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Shapiro, Johanna
Youm, Julie
Kheriaty, Aaron
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CONTENTS

The Human Kindness Curriculum: An Innovative Preclinical Initiative to Highlight Kindness and Empathy in Medicine

Johanna Shapiro[1], Julie Youm[2], Aaron Kheriaty[3], Tiffany Pham[4], Yanjun Chen[5], Ralph Clayman[6]

Departments of [1]Family Medicine, [2]Emergency Medicine, [3]Psychiatry and Human Behavior, [4]University of California Irvine School of Medicine, [5]Institute of Clinical and Translational Science, [6]Urology, University of California Irvine School of Medicine, Irvine, California, USA

ABSTRACT

Background: Prior studies have shown a marked drop in empathy among students during their third (clinical) year of medical school. Curricula developed to address this problem have varied greatly in content and have not always been subjected to validated measures of impact. **Methods:** In 2015, we initiated a Human Kindness (HK) curriculum for the initial 2 years of medical school. This mandatory 12-h curriculum (6 h/year) included an innovative series of lectures and patient interactions with regard to compassion and empathy in the clinical setting. Both quantitative (Jefferson Scale of Empathy [JSE]) and qualitative data were collected prospectively to evaluate the impact of the HK curriculum. **Results:** In the initial Pilot Year, neither 1st (Group 1) nor 2nd (Group 2) year medical students showed pre-post changes in JSE scores. Substantial changes were made to the curriculum based on faculty and student evaluations. In the following Implementation Year, both the new 1st (Group 3) and the now 2nd year (Group 4) students, who previously experienced the Pilot Year, showed significant improvements in post-course JSE scores; this improvement remained valid across subanalyses of gender, age, and student career focus (e.g., internal medicine, surgery, etc.). Despite the disappointingly flat initial Pilot Year JSE scores, the 3rd year students (Group 2) who experienced only the Pilot Year of the curriculum (i.e., 2nd year students at the time of the Pilot Year) had subsequent JSE scores that did not show the typical decline associated with the clinical years. Students generally evaluated the HK curriculum positively and rated it as being important to their medical education and development as a physician. **Discussion:** A required preclinical curriculum focused on HK resulted in significant improvements in medical student empathy; this improvement was maintained during the 1st clinical year of training.

Keywords: Compassion, curriculum development, human kindness, Jefferson Scale of Empathy, medical education, medical humanities, medical student empathy

Background

Physicians' empathic skills appear to be directly related to their ability to cope with the daily stresses of modern-day medicine.[1] Yet, exposure to the medical humanities, which directly addresses compassion and empathy through the development of close attention and perspective taking, is either absent from many medical school curricula or included only as voluntary electives.

In 2016, after securing funds from a generous donor, we proceeded to develop and implement a mandatory 12-h human kindness (HK) curriculum to be given during the initial (i.e., preclinical) 2 years of medical school. This content thread was specifically aimed at strengthening the constructs of kindness, compassion, and empathy in our students.

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Address for correspondence:
Dr. Johanna Shapiro, Department of Family Medicine, University of California Irvine Medical Center, Bldg 200, Rte 81, Ste 835, 101 City Dr. South, Orange, CA 92868, USA.
E-mail: jfshapir@uci.edu

The HK curriculum is multispecialty and interdisciplinary, bringing together primary care, psychiatry, neuroscience, and surgical subspecialty perspectives as well as the arts/humanities. Because the literature records many instances of medical student resistance to being taught attitudes of professionalism,[2,3] we attempted to create an intellectual and interactive space in which students would be exposed more deeply to the meaning of empathy in a clinical context. We also focused on circumstances that interfere with being a kind, empathic physician and what individual actions could enhance these attributes in the presence of clinically challenging circumstances. Our theoretical framework was based on the work of Ekman and Krasner,[4] who developed a model of compassionate empathy that emphasizes emotional self-regulation and cognitive mediation of automatic emotional responses in difficult clinical situations.

