Gender Differences in the Effect of Medical Humanities Program on Medical Students' Empathy: A Prospective Longitudinal Study

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Research article

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Abstract

Objective Previous studies have suggested that Medical students' empathy declines during medical school, especially during clinical studies. The aim of this study was to examine whether humanities curriculum and admission system affect empathy changes during the first clinical year in medical school.

Methods In this prospective longitudinal study, 262 students were assessed during the fourth-year of medical school. Empathy was assessed before and at 4th-year-end, using the Jefferson Scale of Physician Empathy-Student Version (JSPE-S). The study included three cohorts, differing in humanities curriculum [limited Medical Humanities (MH (lim)) vs. extended Medical Humanities (MH (ext))], and in admission system [Personal Interview (PI) vs. multiple mini interviews (MMI)].

Results Among women, but not among men, MH (ext) as compared to MH (lim) was associated with significantly higher JSPE-S at the beginning (118.47 ± 11.43 vs. 110.36 ± 9.97, $p < 0.001$), and end of 4th-year (117.97 ± 12.86 vs. 111.49 ± 14.42, $p < 0.001$), ($p = 0.009$). Admission system was not associated with JSPE-S at the beginning or at the end of the 4th year.

Conclusion Among women, extended MH program had a positive effect on empathy at the beginning of the first clinical year, as compared to the limited program. This effect persisted through that year. However, in men MH program did not affect empathy. Adopting MMI-based admission system had no measurable effect on students' empathy. Extensive educational program can enhance and sustain empathy in medical students during the first clinical year following the program. Gender differences in response to medical humanities programs requires further study.

Background

Enhancing physician's empathy towards patients is recognized as an important aim of medical education [1,2,3]. Empathy is defined [3] as involving cognitive and emotional domains [4]. 'The cognitive domain of empathy involves the ability to understand another person's inner experiences and feelings and a capability to view the outside world from the other person's perspective [5]. The affective domain involves the capacity to enter into or join the experiences and feelings of another person [5].'

Empathic patient-doctor communication can increase patients' trust and satisfaction [6,7], increase adherence to treatment [7,8], and also reduce the number of legal claims against primary care physicians [9]. However, most of the studies on empathy changes during medical studies have suggested that empathy declines, rather than increases during studies [1,10-13]. In a cross-sectional study of empathy among medical students, Chen et al. showed that first-year students had the highest empathy scores whereas the fourth-year students had the lowest scores [10]. Two longitudinal studies showed a decline in empathy during medical studies [1,11]. Interestingly, most of the studies showing a decline in empathy during medical school have suggested that the decline is largest following students' exposure to clinical life during clerkships [1,10-12]. However, in a review of studies reporting on empathy at various stages of physician training [14], Colliver et al. have found only a small decline, and low and varying response rate.

To prevent empathy decline during medical studies at least two potential strategies can be suggested: One is to enhance students' empathy through targeted educational interventions during studies. The other is to improve medical schools' admission system, so it will allow a selection of medical students with enhanced empathic attitude.

The main aim of the present study was to examine changes in medical students' empathy during the first clinical year in medical school. We sought to examine the impact of factors including students' gender, admission to medical school (through personal interviews or multiple mini interviews), and humanities curriculum (participation in limited or extensive program), on the changes in medical students' empathy during the 4th year in medical school. An additional aim was to validate the JSPE-S in Hebrew.

We hypothesized that students' empathy will decline during their first clinical year of medical studies. We hypothesized that an extensive 3-year preclinical medical humanities curriculum and a change in medical school's admission system would prevent this decline in medical students' empathy during their first encounter with medical life.

Methods

The study was approved by the ethical committee of Hadassah Medical School. Informed consent was signed by all participants.

Context- Structure of Medical studies

The Hadassah Hebrew University of Jerusalem Medical School offers a six-year program. The first three years includes basic sciences and preclinical studies. During the first three years of studies, exposure to patients and everyday hospital life is limited and occasional. During the following three years, students attend hospitals or outpatient clinics in small groups on a daily basis. Thus, the first students' significant clinical experience occurs at the fourth-year of studies.

