

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

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Research article

Keywords: Empathy, Medical Humanities, Admission System, Gender

Posted Date: October 3rd, 2019

DOI: <https://doi.org/10.21203/rs.2.15503/v1>

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Version of Record: A version of this preprint was published on November 10th, 2020. See the published version at <https://doi.org/10.1186/s12909-020-02333-9>.

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]. Empathic patient-doctor communication can increase patients' trust and satisfaction [4,5], increase adherence to treatment [5,6], and also reduce the number of legal claims against primary care physicians [7]. However, most of the studies on empathy changes during medical studies have suggested that empathy declines, rather than increases during studies [1,8–12]. 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 [8]. Sherman et al. have found a significant decline in empathy among dentistry students during their second year of studies [9]. Two longitudinal studies showed a decline in empathy during medical studies [1,10]. 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 [1,8–11]. However, Colliver et al. [13], have suggested that the reports on empathy decline are exaggerated, and have questioned the significance of these findings.

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 selection of medical students with enhanced empathic attitude.

The aim of the present study was to examine the effect of an extensive 3-year preclinical medical humanities curriculum and of a change to medical school's admission system (personal interviews vs. multiple mini interviews) on the changes in medical students' empathy during the first clinical year in medical school.

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:

- (1) PI/MH_(lim) cohort: Personal Interview (PI), limited Medical Humanities program (MH_(lim))
- (2) Cohort MMI/MH_(lim) cohort: multiple mini interviews (MMI), limited MH
- (3) Cohort 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 [14].

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 ('Human and Medicine') incorporating exposure to patients, hospital work, ethical issues, communication skills, and humanities studies.

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 [15]. 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.

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 [19]. 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 [1,3,8,9,11,20,21]. The questionnaire encompasses 3 components of empathy; perspective taking (considered the core component of empathy), compassionate care and standing in the patient's shoes [3,19]. 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 subscales administered at the beginning of the study were $r = 0.43$; $p < .01$ for Perspective Taking, and $r = .30$; $p < .05$ for Empathic Concern, similar to the results reported by Hojat [22], supporting the validity of the JSPE-S. In addition, the alpha Cronbach coefficient of internal reliability of the JSPE-S was excellent: $\alpha = 0.86$ for pre-clinical JSPE-S scores, and $\alpha = 0.90$ 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 categorical variables. Dependent samples t-tests and ANOVA with repeated measures were used for longitudinal analyses of pre-clinical vs. end of the fourth-year 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).

Preclinical JSPE-S

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

(Table 2 approx. here)

Overall changes in JSPE-S during the fourth-year

In the whole sample, there was a small but significant decrease in JSPE-S during the fourth-year of studies (Table 2). Among men, but not among women students, JSPE-S scores declined significantly during the fourth-year (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).

Humanities Program

The effect of Humanities Program on preclinical JSPE-S: MH was associated with pre-clinical JSPE-S ($F_{(1,166)} = 11.11, p = 0.001$). No main effect of gender was obtained ($F_{(1,166)} = 0.28, ns$) but there was a significant interaction between humanities studies and gender ($F_{(1,166)} = 6.17, p = 0.014$). Women who participated in $MH_{(ext)}$ had a significantly higher preclinical JSPE-S as compared to women who did not ($t_{(80)} = 3.83, p < 0.001$), while no effect of $MH_{(ext)}$ on preclinical JSPE-S was observed among men students (Table 3).

(Table 3 approx. here)

The effect of Humanities Program on JSPE-S change:

Among men MH was not associated with JSPE-S scores ($F_{(1,76)} = 0.11, ns$), 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 ($F_{(1,76)} = 1.71, ns$; Table 3, Figure1—Panel 1A).

Among men students of the MMI/ $MH_{(ext)}$ cohort there was a significant decline in JSPE-S as compared to the preclinical JSPE-S ($t_{(35)} = 2.38, p = 0.023$; 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 ($F_{(1,64)} = 0.55, ns$) and no interaction between MH program and time ($F_{(1,64)} = 0.37, ns$; Table 3, Figure 1—Panel 1B), indicating that women who participated in MH_(ext) showed greater baseline empathy scores, and these scores did not decline during the fourth-year of studies.