Teaching empathy has been an area of interest in medical education for over 20 years.[5-7] Early studies showed positive effects of empathy training[5,6] and that finding has persisted over time. Two systematic reviews of empathy-enhancing interventions concluded that most efforts were successful in improving physician and medical student empathy.[8,9] However, these conclusions have been challenged due to a failure of student follow-up over time to see if the initial impact was transitory or long-lasting.

We focused on six areas of instruction that were eventually integrated throughout the 2 years of the HK curriculum [Table 1]. First, we incorporated humanities/arts-based teaching, including theater exercises,[10,11] given a recent review that highlighted the value of the arts in medical education for teaching self-awareness, openness to other perspectives, and empathy.[12] Second, narrative medicine skills of perspective taking and close attention to language were also included in our curriculum.[13,14] Third, we elected to add a neuroscience slant in order to provide students with an understanding of the function of mirror neurons and other scientific aspects of emotional regulation as manifested in functional magnetic resonance imaging[15-17] to elucidate the role these play in achieving and maintaining empathy in challenging clinical situations.

Fourth, we noted that research on compassion suggests that despite its theoretical complexity,[18,19] compassion can be trained,[20,21] especially through mindfulness practices and meditation.[22-27] This led us to include training in a loving-kindness meditation in order to further promote prosocial behaviors in students aimed at reducing anxiety and suffering among patients.[28] Fifth, we included exposure to virtual and standardized patients (SP) as this individualized, interactive activity has also been shown to be beneficial in augmenting physician empathy.[29,30] Specifically, our curriculum incorporated an Objective Structured Clinical Examination format with SPs to give students practice in expressing empathy/kindness/compassion. Lastly, we included exposure to the behaviorally based videotapes addressing empathy training (empathetics) developed by Riess *et al*. at Harvard University. Viewing of these videotapes has resulted in a significant elevation in empathy among residents (i.e., postgraduate medical students) from various specialties.[31,32] The curriculum is summarized in Table 1.

Our primary objective was to evaluate whether the HK curriculum improved empathy scores for 1st year medical students (MS1s) and/or 2nd year medical students (MS2s). We also wanted to test the impact of gender, age, specialty choice, and year of HK exposure (i.e., Pilot vs. Implementation Year) on changes in empathy. The secondary objectives were (1) to assess whether students with lower initial empathy scores improved more than students with higher initial empathy scores and (2) to evaluate Groups 1 and 2 at the beginning and end of their 3rd year of medical school to see if the initial exposure to HK exposure had a long-term impact.

Methods

This research was approved by the University of California Irvine Institutional Review Board for Human Subjects (HS# 2014–1195). The HK thread consisted of four mandatory 90 min sessions for both MS1s and MS2s.

Participants

In the Pilot Year, one-half of our combined sample of 138 MS1s and MS2s (Groups 1 and 2) (total possible 208) were under 25 years of age, and a little over one-half were women [Table 2]. Future plans were largely representative of a broad range of medical careers or undecided.

In the Implementation Year ($n = 205$), 62% of Group 3 (MS1s) and 39% of Group 4 (1st-year MS1s who were now MS2s) were

Table 1: Outcomes of interview - general themes

KINDNESS PILOT

MS1 & MS2 Curriculum

1. Overview of Human Kindness
   Jefferson Scale for Physician Empathy: 1st evaluation
   • History and ethics of kindness
   • Patient presentation

2. "Being Present"
   • Theater improvisational skills as relevant to clinical medicine
   • Nonverbal behavior and enhancing interpersonal connections

3. Neurobiology of Kindness and Empathy
   • The science of kindness – imaging and biochemical
   • Zen and the Loving-Kindness Meditation

4. Storytelling & Listening
   Jefferson Scale for Physician Empathy: 2nd evaluation
   • Chaplaincy and medical interactions – tools for better listening skills