Study cohorts

The study included three consecutive cohorts, differing in humanities curriculum and admission system. The participation in the humanities program in each year was mandatory, thus each class was obligated to participate in the program offered in that year (limited/extended). The three consecutive cohorts included:
(1) PI/MH$_{(lim)}$ cohort: Personal Interview (PI), limited Medical Humanities program (MH$_{(lim)}$)

(2) MMI/MH$_{(lim)}$ cohort: multiple mini interviews (MMI), MH$_{(lim)}$
(3) MMI/MH$_{(ext)}$ cohort: MMI, extended Medical Humanities program (MH$_{ext}$).

Admission system

In the admission process, candidates to the Hadassah Hebrew University of Jerusalem Medical School are invited to an interview based on their Psychometric entrance test scores (Israeli version of SAT's) and undergraduate academic scores. The first cohort (PI/MH$_{(lim)}$) went through an admission process that included a panel-style personal interview, in which three examiners interviewed each candidate for about 45 minutes. The second and the third cohorts (MMI/MH$_{(lim)}$ and MMI/MH$_{(ext)}$) went through a multiple mini interviews (MMI)-based admission process. The MMI is an OSCE-style exercise, consisting of multiple, focused interviews, in which candidates have a limited time to discuss an issue with an interviewer, or to demonstrate the capacity to work through a challenging interpersonal situation presented by an actor. The MMI is designed to dominantly focus on ethical and communication issues, and to evaluate traits such as motivation, responsibility, self-awareness and interpersonal skills. It is intended to assess skills that are inadequately assessed by the personal interview. Another advantage of the MMI over the panel-style interview is that multiple interviews may dilute the effect of chance and various biases [15].

Humanities program

The PI/MH$_{(lim)}$ and the MMI/MH$_{(lim)}$ cohorts included a pre-clinical humanities curriculum that was limited to the first year of medical school. The third cohort (MMI/MH$_{(ext)}$) included an extensive and comprehensive three-year pre-clinical curriculum.

The extended pre-clinical humanities program was taught during the first three years of medical school. During the first year of medical studies the program included the 'Human and Medicine' course on patient- doctor communication, cultural competency in medicine, basic principles of medical ethics, and physician professionalism. In addition, the first year course included early clinical exposure and community medicine. During the second year of medical studies the program included courses such as history of medicine, medicine and literature, physicians and holocaust, narrative medicine. During the third year of studies the program included the following courses: medicine and law, introduction to human sexuality and introduction to breaking bad news.

Study population

342 medical students consented to participate in the study. 264 (77%) of these provided full answered questionnaires on the beginning of the 4th year. Among these, two students had a repetitive filling pattern which wasn't consistent with the content of the questionnaire and were excluded. Out of the remaining

262 medical students, 35 (13.4%) students did not fill the end of year questionnaires. Thus, 227 students were included in the longitudinal analyses.

Instruments

Interpersonal Reactivity Index (IRI)

The IRI is a validated 28-item self-report measure consisting of four 7-items subscales, each tapping some aspect of the global concept of empathy. The Perspective-Taking scale assesses the tendency of spontaneously adopting the psychological point of view of others; the Fantasy scale taps respondents' tendencies to identify with feelings and actions of fictitious characters in books, movies and plays. The Empathic Concern scale assesses "other oriented" feelings of sympathy and concern for unfortunate others, and the Personal Distress scale measures "self-oriented" feelings of personal anxiety and unease in tense interpersonal setting [4].

The Hebrew version of the IRI has been widely used in research in Israel [16,17,18] and so it was appropriate to validate the JSPE-S. In the present study the alpha Cronbach coefficient of internal reliability of the IRI was very good: α = 0.81.