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)

Admission System

The effect of Admission System on preclinical JSPE-S by gender: Preclinical JSPE-S was not associated with admission system among both men and women students, and no interaction was observed between admission system and gender (for admission system: $F_{(1,173)} = 0.02, ns$; for gender: $F_{(1,173)} = 2.39, ns$; for the interaction: $F_{(1,173)} = 1.50, ns$; Table 4).

(Table 4 approx. here)

The effect of Admission System on JSPE-S change by gender: Admission system was not associated with JSPE-S change both among men and women (men: admission system $F_{(1,92)} = 1.67, ns$; time: $F_{(1,92)} = 1.51, ns$; interaction between admission system and time: $F_{(1,92)} = 0.21, ns$; women: admission system: $F_{(1,60)} = 0.22, ns$; time: $F_{(1,60)} = 0.37, ns$; interaction between admission system and time: $F_{(1,60)} = 0.91, ns$; Table 4).

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 finding of this study is that the effect of an extended pre-clinical humanities program on students' empathy changes during the fourth-year of medical studies, is gender specific. Women students who participated in the three-year humanities program had higher JSPE-S scores at the beginning of the fourth-year and showed no decline in empathy during the fourth-year of studies, 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 with no effect of participation in medical humanities 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 [1,8,12] 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 in women during the following year. These findings add to reports on enhancement of empathy in medical students [23–26].

Previous studies on gender effect on medical students' empathy yielded inconsistent findings [1,10,27–30]. While some studies have found similar patterns of change in men and women [1,10,27], 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 [28]. 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 students [29,30].

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 [31] and render a more patient-oriented care [32]. It is possible that gender-specific impact of educational programs that we and others [29,30] 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 have higher JSPE-S scores at the beginning of their studies, and that their empathy would not decline during medical studies, because MMI- based system's advantage in interpersonal capabilities evaluation [14]. 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 [33], lack of proper role models [34], 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 [35]. 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 [8].

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 [36] or Ethiopia [37]. 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. Our study was based on a self-reported empathy measurement, the JSPE-S, and not on observed behaviors, that may only partially correlate[38,39].

Conclusions

In women, extended three-year humanities program had a positive effect on empathy at the beginning of the fourth-year, that persisted through the first clinical year. In men however, the humanities program did not affect empathy. 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 both on men and women. Our study suggests that extensive preclinical targeted educational program can enhance and sustain empathy in medical students. Efforts should be made to improve programs so they take into consideration 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

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.

Funding

The authors report no external funding source for this study.

Availability of data and materials

The data used in the current study are available from the corresponding author on reasonable request.

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.

Competing interests

The authors declare they have no competing interests.

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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
		<i>n</i> = 91	<i>n</i> = 86	<i>n</i> = 85
<i>Gender</i> ¹	Men	59 (64.8%)	50 (58.1%)	38 (45.2%)
	Women	32 (35.2%)	36 (41.9%)	46 (54.8%)
<i>Age</i>		25.98±3.52	26.10±2.60	25.57±3.56
<i>Marital Status</i>	Single	67 (73.6%)	62 (75.6%)	63 (75.0%)
	Married	24 (26.4%)	20 (24.4%)	21 (25.0%)
<i>Religiosity</i>	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%)
<i>Ethnicity</i> 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 ($\chi^2_{(2)}=9.40$; $p = 0.009$).

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

	Preclinical	End 4 th year	<i>t</i>	<i>df</i>	<i>p</i>
All students	114.40±11.32	112.75±14.19	2.14	226	0.034
Gender:					
Men	114.54±11.33	112.13±13.99	2.33	129	0.021
Women	114.11±11.38	113.78±14.42	0.29	95	ns
Marital status:					
Single	114.63±11.08	113.26±14.17	1.52	168	ns
Married	114.02±12.23	112.43±13.97	1.09	53	ns
Ethnicity:					
Jew	114.39±11.53	112.94±13.97	1.76	193	ns
Arab	114.65±10.31	113.29±14.91	0.58	24	ns
Religiosity:					
Secular	113.55±12.14	112.44±13.53	1.08	118	ns
Traditional	115.50±10.13	112.52±17.36	1.26	30	ns
Religious	115.23±10.95	115.00±11.93	0.21	64	ns
Residency preferences					
Surgical residency	113.87±11.41	108.96±17.04	2.02	38	0.05
Non- surgical residencies	114.50±11.26	113.77±13.39	0.92	178	ns

ns - not significant

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Table 3: Comparisons between preclinical and end of the fourth-year JSPE-S scores by Medical Humanities program and gender¹