KINDNESS IMPLEMENTATION

MS1 Curriculum

1. Overview of Human Kindness
   Jefferson Scale for Physician Empathy: 1st evaluation
   • History and ethics of kindness
   • Patient presentation

2. "Being Present"
   • Theater improvisational skills as relevant to clinical medicine
   • Nonverbal behavior and enhancing interpersonal connections

3. Neurobiology of Kindness and Empathy
   • The science of kindness – imaging and biochemical
   • Zen and the Loving-Kindness Meditation

4. Kindness/Empathy OSCE
   Jefferson Scale for Physician Empathy: 2nd evaluation
   • Use of Google Glass to provide feedback "through the patient's eyes"

MS2 Curriculum

1. Pediatrics and Empathy
   Jefferson Scale for Physician Empathy: 3rd evaluation
   • *Empathetics: Introduction to the Neuroscience and the Practice of Empathy*

2. Chronic Disease and Empathy
   • *Empathetics training: Managing Difficult Medical Interactions*
   • Internist/Psychiatrist and a chronic disease or psychiatric patient

3. Cancer and Empathy
   • *Empathetics training: Delivering Bad News*
   • Oncologist and cancer patient

4. Death and Empathy
   Jefferson Scale for Physician Empathy: 4th evaluation
   • Palliative care specialist and hospice patient

Variable	Category	Frequency (percent)		
		MS1 and MS2 Pilot Year - Groups 1 and 2 (*n*=138)	MS1 Implementation Year - Group 3 (*n*=104)	MS2 Implementation Year - Group 4 (*n*=101)
Age	<25	69 (50.0)	64 (61.5)	39 (38.6)
	25+	69 (50.0)	40 (38.5)	62 (61.4)
Gender	Female	76 (55.1)	56 (53.9)	51 (50.5)
	Male	61 (44.2)	48 (46.2)	50 (49.5)
Specialty	Primary care	34 (24.6)	29 (27.9)	30 (29.7)
	Medical specialties	11 (8.0)	0 (0.0)	2 (2.0)
	Surgical specialties	18 (13.0)	18 (17.3)	17 (16.8)
	Undecided	36 (26.1)	31 (29.8)	28 (27.7)
	Miscellaneous*	39 (28.3)	26 (25.0)	24 (23.8)

Table 2: Demographic characteristics of medical student study participants

*Combined group of a variety of medical specialties each endorsed by only a small number of students. MS2: 2nd-year medical students, MS1: 1st-year medical students

under 25 years of age; about one-half of Group 3 (MS1s) and Group 4 (MS2s) were female. Similar to the Pilot Year, the majority of the respondents were either considering multiple possible areas of specialty focus or were undecided.

Course content: Year 1 (Pilot Year)

Both MS1s (Group 1) and MS2s (Group 2) received the same four modules [Table 1]. We introduced various methods to make the large group sessions interactive, including the use of an audience response tool in which students could comment on clinical scenarios as well as activities such as theater exercises, led by a Professor of Drama, and meditation, led by a Zen master.

Course content: Year 2 (Implementation Year) – New 1st-year medical students (Group 3)

The following year, based on faculty and student evaluations, we made several changes. For the new MS1s (Group 3), we emphasized the clinical relevance of the sessions and eliminated the chaplain-led story session in favor of an SP experience focused specifically on kindness and empathy. In this session, the SP wore Google Glass throughout the encounter with a single medical student. Three other medical students in the room rated the medical student's interaction with the SP, while a physician mentor watched on a monitor. A "debrief" with the student's classmates, the SP, and the physician mentor all viewing segments of the Google Glass recording followed each session.

Course content: Year 2 (Implementation Year) - New 2nd-year medical students (i.e., prior year 1st-year medical students now designated Group 4)

As these students had completed the 1st year of HK, they required a completely new 6-h curriculum. To meet students' requests for more clinically relevant material, we introduced the Harvard University-developed "empathetics" program consisting of three videotapes, namely (1) "Introduction to the neuroscience and the practice of empathy," (2) "Managing difficult medical interactions," and (3) "Delivering bad news."