Jefferson Scale of Physician Empathy – Student version (JSPE-S)

The JSPE-S was developed to measure empathy specifically within the context of the physician–patient relationship [5]. It includes 20 Likert scale items which are scored from 1 (strongly disagree) to 7 (strongly agree). The questionnaire was validated in numerous studies and is frequently used in medical education research and has been translated to more than 42 languages [1,3, 19,20]. The questionnaire encompasses 3 components of empathy; perspective taking (considered the core component of empathy), compassionate care and standing in the patient's shoes [3,5]. The English version of JSPE-S was translated to Hebrew by four physicians who speak English fluently, and was translated back to English by native English speakers who is also fluent in Hebrew ('forward-backward' procedure). Once the preliminary Hebrew version was obtained, the questionnaire was administered to 3 other physicians to achieve a consensus regarding its final version. In order to validate the Hebrew version of the JSPE-S, we examined convergent validity with a similar instrument (the Interpersonal Reactivity Index (IRI), see above). The correlations between the JSPE-S and the IRI total score administered at the beginning of the study was $r = 0.31$; $p < 0.001$. The correlations between the JSPE-S and the IRI subscales were $r = 0.43$; $p < 0.01$ for Perspective Taking, and $r = 0.30$; $p < 0.05$ for Empathic Concern, and no correlation with the Fantasy and Personal Distress subscales. These findings are very similar to the results reported by Hojat [21], who also found that Perspective Taking and Empathic Concern subscales had the greater correlations with JSPE, thus supporting the validity of the JSPE-S. In addition, the alpha Cronbach

coefficient of internal reliability of the JSPE-S was excellent: α = 0.86 for pre-clinical JSPE-S scores, and α = 0.90 at the end of the fourth-year.

Socio demographic questionnaire

Participants were asked to provide information regarding their gender, age, ethnicity, marital status, religiosity, and preferences regarding future residency.

Procedure

The design of the study was longitudinal: investigators distributed questionnaires in two different time points to each cohort during the three study years. The JSPE-S, the IRI and the socio-demographic questionnaire were administered at the beginning of the fourth-year, before attending clerkships. The JSPE-S was distributed to students again at the end of the fourth-year. All questionnaires were filled anonymously. Each participant received a random number, which was written on his/her questionnaire and was used to identify the individual pre-post questionnaires. Students were allowed to return the questionnaires during the following seven days.

Data analyses

One way and two-way ANOVAs and t-tests were used for continuous variables, and χ^2 tests for demographic categorical variables. For all data analyses, the dependent variable in the present study was level of empathy as assessed by the JSPE-S that was measured twice: at the beginning (preclinical) and at the end of the fourth year. Dependent samples t-tests and ANOVA with repeated measures were used for longitudinal analyses of pre-clinical JSPE-S vs. end of the fourth-year JSPE-S scores. Tukey post-hoc comparison tests were used to examine the differences among the three groups in variables for which one-way ANOVA tests were significant. A two-sided significance level of 0.05 was established for all analyses. Data analysis was performed using Statistical Package for Social Sciences (SPSS) software, Version 21.0 for Windows.

Results

Demographic characteristics

The demographic characteristics of participants are presented in Table 1. There were no differences between the three cohorts in age, marital status or religiosity. Significant differences between cohorts were found in gender and ethnic origin (Table 1).

(Table 1 approx. here).

Overall changes in JSPE-S among all subjects during the fourth-year

There were no significant differences in preclinical JSPE-S by gender, marital status, ethnicity, religiosity or residency preferences (Table 2).

(Table 2 approx. here)

Among all subjects, there was a small but significant decrease in JSPE-S during the fourth-year of studies (114.40±11.32 vs. 112.75±14.19, p= 0.034, Table 2). Among men from the three cohorts, but not among women, JSPE-S scores declined significantly during the fourth-year (In men: 114.54±11.33 vs 112.13±13.99, p=0.021, in women: 114.11±11.38 vs 113.78±14.42, p=0.769, Table 2). Since the decline in JSPE-S was observed in men but not in women, data analysis is presented according to gender (see below).

