

# Disciplining empathy: Differences in empathy with U.S. medical students by college major

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## Abstract

Citing their students' low levels of empathy, medical educators have scrambled to implement curricula with the hopes of buffering against the corrosive effects of biomedical and clinical experiences in medical school. The assumption undergirding these studies by social scientists and medical educators alike is that immersion in biomedical education and clinical experience erodes students' empathic capacities, and that exposure to humanities and social sciences content will amend these losses. But we do not know if this assumption is correct. In this project, we empirically assess this assumption by utilizing a unique data set constructed from student applicant and survey data from the American Medical College Application Service (AMCAS) and the Association of American Medical Colleges (AAMC). We test whether medical school students ( $N=8255$ ) from the United States (U.S.) with different academic backgrounds represented by their college major have different levels of empathy, net of demographic control variables. We report two findings. First, we find that students who majored in humanities or interpretive social sciences disciplines have higher empathy scores than their peers who majored in the positivistic social sciences and STEM (science, technology, engineering, and mathematics) disciplines. Second, we find that the relationship between empathy and time in medical school is more nuanced than we would expect from the existing literature.

## Keywords

patient-physician relationship, profession and professionalization

## Introduction

*"I am not sure whether medical students lose their empathy or whether selection for medical school favors the more scientific over the more social – young people with fewer personal*

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*relations but more scientific know-how over the more social humanists who enjoy personal relationships” (Spiro, 2009: 1179).*

For decades, medical educators have been calibrating and re-calibrating the criteria for selecting and training medical students. While it is almost a time-honored convention of scholarly work on medical education to invoke the Flexner Report of 1910 as a watershed moment for the standardization of medical education in the United States (U.S.), this landmark report by Abraham Flexner indeed expedited rapid professionalization in American medicine (Ludmerer, 1985). But more than that, the Flexner Report catalyzed research on medical students and of medical schools—a century later, medical education, as a professionalizing field in its own right, has become institutionalized and specialized, pursuing a range of questions about medical education (Kuper et al., 2010). One of the central and enduring questions medical educators grapple with is: how can medical schools best select and train students to be empathic physicians?

Empathy, understood as the cognitive and affective abilities to take the perspective of others and feel concern for their well-being (Decety and Cowell, 2014), has waxed and waned in its pedagogical popularity in the last century as a desired characteristic of physicians. While valued in the decades preceding the Second World War (Shoemaker and Rohrer, 1947), by the 1960s and 1970s, efforts at deemphasizing empathy emerged in the formal and informal medical school curriculum (Fox, 1988; Hafferty, 1988; Sinclair, 1997). In fact, in both the classic and more recent work by medical sociologists focusing on the training of physicians, a core theme has been on the role that the central actors and activities in medical schools play in eroding student empathy by the time they graduate (Becker et al., 1961; Brosnan, 2010; Merton et al., 1957; Underman, 2015; Vinson, 2016). Scholars contributing to this literature have shown that medical students are likely to lose idealism, have their caring attitudes subverted into technical competence, and learn specific affective techniques to control their feelings (Fox, 1988; Haas and Shaffir, 1977; Hafferty, 1988; Sinclair, 1997; Underman, 2020), and that the projection of competence and composure continues into post-graduation clinical practice (Crowe and Brughha, 2018).

By the turn of the 21st century, however, empathy as a desired affective state returned triumphant, signaled perhaps by physician, philosopher, and medical educator Jodi Halpern’s (2003) widely celebrated and cited book entitled, *From Detached Concern to Empathy: Humanizing Medical Practice*, as well as the inclusion of empathy measurements on Association of American Medical Colleges (AAMC) annual surveys of medical students. As Vinson and Underman (2020: 6) state, in the contemporary medical education field, “despite a lack of definitional clarity, empathy has taken on broad rhetorical importance as an ideal to be strived for in contemporary medical practice.” Critical to the exulted return of empathy is the notion that *affects* are pivotal to *effects* (Carmel and Glick, 1996; Underman, 2015, 2020; Vinson, 2016; Vinson and Underman, 2020), whereby “physicians who display a warm, friendly, and reassuring manner are more effective” with their patients (Larson and Yao, 2005: 1100).

Throughout the discussion of empathy in medical education, a central, longstanding assumption in academic medicine is that humanities or social sciences majors are more likely to exhibit the desired characteristics of empathy than their peers with more

biomedical academic backgrounds (Chapman et al., 2018; Hirshfield et al., 2019; Shoemaker and Rohrer, 1947; Spiro, 2009). We take this assumption as our point of departure, examining the relationship between disciplinary knowledge and empathy. As the title's opening clause "Disciplining Empathy" signals, in this paper we use *discipline* to deliberately evoke two meanings. First, we wish to capture the way a field, like medicine, might discipline affective states, like empathy. Second, we point to the way in which a field of study, a discipline like sociology or physics, might correlate with empathy.