In addition, to the videotapes, we included a patient–physician team discussing their personal experiences with the session's topic (i.e., managing a difficult encounter, breaking bad news, and death and dying). All patient–physician presentations were followed by a large group discussion. Table 1 displays the HK curriculum for the initial Pilot and following Implementation Year for 1st-and 2nd-year students.

Outcome measures

We used two methods for measuring the effects of the HK curriculum. First, the medical student version of the well-documented Jefferson Scale for Empathy (JSE) was administered before and after the HK curriculum. The JSE is a 20-item self-report measure developed specifically for use with medical professionals; its reliability and validity have been well established.[33-37] Second, individual medical student evaluations of each session included numerical ratings on a 5-point scale (i.e., Likert scale) in the following three areas: impact of the session on the student's development as a physician, appropriateness of teaching methods, and relevance to the overall medical school curriculum. Narrative comments were also solicited and recorded.

Data analysis of Jefferson Scale for Empathy

In the initial Pilot Year, a linear mixed-effect model with repeated measures was used to calculate the least square mean estimation of differences between pre- and post-JSE scores among all Group 1 (MS1s) and Group 2 (MS2s) respondents ($n = 138$) as a group and then stratified by age, gender, program year, and prospective specialty.

In the subsequent Implementation Year, a linear mixed-effect model with subject-level random effect was used to calculate the least square mean estimation of differences between pre- and post-JSE scores among all Group 3 (new MS1) and Group 4 (prior MS1 students who were now MS2s) respondents ($n = 205$) as a group and then stratified by age, gender, and specialty. We also did a least means square longitudinal analysis of the initial MS1 class (Group 1, Year 1)

and initial MS2 class (Group 2, Year 1) following each class for 3 years. Finally, a linear mixed-effect model incorporating each assessment time point as covariates was used to find the pattern of change over the 2 years for the 56 students who completed all Pilot Year and Implementation Year JSE administrations.

Results

JSE scores are summarized in Table 3. In the Pilot Year, for Group 1 (MS1s), before and after JSE scores were higher than those of Group 2 (MS2) (pre-score, $P = 0.06$; post-score, $P = 0.01$). There were no significant intragroup differences before and after the HK curriculum for Groups 1 (MS1s) or 2 (MS2s). Indeed, almost all variables showed a slight although not significant decline in empathy. There were no significant pre-post differences on the subanalysis for gender, age, or anticipated specialty. Despite the lack of significant change after completion of the HK curriculum, when we reevaluated the Pilot Year MS2s (now 3rd-year medical students [MS3s]) in the latter part of their 3rd year, they did not show the characteristic "dip" in empathy documented in the literature;[34] indeed, these students' scores remained comparable to their scores from the previous year (JSE post-HK curriculum MS2 = 114.8 standard deviation (SD) =12.7; JSE MS3 = 115.8, SD = 10.7; n.s.). A longitudinal least means square analysis of JSE scores for both MS1 and MS2 classes confirmed that there was no significant dip in their JSE scores for either class during their 3rd year [Table 4].

In the Implementation Year [Table 3], with the revamped curriculum based on student and faculty feedback and suggestions, we found significant pre-post improvement for Group 3 (i.e., new MS1s) and Group 4 (Pilot Year MS1s, now MS2s).

On the sub-analysis of Group 3 (i.e., new MS1s), there were significant JSE increases for older students, female students, and students focused on a career in the primary care specialties. Students whose pre-HK curriculum scores were in the lower 3rd quartile had significant increases in JSE after taking the revised curriculum, whereas students in the lowest 4th quartile approached significance. No significant changes were found for students starting out with high JSE scores [Figure 1].