The effect of MH Program on JSPE-S change:

In order to evaluate the effect of MH program (limited vs extended) and time (beginning and end of year), and their interaction on JSPE-S, repeated measures ANOVA was performed on the two cohorts admitted by the same system (MMI). The analysis included JSPE-S scores as dependent variable, and MH program and time as independent measures. Among men there was no effect of MH on JSPE-S scores ($F_{(1,76)}$ = 0.11, p = 0.737), there was a trend towards an effect of time on JSPE-S ($F_{(1,76)}$ = 3.88, p = 0.053), and there was no interaction between humanities program and time ($F_{(1,76)}$ = 1.71, p = 0.195; Table 3, Figure1 – Panel 1A). However, among men students of the MMI/MH$_{(ext)}$ cohort we found a significant decline in JSPE-S during the fourth-year of studies ($t_{(35)}$ = 2.38, p = 0.023; Table 3), while no significant decline was observed in the MMI/MH$_{(lim)}$ cohort ($t_{(41)}$ = 0.46, p = 0.645; Table 3).

Among women, MH was significantly associated with JSPE-S scores ($F_{(1,64)}$=7.25, p = 0.009). However, there was no effect for time ($F_{(1,64)}$ = 0.55, p = 0.816) and no interaction between MH program and time ($F_{(1,64)}$ = 0.37, p = 0.546; Table 3, Figure 1 – Panel 1B), indicating that women who participated in MH$_{(ext)}$ showed higher JSPE-S scores as compared to MH$_{(lim)}$, and that women who participated in either MH$_{(ext)}$ or MH$_{(lim)}$ did not show a decline in JSPE-S (Table 3).

In order to evaluate if the impact of MH$_{(ext)}$ on JSPE-S was not only statistically significant but also substantial, we calculated Cohen's d effect sizes: At baseline, differences in empathy scores between women who participated in MH$_{(ext)}$ and those who did not were great, yielding a large effect size: Cohen's

d = .76. At the end of the fourth-year, differences between the two groups of women were still significant, yielding a medium effect size: Cohen's d = .47.

(Figure 1 approx. here)

(Table 3 approx. here)

The effect of Admission System on JSPE-S change:

In order to evaluate the effect of admission system (PI vs MMI) and time (beginning and end of year), and their interaction on JSPE-S, repeated measures ANOVA was performed on the two cohorts who participated in the same humanities program (MH limited). This analysis included JSPE-S scores as dependent variable, and admission system and time as independent measures. Admission system was not associated with JSPE-S change both among men and women (men: admission system $F_{(1,92)}$=1.67, p = 0.199; time: $F_{(1,92)}$=1.51, p = 0.223; interaction between admission system and time: $F_{(1,92)}$=0.21, p = 0.644; women: admission system: $F_{(1,60)}$=0.22, p = 0.638; time: $F_{(1,60)}$=0.37, p = 0.847; interaction between admission system and time: $F_{(1,60)}$=0.91, p = 0.345; Table 4).

(Table 4 approx. here)

The effect of residency preferences on JSPE-S change

Students who stated they would prefer surgical residency after their studies had a trend towards a decline in empathy during the fourth-year (p=0.05). Such decline was not observed among students who preferred non-surgical residencies (Table 2).

Discussion

The main findings of this study are that medical students' empathy declined during their first extensive clinical experience and that the effect of a pre-clinical humanities program on students' empathy change during the fourth-year of medical studies, is gender specific. Women students (regardless of type of humanities program) showed no decline in empathy during the fourth-year of studies. In addition, women who participated in the extended humanities program had higher JSPE-S scores during the fourth-year as compared to women who participated the limited program.

In contrast to the finding in women, among men we found a significant decline in empathy during the fourth-year of studies in those who participated in the extended humanities program, but not in those who participated in the limited program. Our study suggests, according to the large to medium effect sizes

observed, that the differences in empathy scores in women who participated in the extended humanities program as compared to the limited program are likely to be substantial, thus potentially having educational implications.