	Preclinical	End 4 th year	<i>t</i>	<i>df</i>	<i>p</i>
Men					
MH _(lim)	115.24±10.67	114.31±12.77	0.46	41	ns
MH _(ext)	116.29±9.30	111.67±15.19	2.38	35	.023
Women					
MH _(lim)	110.36±9.97	111.49±14.42	-0.55	31	ns
MH _(ext)	118.47±11.43 *	117.97±12.86**	0.29	33	ns

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*

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Table 4 Preclinical and end of the fourth-year JSPE-S scores by admission system and gender¹

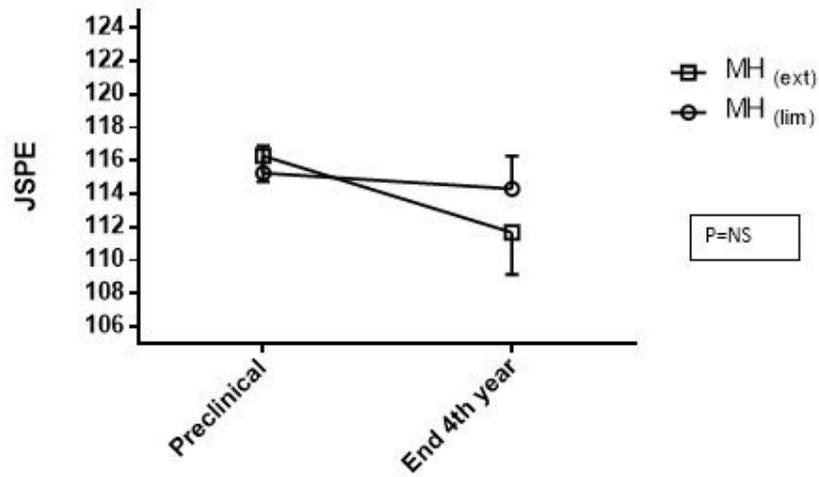
	Preclinical	End 4 th year	<i>t</i>	<i>df</i>	<i>p</i>
<i>Men</i>					
PI	112.76±12.97	110.70±14.13	1.40	51	ns
MMI	115.24±10.67	114.31±12.77	0.46	41	ns
<i>Women</i>					
PI	113.17±11.41	111.47±15.50	0.79	29	ns
MMI	110.36±9.97	111.49±14.42	-0.55	31	ns

¹ Only students not participating in limited Medical Humanities program.

*Admission system - PI: one-hour personal interview, MMI: multiple mini interviews.
ns - not significant.*

Figures

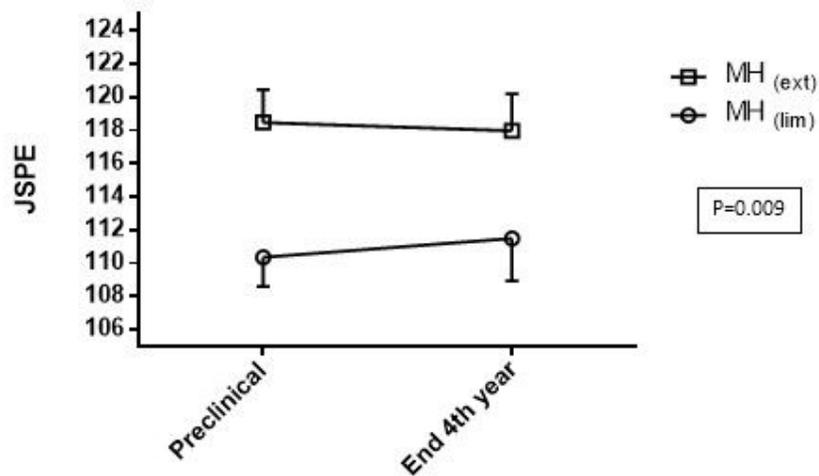
Panel 1A – Men



ns – not significant.

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

Panel 1B – Women



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].