the mean difference in ratings on each item in order to further characterize any significant differences. That is, we sought to describe the average amount by which any item's ratings changed.

Qualified change in items

The previous two methods rely on a key assumption that is not particularly supportable in the context of a survey of attitudes. The assumption is that any person responding ‘strongly agree’ at the first assessment and ‘agree’ at the second assessment is accurately reporting his/her level of agreement at both times. That is, it requires a change in ratings to accurately reflect a change in the rater’s level of agreement. It is not possible to determine the validity of this assumption, or whether a person just made a mistake when they tried to report the same level as in the previous rating. The assumption is strict, however, and so not entirely warranted given the subjective nature of the questions on the survey. That is, the fact that a respondent ‘strongly’ agrees at time 1 and just agrees at time 2 does not necessarily mean that a decrease in level of certainty has occurred, and if it has not, the nonparametric methods are not appropriate. The third method for assessing change in attitude is therefore to take a broader, more objective, view of ‘change’ by subjecting each item to the following calculus (originally described in Tractenberg *et al.*, 2000). As shown in Table 1, all ratings (on the Likert scale) are reclassified as agree, disagree and neutral. For each item, for each individual, a ‘shift’ in attitude occurred when ratings changed classification (e.g., agree to neutral, agree to disagree, neutral to agree, etc.). The modal response-change type(s) then reflects the tendency of the group in terms of actual attitude shift.

The main difference between this approach and the Wilcoxon tests under the other two methods of evaluating attitude changes is that we have here defined ‘attitude change’ to be essentially independent of the differences between any two Likert ratings and independent of the tendency to select the same, or different, rating levels at any two times (which appears to be important in this context; see Figure 1). Collapsing across all possible categories of agreement or disagreement will result in the loss of this rating-level data, but there is no reason to expect that there is relevant data at this level. More importantly, there is no reason to assume that there are no errors in incremental (e.g., strongly agree to agree) changes. Instead, under this classification method, any positive rating (agree) is only assumed to reflect agreement rather than a consistently-reportable level of agreement with any given statement; therefore the differences between categories (positive shift, negative shift, no shift) can now be treated as equivalent.

A ratio of positive shifts (positive/ total shifts) was formed for each item, collapsing across all students experiencing a shift, to describe the tendency towards positive or negative change of the group given that some objectively defined change did take place. Given a change in attitude, this ratio should be 50% if equivalent positive and negative changes were occurring; a two-sided 99% confidence interval that excludes the value 0.5 would suggest significantly greater (if the lower bound >0.5) or significantly less (if the upper bound <0.5) positive changes than negative. We applied the conservative Bonferroni adjustment (for 16 tests) to these intervals to control the simultaneous Type I error in the absence of truly rankable outcomes and under the assumption that each proportion (positive shifts/all shifts) was a sample estimate of the same (true) proportion $p=0.50$ (see Rosner, 2000, pp. 251–253). Intervals that contain the value 0.50 suggest that the proportions of positive and negative shifts are not significantly different. A similar approach could have been used to compare positive shifts to ‘remained neutral’ or shifts to ‘no shifts’.

Results

The 70 students were first and second year medical (preclinical) students who applied to enroll in this not-for-credit elective course. At the start of the first MBM class meeting, participants filled out the survey. They completed it again 11 weeks later, after completing the last session. The class did not focus on attitudes or changes in attitudes in terms of the elements of the survey. The survey assessments before and after participating in the MBM class were analyzed in each of the three methods described above.

Wilcoxon tests showed significant differences between the sums of ratings before and after taking the 22 contact-hour Mind Body Medicine Skills course ($z=-6.6$, $p<0.001$); however, the sums reflect a high degree of correspondence between responses at the two timepoints (Spearman's $\rho = .78$, $p<0.001$). Figure 1 shows the correspondence between the sum of the frequency ratings at each survey administration.

Table 2 presents the item-level comparison results. After correcting the results for multiple comparisons, significant differences were observed in 15 of the 21 questions (all adjusted $p<0.05$); however, when the mean difference between item ratings given before and after the MBM class was only as large as 1 point for one question (question 7).

Table 3 shows the results of the classifications for changes in attitude. On Items 1, 2, or 9 100% of respondents experienced 'no change' in attitude.