To do so, we draw upon medical student demographic and educational background data from the American Medical College Application Service (AMCAS) and student survey data from the Association of American Medical Colleges (AAMC) at matriculation (2012) and graduation (2016). After merging these datasets and dropping cases where there were only observations at one wave of data collection ( $N=8255$ ), we use empathy scores from the AAMC survey data at matriculation and graduation as our dependent variables and we use college major from the AMCAS as our central independent variable, with gender, race, socioeconomic status (SES) as demographic control variables, also reported in the AMCAS.

In this paper, we begin with an overview of the literatures that describe the relationship between disciplinary knowledge and empathy in medical education. Then, we describe our data and some of the limitations, such as our inability to measure the impact of college major directly because we do not have students' empathy scores *before* matriculation. Next, we present our findings, whereupon we show that humanities and interpretive social sciences majors have higher levels of empathy than their biomedical and positivistic social sciences peers at both matriculation and graduation. Finally, we link our findings back up with debates in both the sociology of medicine as well as the field of medical education, more broadly.

## Background

The ideal physician, according to Flexner (1910) and his contemporaries, was empathic, understanding, dedicated, creative, and curious—in addition to being knowledgeable about the latest scientific concepts and technologies. While the ideal appeared to be something medical educators agreed upon, the execution of how, precisely, this ideal would be realized has been a source of perennial debate (Bloom, 2002). The sides of the debate could be categorized into three positions: first, educators who believed that through formal instruction, future physicians could learn empathy, compassion, and social responsibility; second, educators who believed that this knowledge and these skills could only be role-modeled through clinical faculty when seeing patients; and, third, educators who believed that these qualities existed independent of—and prior to—medical education.

In relation to the third camp of this debate, as the medical profession tightened its standards as a part of this turn-of-the-20th-century process, it became more male, more white, and more elite (Light, 1988).<sup>1</sup> Thus, the initial structure and composition of the modern U.S. medical school was premised on the appreciation of the social sciences and humanities, but in a manner that was tied to the elitism undergirding early- and mid-20th century medical schools. By and large, the medical educators of this time period agreed

with the third camp in the debate about how to *cultivate* the ideal physician: the best way to cultivate a good doctor is to select already *cultivated* students.<sup>2</sup> As historian Kenneth Ludmerer (1985: 115) writes, the professional leaders representing the “American Medical Association and the American Academy of Medicine wanted the requirement for admission to be a college degree because the popular stereotypes of ‘coarse and common doctors’ could be readily combated if only *cultivated* persons were permitted to become physicians” (emphasis added).

The desire for cultivated persons, which Ludmerer (1999) notes was reflected in the preference given to students who could pay tuition, came from prestigious families, and attended elite liberal arts institutions with coursework in English, foreign languages, politics, philosophy, mathematics, and biology, was tied to both professionalizing aspirations as well as the belief in what “personal characteristics” aided in the “production of caring doctors” (p. 77). This value and expectation were further reflected in the MCAT section on these subjects, “Understanding Modern Society,” instituted in 1946 and lasting until 1977 (McGaghie, 2002). By the 1970s, however, a number of changes to the structure of higher education coupled with the vast increase in biomedical knowledge and technology created the conditions in which leaders of medical education sidelined the humanities and social sciences from their previous roles in preparing students for medical school (Bloom, 2002; Brint et al., 2005; McGaghie, 2002). While sustained in idiosyncratic forms at particular medical schools across the U.S. (Bloom, 2002), concerns about the empathy of students were absent from the national, profession-wide debates about what it meant to be a good doctor until the late 20th and early 21st centuries (Sales and Schaff, 2010).

This debate and need for empathy re-emerged with the claim that when physicians exhibit empathy there are positive effects for physicians, patients, and their interactions (Carmel and Glick, 1996; Horowitz et al., 2003; Robbins et al., 1993). Yet despite the desire for empathic students and physicians, U.S. trained medical students have been shown to lose idealism and empathy over the course of their training (Hojat et al., 2009; Newton et al., 2000; Silver and Glick, 1990; Spiro, 2009). Empirical studies by medical educators pinpoint the third year of clerkships, in particular, as the time where empathy is eroded, leading to what Ward (2016) has termed the “empathy enigma”, or the mystery surrounding how health professional students matriculate into school with more empathy than they graduate with. The void of mentorship, high volume of patients to see and material to master, time pressure, and involvement with more technological components of clinical practice create the conditions under which medical students lose empathy (Coulehan and Williams, 2003; Pedersen, 2010; Shapiro et al., 2004). Additionally, sociological studies have shown how the actors and curricula within medical education emotionally socialize medical students to adopt affective neutrality and detached feeling rules (Brosnan, 2010; Hafferty, 1988; Sinclair, 1997; Underman, 2015; Underman and Hirshfield, 2016). Recent research suggests that physicians are further expected to remain emotionally detached and hide their emotional vulnerability once in clinical practice (Crowe and Brugha, 2018).