For Group 4 (Pilot Year MS1s, now MS2s), who completed 2 years of the HK curriculum, significant JSE increases were found for older students and male students. Students who shifted/remained undecided about specialty choice also benefitted from the curriculum. Students with the lowest (4th quartile) precurriculum scores had a significant increase in empathy scores, whereas those in the lower 3rd quartile approached significance. As with
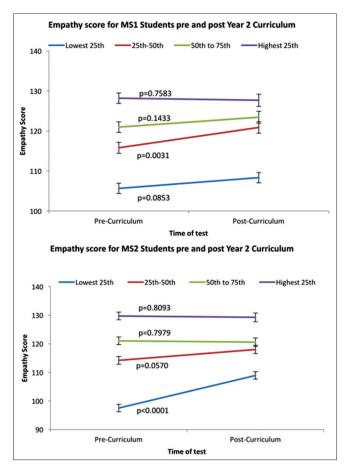

Figure 1: Changes in empathy scores pre and post for 1st year medical students (Group 3) and 2nd year medical students (Group 4) grouped by quartiles

Group 3 (Implementation Year MS1s), no significant change was found for students starting out with high JSE scores [Figure 1].

Session evaluation

In the Pilot Year, in which both Groups 1 and 2 (MS1s and MS2s) received the same curriculum, the majority (50%–68%, depending on the question asked) rated the sessions as above average or high value for all the following three parameters: development as physicians; appropriateness of teaching methods; and relevance to the overall medical school curriculum [Table 5]. Group 2 (MS2s; = 3.4, SD = 1.2) consistently rated the sessions significantly lower than Group 1 (MS1s; = 3.9, SD = 1.0; $P < 0.001$); of note, Group 2 also had overall lower JSE scores than Group 1.

In the Implementation Year, ratings of the sessions having above average or high value on the above three parameters were similar to the Pilot Year at 48%–67% [Table 5]. However, Group 3 (new MS1s) Implementation Year; = 3.4; SD = 1.3) was significantly less satisfied than MS1s from the Pilot Year (i.e., Group 1) (MS1s Pilot Year; = 3.9, SD = 1.0; $P < 0.001$) despite a positive increase in their JSE scores. There was a

Table 3: Comparison of empathy scores pre- versus post-curriculum, stratified by age, gender, program year, and specialty