It can be seen in Table 3 that the percent experiencing no change in attitude was at least 60% for every item, and that for all but six items, a larger proportion (2–27 times larger) experienced a positive shift compared to a negative shift. For each of the items where change did occur, a ratio was formed comparing the percent of individuals experiencing a positive shift (numerator) to the percent experiencing any change (denominator), i.e., the proportions of all shifts that were positive. These are shown in Table 4 with their respective 95% confidence intervals, along with the ratios formed by the type of shift (%positive/%negative).

Table 4 shows that no shift in attitude occurred on three items (1, 2, 9) and no negative shifts occurred on two items (8, 10). Between two times (item 20) and 27 times (item 7) as many positive as negative shifts occurred given that a shift occurred; similarly, given that a shift occurred, between 0.80 (item 16) and three (item 13) times as many negative as positive shifts occurred on six items.

The two item-level analyses shown in Tables 2 and 4 agree in their demonstration of significantly more positive than negative change occurring on items 4, 6, 7, 8 and 10.

Discussion and conclusions

We found statistically significant differences in ratings reflecting changes in attitude towards MBM skills in 1st and 2nd year medical students after a 22 contact hour elective course. These significant differences were observed: (a) when we compared the sum of all ratings before and after the course; and (b) when we compared ratings on the individual items.

However, when we defined ‘change in attitude’ to be a shift from a rating in the positive, neutral, or negative range of the Likert scale to a rating in another range, the majority (60–100%) of the group experienced no change in attitude; under this definition, significantly more positive than negative change was observed on only five of the 15 items found to differ by item-level nonparametric analysis.

The juxtaposition of these three methods shows that a description of changes in attitude (e.g., comparisons of actual ratings at two survey administrations) may result in statistical significance but might not reflect a practical difference (i.e., the apparent movement from ‘positive’ to ‘neutral’). However, if observed differences between positive and negative shifts are found in two different item-level analyses, such as those we observed on items targeting self awareness, ability to deal with stress, understanding of classmates, appreciation of classmates, emotional well-being critical in clinical practice (items 4, 6, 7, 8 and 10, see Table 2), they are likely to reflect robust and reliable changes in attitude that could be attributable to the curriculum change, which is participation in the MBM skills course in the present context.

Since the students in the MBM skills course were self selected and highly motivated at baseline, a failure to observe much improvement in attitude is not surprising. The data described here do not represent a random sample of preclinical medical students, but the methods described to analyze changes in elusive concepts such as ‘attitude’ do not depend on this set of data. Typically, survey data are not subjected to the types of analytic methods described here because of the degree of inherent subjectivity in survey responses. However, assessing the impact of decisions regarding changes and innovations in the curriculum is an important goal. This assessment of impact of new curricular elements on student attitudes and opinions will depend largely on the type and appropriateness of the analytic method applied, and the interpretability of results. Using the methods we have outlined here, design and evaluation of new curriculum elements, including pedagogical changes, can be informed by both student performance measures and student opinions or attitudes.

Under the qualified change approach, one makes the assumption that the type of change of interest is the one that goes from one category (negative, neutral, positive) to another. The difference between this approach and the other two is along the same lines as that between practical significance and statistical significance: we have shown statistically different differences in ratings between two assessments (items 1, 2, and 9 (see Table 2)) that did not necessarily reflect actual differences in attitude. The qualified change approach offers a way to determine whether an objectively defined change occurred whereas the nonparametric comparison of item or total ratings identify a statistically significant, but not necessarily meaningful, degree of change. Our objective definition of ‘change in attitude’ was ‘movement from one range to another’, and other definitions are both possible and amenable to this method of analysis.

This study was carried out to highlight the appropriate analysis of outcomes, including changes in attitude, an important area that has been under-emphasized both in the development of curricular elements, such as those involving CAM, and within the SOTL movement in general. Establishing the validity of standard parametric-analytic assumptions

is important for rigorous classroom- and curriculum-based research. In the meantime, nonparametric methods such as those described here are easy to employ, are appropriate for the study of changes in attitudes or opinions, and will not produce biased results.

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Biographies

Rochelle Tractenberg is a cognitive scientist and biostatistician. She teaches introductory biostatistics at the Georgetown University School of Medicine and is on the leadership team of the Interdisciplinary Program in Neuroscience cluster of the Carnegie Initiative on the Doctorate. She is interested in the development of statistical literacy, curriculum development and assessment, and optimal course design for achieving both teaching and learning goals in higher education.

Ranjana Chaterji earned an M.S. in Physiology from Georgetown University and is working towards the D.O. at the Philadelphia College of Osteopathic Medicine, Philadelphia, PA.