In line with previous studies [1,10,11,12] our results suggest that an overall decline in JSPE-S scores during the fourth-year of medical studies does exist. However, our study suggests that an extensive program that included exposure to ethical issues, communication skills, and humanities studies, had a sustained effect on empathy during the following year in women, but not in men. These findings add to reports on enhancement of empathy in medical students [22-25].

Previous studies on gender effect on medical students' empathy yielded inconsistent findings [1,11,26-29]. While some studies have found similar patterns of change in men and women [1,11,26], in one of these studies the effect size of empathy decline was much larger for men [1], and another cross-sectional study found that empathy declined between the third and the fourth-year of medical studies in men but not in women [27]. Two additional studies on the effect of targeted educational program on empathy supported our findings showing a significant increase in empathy in women but not in men [28,29].

These findings suggest that gender differences in empathy may exist, and go along with gender differences previously reported in clinical practice. For example, female physicians have been reported to spend more time with their patients [30] and render a more patient-oriented care [31]. It is possible that gender-specific impact of educational programs that we and others [28,29] have observed, were underestimated in previous studies because of small samples, which did not allow to assess such effects. It is also possible that measuring empathy at a single time point would be less sensitive to detect gender differences in empathy as compared to longitudinal studies.

In our study, the medical school's admission system did not affect preclinical empathy or empathy changes during the 4th year of studies. We hypothesized that students who had been admitted to medical school using the MMI –based system would not experience empathy decline during medical studies, because MMI- based system's advantage in interpersonal capabilities evaluation [15]. However, this hypothesis was not confirmed in the current study. This finding may suggest that MMI, contrary to our hypothesis, is not more effective than PI in evaluating students' empathy. An alternative explanation to this finding is that any potential difference in students' qualities that could be observed at entering medical school was lost after spending three years in medical school. Future longitudinal studies

designed to evaluate the effect of admission system on empathy changes during medical studies are required to directly address this question.

We found that students who are 'surgically oriented' had a trend towards a decline in empathy during the fourth-year, while students who are not 'surgically- oriented' did not have such a decline, despite similar empathy scores at the beginning of the fourth-year. Our results are in line with those of Hojat et al. [1], who showed that the magnitude of the decline in empathy was larger for medical students in 'technology oriented' specialties (such as surgery, orthopedics, anesthesiology, heart surgery, ENT) compared with their counterparts in 'people-oriented' specialties (such as family medicine, internal medicine, pediatrics, psychiatry).

The decline in empathy during the first clinical year, while students are introduced to the clinical work in the wards, can have several potential explanations. These include de-idealization of students' perception of medicine [32], lack of proper role models [33], and students' perception that, as compared to the power of technology and the intense clinical experience, empathy may not be a significant tool in the profession of medicine as students had believed it to be before they entered clinical life [34]. Students can easily put aside the importance of interpersonal engagement in patient care when the majority of their studies are based on quantitative scientific outcomes. At the same time, the decline in empathy among medical students may reflect a protective mechanism that can help students to deal with emotionally difficult situations [10].

Our study has several limitations. The study included a single medical school, which may limit the generalization of the findings. Cultural differences and differences in the average age in which students start medical school, may affect students' previous life experiences and empathy levels. For example, the average starting age for medical school in Israel is higher than in USA [35] or Ethiopia [36]. Such differences might have an impact on our results regarding students' empathy. We followed students during the 4th year of studies, and not during all 3 clinical years. This has likely limited our conclusions regarding changes in empathy during medical studies. In addition, the aim of this study was to explore empathy changes that have been previously suggested to occur following the first students' clinical experiences during clerkships. Thus, we evaluated empathy at the beginning and following the fourth year of medical studies in three consecutive classes of medical school. However, since JSPE-S scores at entry to medical school are not available, we cannot exclude the possibility that differences in empathy between cohorts, prior to entrance to medical school, could have contributed to our findings. However, we examined the effect of medical humanities curriculum on empathy in two cohorts of students that were admitted to medical school using the same admission system (MMI), thus it is unlikely that there were baseline difference between cohorts in baseline empathy. In addition, a single humanities program was

offered in each year (limited/extended), and students were obligated to participate in it, therefore students' preferences could not affect their participation in the limited/extended programs.