One assumption undergirding these studies, at times explicit and at other times implicit, is that biomedical education erodes empathy and that the lack of humanities and social sciences is part of the problem. For example, in a case study of a single medical school,

Michalec (2011) found that structure of the formal curriculum—that is, the amount of hours dedicated to teaching the social aspects of medicine and whether or not that material was tested—impacts medical students' levels of empathy. And, in their study documenting a narrative photography intervention in medical training, Chapman et al. (2018: 207) show that after “any level of exposure” to learning how to view, interpret, and respond to photographs from Latinx adolescents “was associated with higher levels of ethno-cultural empathy, physician empathy, and patient centeredness.” In another recent study, Hirshfield et al. (2019) find that medical students who were humanities or social sciences majors performed better on the Communication and Interpersonal Skills portion of the United States Medical Licensing Exam (USMLE) than their biomedical sciences counterparts.

To our knowledge, no one has yet directly measured whether humanities and social sciences students actually make for more empathic medical students relative to their biomedical peers. Moreover, we do not know if the loss of empathy that many medical students experience is something that can be mitigated by college/educational background. Therefore, we examined whether there was a relationship between medical students' undergraduate major (e.g. humanities; interpretive social sciences; positivistic social sciences; or science, technology, engineering, and mathematics (STEM)) and their empathy scores at matriculation and graduation. We assess two central hypotheses. First, based upon the literature, we would expect to find that humanities and social sciences medical students are more empathic upon matriculation and graduation than their biomedical peers. Second, with regard to assessing the impact of medical education on these college major differences, we would expect medical students with humanities and social sciences backgrounds to have less of a decrease in their overall empathy scores, from matriculation to graduation, than their biomedical peers.

## Data and Methods

There are two main sources of data informing our present study: student demographic and educational background data from the American Medical College Application Service (AMCAS) and student survey data from the Association of American Medical Colleges (AAMC) at matriculation (2012) and graduation (2016). Each student has a unique identifier, which allowed us to link the data across datasets and time (2012–2016). While in our original dataset we had 15,558 cases, we dropped cases where we did not have observations for each wave, yielding a dataset of 8255 linked cases; however, as shown in the Appendix, when we ran analyses at matriculation and graduation with the full dataset, we found very similar patterns. With these data, we test whether students from humanities and social sciences backgrounds exhibit more empathy when they matriculate into and graduate from medical school than their biomedical peers. This project was deemed exempt from IRB review.

### Data

Within these data sets ( $N=8255$ ), there are several variables of interest. The dependent variables are drawn from the AAMC surveys at the two distinct moments in the life course of a medical student: empathy scores before matriculating (Matriculating Student

Questionnaire, MSQ) and before entering residency (Medical School Graduation Questionnaire, GQ). The independent variables are medical student educational background, which we capture with each student's college major from the AMCAS data. We draw upon demographic background variables—gender, race, and SES—from the AMCAS as demographic control variables.

*Empathy scores.* The dependent variables for these analyses are empathy scores. For this paper we necessarily use the scale from the AAMC data which conceptualizes empathy as the cognitive and affective abilities to take the perspective of others and feel concern for their well-being.<sup>3</sup> Perspective-taking, as a foundation of empathy, was developed from the work of Mead (1934), and it captures the ability to “consciously put oneself in the mind of another individual and imagine what that person is thinking or feeling” (Decety and Cowell, 2014: 533). Neuroscientists have shown that perspective-taking activates neural circuits similar to the ones that undergird first-person experiences (Jackson et al., 2006) and behavioral scientists have linked perspective-taking to the reduction of out-group prejudice and biases (van Lange, 2008). Empathic concern, or the intention or desire to care for others, often flows from the act of perspective-taking; where perspective taking is cognitive, empathic concern is affective.