Aviad Haramati is Professor and Director of Education in the Departments of Physiology & Biophysics and Medicine at Georgetown University School of Medicine. He has taught medical and graduate students for over 25 years, and for the past decade has directed the course in Human Physiology and several graduate courses.

Figure 1.
Sums of item ratings before and after the 22 contact hour MBM skills class in 70 students
(Spearman's $\rho = .779$, $p < 0.001$)

Table 1

Attitude shift: possible change in attitude for any given item from time 1 (pre-class) to time 2 (post-class)

Time 1	Time 2	Change type
AGREE	AGREE	No change.
NEUTRAL (NO OPINION)	AGREE	+
DISAGREE	AGREE	+
AGREE	NEUTRAL (NO OPINION)	–
NEUTRAL (NO OPINION)	NEUTRAL (NO OPINION)	No change
DISAGREE	NEUTRAL (NO OPINION)	+
AGREE	DISAGREE	–
NEUTRAL (NO OPINION)	DISAGREE	–
DISAGREE	DISAGREE	No change

AGREE: Agree (absolutely, strongly and somewhat); DISAGREE: Disagree (absolutely, strongly and somewhat). +: change towards a more positive attitude (towards stronger agreement); –: change towards a more negative attitude (towards stronger disagreement).

Table 2

Differences in individual item ratings, before and after MBM class

Survey Item	Mean difference (post-pre)	Holm-adjusted p-value
1. The mind-body approach can have a profound effect on my own physical and emotional well-being.	0.39	<0.001
2. The mind-body approach can have a profound effect on my chronically ill patients' physical and emotional well-being.	0.33	<0.001
3. I understand what self-awareness means.	0.76	<0.001
4. I have a high degree of self-awareness.	0.53	<0.01
5. I am comfortable sharing my feelings with others when appropriate.	0.63	<0.001
6. I feel that I have the capacity to deal effectively with stresses of medical school.	0.88	<0.001
7. I feel a powerful connection with my own capacity for self-healing.	1.06	<0.001
8. I have an appreciation for my classmates' concerns and struggles.	0.79	<0.001
9. I believe mind-body approaches are important to promoting health.	0.34	<0.001
10. I believe that all aspects of emotional well-being are a critical element of clinical practice.	0.50	<0.001
11. I believe that such mind-body practices as biofeedback, guided imagery and meditation can bring about profound physical changes.	0.60	<0.001
12. I have doubts about whether pursuing a medical degree is suitable for me.	-0.21	>0.50
13. I feel prepared to deal with the rigors of medical school.	0.40	<0.05
14. I believe the spiritual dimension is important to me.	0.07	>0.50
15. I believe the spiritual dimension is important to healthcare.	0.12	>0.50
16. I would have a lesser view of myself if I were not at or near the top of my class.	-0.16	>0.50
17. I worry a lot about my grades.	-0.09	>0.50
18. I am very concerned that my classmates may be doing better than I am.	-0.12	>0.50
19. The innate healing capacity of patients often determines the outcome of the case, regardless of treatment interventions.	0.42	<0.05
20. Physicians who strive to understand themselves generate improved patient satisfaction.	0.63	<0.001
21. I feel relaxed and happy most of the time.	0.44	<0.05

Table 3

Shift in attitude (positive, no change, negative) reflected in ratings on each survey item before and after MBM Class

Survey Item	TYPE OF SHIFT (percents sum to 100%)		
	Negative	None	Positive
1. The mind-body approach can have a profound effect on my own physical and emotional well-being.	0	100%	0
2. The mind-body approach can have a profound effect on my chronically ill patients' physical and emotional well-being.	0	100	0
3. I understand what self-awareness means.	1.4	90.0	8.6
4. I have a high degree of self-awareness.	5.7	68.6	25.7
5. I am comfortable sharing my feelings with others when appropriate.	4.3	77.1	18.6
6. I feel that I have the capacity to deal effectively with stresses of medical school.	1.4	72.9	25.7
7. I feel a powerful connection with my own capacity for self-healing.	1.4	60.0	8.6
8. I have an appreciation for my classmates' concerns and struggles.	0	91.4	8.6
9. I believe mind-body approaches are important to promoting health.	0	100	0
10. I believe that all aspects of emotional well-being are a critical element of clinical practice.	0	91.4	8.6
11. I believe that such mind-body practices as biofeedback, guided imagery and meditation can bring about profound physical changes.	7.1	68.6	24.3
12. I have doubts about whether pursuing a medical degree is suitable for me.	14.3	80.0	5.7
13. I feel prepared to deal with the rigors of medical school.	5.7	80.0	14.3
14. I believe the spiritual dimension is important to me.	12.9	82.9	4.3
15. I believe the spiritual dimension is important to healthcare.	12.9	78.6	8.6
16. I would have a lesser view of myself if I were not at or near the top of my class.	14.3	74.3	11.4
17. I worry a lot about my grades.	18.6	70.0	11.4
18. I am very concerned that my classmates may be doing better than I am.	14.3	75.7	10.0
19. The innate healing capacity of patients often determines the outcome of the case, regardless of treatment interventions.	6.3	72.9	20.8
20. Physicians who strive to understand themselves generate improved patient satisfaction.	2.9	68.6	31.4
21. I feel relaxed and happy most of the time.	4.2	77.1	18.8