In addition, our study was based on a self-reported empathy measurement, the JSPE-S, and not on observed behaviors, that may only partially correlate [37,38].

Conclusions

In women, empathy did not decline during the fourth year of medical school, while in men there was a significant decline in empathy. In men who participated in an extended humamities program, a decline in empathy during the fourth year was observed, while among women ,who participated in extended humamities program no decline in empathy during the fourth-year of studies was observed. Adopting a Multiple Mini Interviews-based admission system did not affect medical students' empathy. Our findings regarding gender-specific effects of such educational program require further validation. Such research could examine the impact of educational interventions on men and on women, and may help to design interventions to address potential gender differences in empathy.

Abbreviations

PI: personal interview, MMI: multiple mini interviews, MH(lim): limited Medical Humanities program, MH(ext): extended Medical Humanities program.

Declarations

Ethics approval and consent to participate - The study was approved by the ethical committee of Hadassah Medical School. Informed consent was obtained from all participants.

Consent for publication - Not applicable

Availability of data and material - The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests - The authors declare that they have no competing interests.

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Authors' contributions: ML, MM designed the study, ML collected the data, LC analyzed the data, all authors interpreted the data and contributed to the writing. All authors read and approved the manuscript. All authors critically revised the manuscript and gave final approval.

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Tables

Table 1: Demographic characteristics of participants in the study

Cohort	PI/MH$_{(lim)}$	MMI/MH$_{(lim)}$	MMI/MH$_{(ext)}$
Preclinical Medical Humanities program	limited MH	limited MH	extended MH
Admission system	Personal Interview	Multiple Mini Interviews	Multiple Mini Interviews
	$n = 91$	$n = 86$	$n = 85$
Gender[1] Men	59 (64.8%)	50 (58.1%)	38 (45.2%)
Women	32 (35.2%)	36 (41.9%)	46 (54.8%)
Age	25.98±3.52	26.10±2.60	25.57±3.56
Marital Status Single	67 (73.6%)	62 (75.6%)	63 (75.0%)
Married	24 (26.4%)	20 (24.4%)	21 (25.0%)
Religiosity Secular	46 (51.7%)	47 (59.5%)	43 (54.4%)
Traditional	13 (14.6%)	10 (12.7%)	12 (15.2%)
Religious	30 (33.7%)	22 (27.8%)	24 (30.4%)
Ethnicity[2] Jew	73 (81.1%)	78 (96.3%)	71 (87.7%)
Arab	17 (18.9%)	3 (3.7%)	10 (12.3%)

1. The proportion of women was about one third in the PI/MH$_{(lim)}$ cohort increasing to more than a half in the MMI/MH$_{(ext)}$ cohort ($\chi^2_{(2)}$=6.99; p = 0.030).

2. A significant difference in distribution of ethnic origin between cohorts were observed ($\chi^2_{(2)}$=9.40; p = 0.009).

Table 2: Comparisons between pre-clinical and end of the fourth-year JSPE-S scores according to demographic and baseline characteristics

	Preclinical	End 4th year	t	df	p	Cohen's d
All students	114.40±11.32	112.75±14.19	2.14	226	0.034	0.13
Gender:						
Men	114.54±11.33	112.13±13.99	2.33	129	0.021	0.19
Women	114.11±11.38	113.78±14.42	0.29	95	0.769	0.03
Marital status:						
Single	114.63±11.08	113.26±14.17	1.52	168	0.130	0.11
Married	114.02±12.23	112.43±13.97	1.09	53	0.282	0.12
Ethnicity:						
Jew	114.39±11.53	112.94±13.97	1.76	193	0.079	0.11
Arab	114.65±10.31	113.29±14.91	0.58	24	0.565	0.10
Religiosity:						
Secular	113.55±12.14	112.44±13.53	1.08	118	0.282	0.09
Traditional	115.50±10.13	112.52±17.36	1.26	30	0.218	0.19
Religious	115.23±10.95	115.00±11.93	0.21	64	0.837	0.02
Residency preferences						
Surgical residency	113.87±11.41	108.96±17.04	2.02	38	0.050	0.33
Non- surgical residencies	114.50±11.26	113.77±13.39	0.92	178	0.359	0.06