Subgroups	Pre-curriculum score			Post- curriculum score			LS mean† difference	P (P<0.05*)
	n	$\overline{X}$	SD	*n*	$\overline{X}$	SD	Post - Pre (95% CI)	
Pilot Year MS1 and MS2 (*n*=138)								
All respondents	111	117.1	11.3	87	114.8	12.7	0.9 (3.2-1.4)	0.451
Age <25	58	116.9	12.6	44	114.4	14.5	0.9 (4.2-2.3)	0.575
Age 25+	53	117.3	9.9	43	115.2	10.7	0.9 (4.3-2.5)	0.611
Male	47	117.1	12.2	41	114.4	12.9	0.3 (3.8-3.2)	0.850
Female	63	117.2	10.9	46	115.1	12.7	1.3 (4.5-1.9)	0.418
1st year	46	119.3	10.2	31	118.9	8.7	1.0 (3.0-5.0)	0.632
2nd year	64	115.6	12.0	56	112.5	14.0	1.7 (4.6-1.2)	0.266
Primary care	26	124.5	9.4	21	117.0	11.4	3.4 (8.2-1.4)	0.174
Medical specialties	11	116.6	8.9	5	109.8	9.0	5.2 (13.6-3.2)	0.230
Surgical specialties	14	116.8	12.2	12	111.3	19.5	5.7 (12.0-0.6)	0.080
Undecided	27	116.3	9.5	21	116.3	12.1	0.8 (4.1-5.7)	0.755
Miscellaneous	33	112.3	12.2	28	114.4	11.2	2.4 (1.6-6.3)	0.244
Implementation Year MS1 (*n*=104)								
All respondents	97	117.5	9.2	95	119.5	11.6	2.1 (0.5-3.7)	0.012*
Age <25	58	116.2	9.6	59	117.4	11.3	1.2 (0.9-3.2)	0.270
Age 25+	39	119.4	8.2	36	123.0	11.3	3.7 (1.1-6.2)	0.006*
Male	44	116.9	9.9	43	117.9	12.5	1.5 (1-3.9)	0.237
Female	53	118.0	8.6	52	120.9	10.6	2.7 (0.5-4.8)	0.020*
Primary care	28	121.3	7.0	27	124.0	8.0	3.3 (0.3-6.3)	0.035*
Medical specialties				2	118.0	15.6		
Surgical specialties	17	115.0	8.5	14	116.4	12.1	1.5 (2.6-5.7)	0.472
Undecided	29	113.9	10.6	30	113.8	14.0	0.5 (2.4-3.4)	0.734
Miscellaneous	23	119.3	8.3	24	123.5	7.4	3.2 (0.1-6.6)	0.061
Shift/Undecided	58	116.3	9.5	58	118.1	11.7	1.9 (0.1-4)	0.065
Implementation Year MS2 (*n*=101)								
All respondents	75	115.4	12.5	97	118.8	12.0	3.2 (1.1-5.3)	0.004*
Age <25	26	114.9	11.5	36	118.2	12.7	3.2 (0.5-6.9)	0.099
Age 25+	49	115.6	13.1	61	119.1	11.6	3.3 (0.6-5.9)	0.017*
Male	35	110.9	13.7	48	116.5	13.8	5.1 (2.1-8.2)	0.002*
Female	40	119.3	9.9	49	121.0	9.5	1.6 (1.3-4.5)	0.277
Primary care	26	120.7	8.7	30	123.8	9.5	3.3 (0.3-6.9)	0.081
Medical specialties	2	118.0	15.6	2	121.0	18.4	3 (10.3-16.3)	0.659
Surgical specialties	13	113.5	12.8	15	119.6	12.5	4.8 (0.6-10.3)	0.087
Undecided	14	111.8	12.9	26	116.0	11.6	1.6 (3.5-6.7)	0.538
Miscellaneous	20	112.0	14.7	24	114.8	13.0	3.7 (0.4-7.9)	0.082
Shift/undecided	39	116.1	12.3	39	119.1	10.3	2.9 (0-5.9)	0.055

MS2: 2nd year medical students, MS1: 1st year medical students, SD: Standard deviation

Table 4: Longitudinal Jefferson Scale of Empathy Scores by 1st-year medical students and 2nd-year medical students classes over 3 years

Class	Year	*n*	$\overline{X}$	SD	P
MS1	Year 1	31	118.94	8.702	
	Year 2	97	118.77	11.99	0.70
	Year 3	46	116.72	12.15	0.12
MS2	Year 1	56	112.50	14	
	Year 2	57	115.82	10.67	0.67
	Year 3	20	115.25	14.32	0.14

SD: Standard deviation

significant improvement in the level of satisfaction in Group 4 (MS1s, now MS2s) in the Implementation Year (= 3.9, SD = 1.2)

compared to Group 2 (MS2s Pilot Year; = 3.4, SD = 1.2; *P* < 0.001).