Table 4

Relative ratio of % positive to % negative shifts and the 95% ** confidence intervals for the proportion of positive shifts/all shifts per item

Item	Ratio of % positive to % negative shifts	Ratio of positive/all shifts and upper, lower bounds for proportion of positive shifts**
1. The mind-body approach can have a profound effect on my own physical and emotional well-being.	—*	—
2. The mind-body approach can have a profound effect on my chronically ill patients' physical and emotional well-being.	—*	—
3. I understand what self-awareness means.	.086/.014= 6.1^a	6/7 (85.7%) [.325, .999]
4 ^c . I have a high degree of self-awareness.	.257/.057= 4.5	18/22 (81.8%) [.505, .940]
5. I am comfortable sharing my feelings with others when appropriate.	.186/.043= 4.3	13/16 (81.3%) [.460, .960]
6 ^c . I feel that I have the capacity to deal effectively with stresses of medical school.	.257/.014= 18.4	18/19 (94.7%) [.695, 1.0]
7 ^c I feel a powerful connection with my own capacity for self-healing.	.386/.014= 27.6	27/28 (96.4%) [.77, 1.0]
8 ^c I have an appreciation for my classmates' concerns and struggles.	— [†]	6/6
9. I believe mind-body approaches are important to promoting health.	—*	—
10 ^c I believe that all aspects of emotional well-being are a critical element of clinical practice.	— [†]	6/6
11. I believe that such mind-body practices as biofeedback, guided imagery and meditation can bring about profound physical changes.	.243/.071= 3.4	17/22 (77.3%) [.475, .910]
12. I have doubts about whether pursuing a medical degree is suitable for me.	.057/.143= 0.40^b	4/14 (28.6%) [.065, .625]
13. I feel prepared to deal with the rigors of medical school.	.143/.057= 2.5	10/14 (71.4%) [.318, .920]
14. I believe the spiritual dimension is important to me.	.043/.129= 0.33	3/12 (25%) [.041, .660]
15. I believe the spiritual dimension is important to healthcare.	.129/.086= 0.66	6/15 (40%) [.120, .750]
16. I would have a lesser view of myself if I were not at or near the top of my class.	.114/.143= 0.80	8/18 (44%) [.150, .730]
17. I worry a lot about my grades.	.143/.186= 0.61	8/21 (38.1%) [.131, .688]
18. I am very concerned that my classmates may be doing better than I am.	.100/.143= 0.70	7/17 (41.3%) [.111, .750]
19. The innate healing capacity of patients often determines the outcome of the case, regardless of treatment interventions.	.208/.063= 3.30	10/13 (76.9%) [.375, .960]
20. Physicians who strive to understand themselves generate improved patient satisfaction.	.042/.021= 2.0	2/3 (66.7%) [0, 1.0]
21 I feel relaxed and happy most of the time.	.188/.042= 4.5	9/11 (81.8%) [.385, .855]

^a 6.14 times as many positive as negative shifts occurred, given that a shift occurred.

^b 0.4 times as many positive as negative shifts occurred given that a shift occurred.

* no shifts occurred.

** Confidence interval boundaries derived based on = the occurrence of a positive shift/all shifts and modeling the probability distribution as binomial. Values derived under Bonferroni-adjusted alpha level of 0.05/16=0.003 from Rosner, (2000; Table 7b, p. 760)

^c Intervals that contain the value 0.50 suggest that the proportion of positive shifts is not significantly different than negative shifts.

[†] no negative shifts (100% positive shifts when shift occurred).