Table 3: Comparisons between preclinical and end of the fourth-year JSPE-S scores by Medical Humanities program and gender[1]

	Preclinical	End 4th year	t	df	p	Cohen's d
Men						
MH$_{(lim)}$	115.24±10.67	114.31±12.77	0.46	41	0.645	0.08
MH$_{(ext)}$	116.29±9.30	111.67±15.19	2.38	35	0.023	0.34
Women						
MH$_{(lim)}$	110.36±9.97	111.49±14.42	-0.55	31	0.589	0.09
MH$_{(ext)}$	118.47±11.43 *	117.97±12.86**	0.29	33	0.775	0.04

[1] Only students admitted by the same admission system (MMI).

Humanities program – MH$_{(lim)}$: limited Medical Humanities program, MH$_{(ext)}$: extended three-year Medical Humanities studies.

*p<0.001 for difference between MH$_{(lim)}$ and MH$_{(ext)}$ in preclinical JSPEs in women

**p<0.001 for difference between MH$_{(lim)}$ and MH$_{(ext)}$ in end of 4th-year JSPEs in women

Table 4 Preclinical and end of the fourth-year JSPE-S scores by admission system and gender[1]

	Preclinical	End 4th year	*t*	*df*	*p*	Cohen's d
Men						
PI	112.76±12.97	110.70±14.13	1.40	51	0.168	0.15
MMI	115.24±10.67	114.31±12.77	0.46	41	0.645	0.08
Women						
PI	113.17±11.41	111.47±15.50	0.79	29	0.434	0.12
MMI	110.36±9.97	111.49±14.42	-0.55	31	0.589	0.09

[1] *Only students not participating in limited Medical Humanities program.*

Admission system – PI: one-hour personal interview, MMI: multiple mini interviews.

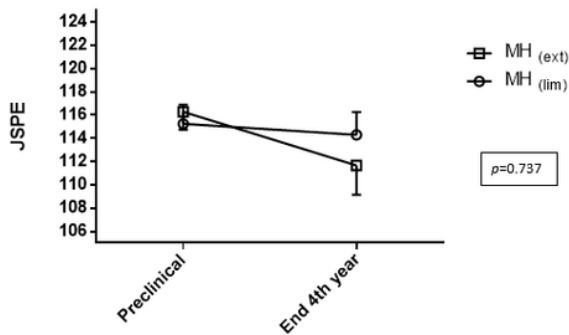
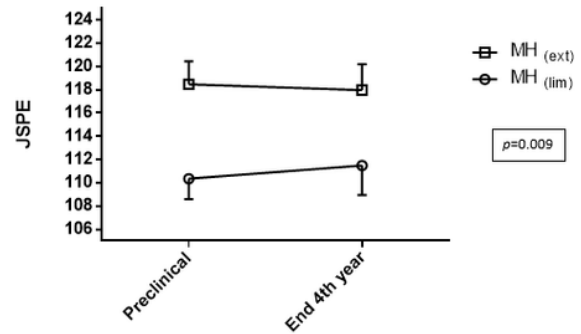
Figures

MH(lim): limited Medical Humanities program, MH(ext): extended three-year Medical Humanities studies.

Figure 1

The effect of medical humanities curriculum on JSPE-S during the fourth-year (Mean ± SEM) among men (Panel 1A) and women (Panel 1B), [p values are for the main effect of medical humanities curriculum on JSPE-S scores, two-way ANOVA of JSPE-S by time (pre-clinical – end of the 4th year) and by humanities program, performed separately in men and women].