Narrative comments

In the Pilot Year, we received 44 comments from 40 MS1 respondents and 58 comments from 46 MS2 respondents. In the Implementation Year, we registered 86 comments from 55 MS1 respondents and 89 comments from 49 MS2 respondents. Comparing MS1s in the Pilot (Group 1) and the Implementation (Group 3) Years, negative comments moderately increased and positive comments decreased consistent with their evaluations of the sessions [Table 3]. Positive narrative comments emphasized the importance of incorporating

Table 5: Evaluations summary comparing 1st-year medical students and 2nd-year medical students						
Comparison of MS1 and MS2 Course Evaluations		*n*	Some value	Average value	Above average value	High value
AY 2015-2016 Pilot Year						
How valuable was this session to you with regard to your development as a physician? (%)	MS1 (*n*=86)	3	7	23	40	27
	MS2 (*n*=104)	10	9	29	34	18
Appropriateness of the teaching methods that were used (%)	MS1 (*n*=86)	2	6	18	31	43
	MS2 (*n*=104)	8	8	32	30	22
Level of contribution to the overall medical school curriculum (%)	MS1 (*n*=85)	4	11	22	40	23
	MS2 (*n*=104)	9	13	33	29	16
AY 2016-2017 Implementation Year						
How valuable was this session to you with regard to your development as a physician? (%)	MS1 (*n*=111)	14	12	22	32	22
	MS2 (*n*=110)	5	9	18	29	38
Appropriateness of the teaching methods that were used (%)	MS1 (*n*=112)	11	7	21	29	31
	MS2 (*n*=111)	3	10	23	19	46
Level of contribution to the overall medical school curriculum (%)	MS1 (*n*=110)	15	12	25	29	19
	MS2 (*n*=11)	6	10	24	23	37
AY 2017-18 Kindness Implementation						
How valuable was this session to you with regard to your development as a physician?	MS1 (*n*=111)	4	10	15	30	40
	MS2 (*n*=110)	2	10	31	34	23
Appropriateness of the teaching methods that were used	MS1 (*n*=112)	3	7	18	31	41
	MS2 (*n*=111)	5	9	28	35	23
Level of contribution to the overall medical school curriculum	MS1 (*n*=110)	6	10	18	28	38
	MS2 (*n*=111)	4	11	33	31	21

clinical scenarios with physicians and their patients. Negative comments expressed doubts about being "taught" kindness and questioned the value of the empathetics video experience.

Suggestions for course improvement

There were a total of 49 suggestions in the Pilot Year (Group 1 [MS1s], *n* = 21; Group 2 [MS2s], *n* = 28) and a total of 70 suggestions in the Implementation Year (Group 3 [MS1], *n* = 37; Group 4 [MS2], *n* = 33). Suggestions from Groups 1 and 3 (MS1s, Pilot and Implementation Years) requested more clinical relevance in the 1st year of the curriculum (total *n* = 25). All groups suggested sessions that were more interactive (total *n* = 22), and all desired more patient contact (total *n* = 18). Groups 2 and 4 (MS2s from both years) requested more physician role models.

Discussion

In the 1st year of HK, although the majority of students were satisfied with the curriculum, we did not succeed in influencing self-perceived student empathy as determined by the JSE scores. Indeed, across almost all subgroups, empathy scores actually declined, albeit not significantly. Especially disconcerting was the 7-point JSE score drop among students interested in primary care specialties. This decline challenged whether the HK curriculum as it existed was a worthwhile expenditure of time, funds, and teaching resources. Indeed, it stimulated an overhaul of the curriculum based on the students' narrative comments, resulting in a marked increase

in clinical exposure for the Implementation Year's 1st year students and a heavy clinical emphasis for the development of the 2nd year of the curriculum.

In the Implementation Year, after major curricular changes of a more clinical nature, there were improved prepost JSE scores for both Groups 3 (Implementation Year MS1s) and 4 (former Pilot Year MS1s, now Implementation Year MS2s). We were also able to avoid the well-documented significant decline in 3rd-year students' self-reported empathy scores.[34,38] Some studies do report no significant differences in JSE across years of training,[39] concluding that careful student selection and a strong curriculum on personal and professional development can protect students against empathy decline. This provides support for our interpretation of the confirmation of the null hypothesis in the present study.

As with other studies, we too noted gender differences in self-reported empathy scores, favoring higher scores among female medical students.[33,40-42] Several studies also report higher empathy scores in students contemplating careers in primary care;[30,38] our JSE results were consistent with this finding. In our study, older students (i.e., >25 years of age) who as a group started with lower JSE scores showed more improvement in their scores than younger students. This is in concert with other reports that younger medical cohorts are more empathic than older ones.[40]

Of note, while there was a change in the medical school curriculum during the 1st year of the study in which the

method of teaching the various course offerings during the first 2 years of medical school was altered, importantly, the content remained the same. During the 2nd year of the study, there were no significant changes to either the course content or how courses were taught. None of these changes included introduction of new course material in the content areas on which the HK curriculum was based.

We found evidence that students with lower initial JSE scores tended to improve more than students with higher initial scores, suggesting that curricula such as HK might be more effective for students who are less empathic. Also intriguing was the pattern of change for the 56 students, who returned JSE scores for all the 4 time points (i.e., prepost scores for Pilot Year as MS1s and pre-post scores Implementation Year as MS2s) [Figure 2]. In the Pilot Year, for these students, the HK curriculum did not result in a significant change for either male or female students. Indeed, following their summer break, these same students had a noticeable dip in JSE scores. However, this decrease was reversed during the Implementation Year, with female students showing a rise in JSE; male students returned to their baseline JSE score.

Limitations

This is a single-institution study, so results may certainly vary at medical schools in different regions of the country and/or with a different student body composition (e.g., private medical schools, off-shore medical schools, and schools of osteopathy). For this reason, we have described our curriculum in detail in hopes that it will be adopted and tested at other institutions. Another limitation of our study was our inability to utilize a control group due to educational requirements to implement the same curriculum for all the enrolled students. Other preclinical coursework, such as the Clinical Foundations course (a doctor–patient course teaching, among other things, interviewing skills) and the Patient and Community Engagement Clerkship, consisting of five ½ day clinical
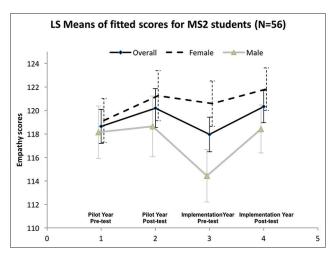
exposures in outpatient settings followed by debriefing, touched on the value of empathy and compassion in clinical interactions, although not in any systematic or formal way. However, as noted, there were no major curricular modifications during the 2015–2016 and the 2016–2017 school years that would have accounted for the JSE changes. A third limitation to our study was the lack of a prior HK curriculum that we could have adopted and tested. We were designing an experience *de novo* and "guessing" what our target learners would find to be impactful and meaningful on an extended basis, although basing these "guesses" on evidence in the existing literature. Clearly, our best efforts were less than optimal during the Pilot Year resulting in marked course changes based on Group 1 and Group 2 feedback. These suggestions were essential to develop a more clinical focus for the HK curriculum which led to the positive JSE alterations in the Implementation Year. Lastly, comparing preclinical and clinical students has several shortcomings, but it is nonetheless suggestive that over time, students exposed to the HK curriculum had no significant drops in their empathy scores during the 3rd year.

It remains difficult to compete with the hard sciences for students' attention in the preclinical years. An innovative interdisciplinary curriculum exploring topics such as kindness and compassion can exert a positive influence on students' self-perceived empathy, but its clinical relevance needs to be demonstrated. The more that teaching can incorporate actual patients and physicians, the more students will perceive it as useful.

Conclusions

Based on student feedback, we were able to develop an HK curriculum that in general satisfied learners. The modified clinically focused curriculum (the Implementation Year) was associated with significant positive changes in self-reported empathy, particularly among those entering with low scores, and maintained empathy levels among students with initially high scores. Finally, the HK curriculum precluded the common dip in medical student empathy documented to occur during their first clinical year of training.

Figure 2: Change in empathy scores at all four time points (*n* = 56)

Conflicts of interest

There are no conflicts of interest.

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