The AAMC question is based on a measure of empathy generated by the Interpersonal Reactivity Index (IRI). In Davis' (1983: 113) seminal work defining and validating the measures of the IRI, he describes empathy as “the reactions of one individual to the observed experiences of another.” The IRI is comprised of 28 items, with four subscales of separate but related constructs, on a five-point Likert scale going from “does not describe me well” to “describes me very well”. This scale has been validated independently by Pulos et al. (2004) and the AAMC has used the IRI to show how levels of empathy change over the course of medical education. The multidimensional construct of empathy captured in the IRI draws upon four inter-related components: social functioning, self-esteem, emotionality, and sensitivity to others. Following these components, the four subscales measuring empathy are *perspective-taking*, or “the tendency to spontaneously adopt the psychological point of view of others”; *fantasy*, which “taps respondents' tendencies to transpose themselves imaginatively into the feelings and actions of fictional characters in books, movies, and plays”; *empathic concern*, or “‘other-oriented' feelings of sympathy and concern for unfortunate others; and, *personal distress*, or “‘self-oriented' feelings of personal anxiety and unease in tense interpersonal settings” (Davis, 1983: 113).

In the dataset, the AAMC included more IRI items in the Matriculating Student Questionnaire (MSQ) than the Graduation Questionnaire (GQ). In the MSQ, the AAMC included 14 items, exhausting the number of items for two of the subscales: seven from the *perspective-taking* subscale and seven from the *empathic concern* subscale in the IRI. An example of a perspective-taking statement that a student would respond to is, “I sometimes try to understand my friends better by imagining how things look from their perspective,” and for empathic concern it would be, “when I see someone being taken advantage of, I feel kind of protective toward them” (Davis, 1983). Each of the 14 items within these subscales is measured on a 0-4 point scale, therefore the possible range of scores is 0 to 56, where the higher scores are correlated with higher levels of empathy.

**Table 1.** Descriptive statistics.

Variable	Total N	Mean	SD	Min.	Max.
Empathy measure					
MSQ perspective	8255	11.38	2.53	0	16
MSQ concern	8255	12.12	2.28	0	16
MSQ total empathy	8255	23.50	4.27	0	32
GQ perspective	8255	12.04	2.56	0	16
GQ concern	8255	11.80	2.49	0	16
GQ total empathy	8255	23.84	4.55	0	32
Perspective change	8255	0.66	2.48	-14	12
Concern change	8255	-0.32	2.29	-13	11
Empathy change	8255	0.33	4.02	-21	22

Because the GQ iteration only gave students 8 items, we selected the same items and reduced the MSQ to match the same 0 to 32 range; we also report on the means for the perspective-taking and empathic concern constructs at each point in time (see Table 1 below). Additionally, the AAMC provide a reliability estimate (Cronbach's alpha) for the IRI to show the degree to which these figures are internally consistent, which for each of the two surveys is 0.8. To measure change over medical school, we subtracted each respondent's graduation empathy score from their entering empathy score. This is their change in empathy, useful for determining whether certain respondents tend to gain or lose empathy in medical school.

*College Major.* The critical independent variable for this analysis is college major. In applying for medical school, among other components of the application, prospective students report their college major, which is then transformed in the AMCAS database into a categorical variable (e.g. English, Chemistry, etc.). We do not have data beyond what medical students report on their AMCAS application and are therefore cannot decipher whether students changed major over the course of their college education. See Appendix for further individual major data. Instead of having just three categories of aggregated college majors (e.g. humanities, social sciences, and STEM), we followed the "epistemological styles" logic of Lamont and colleagues (Lamont, 2009; Lamont et al., 2006) and broke the social sciences into interpretive and positivist categories.<sup>4</sup> Therefore, we constructed aggregate categories for the Humanities, Positivist Social Sciences, Interpretive Social Sciences, and STEM. In addition to these more traditional liberal arts disciplines, we also created an aggregate category for the health oriented "practical arts" disciplines, which we call Helping Professions and a catchall for other "practical arts" disciplines, which we call Miscellaneous (see Brint et al., 2005 for a discussion of the liberal and practical arts).

The STEM major category was the largest in terms of matriculating medical students' chosen major ( $N=5370$ ); as the Appendix captures, the STEM major category encapsulates dozens of majors, versions of Biology, Chemistry, Engineering, Mathematics, and Physics. The Positivist Social Sciences category contained Economics and Political Science ( $N=182$ ), whereas the Interpretive Social Sciences category captured

Anthropology, Environmental Studies, and Sociology ( $N=170$ ). In the Humanities category, we included Art, Classics, English, History, Music, Philosophy, and Religion ( $N=742$ ). Finally, in the Helping Professions category we put Nutrition, Nursing, Psychology, and Public Health ( $N=1754$ ), whereas in the Miscellaneous category, we placed Business, International Relations, and Interdisciplinary Studies ( $N=183$ ). Following Brint et al.'s (2012) classification schemes on broad disciplinary categories, we utilized the terminology in the Helping Professions category to distinguish these disciplines' applied potential foci, as these disciplines have corresponding professional fields that are engaged in helping others, whether on an individual or collective basis. In addition to Psychology majors falling under this broad disciplinary category of Helping Professions, it is plausible that it could have been categorized as a Positivistic Social Science. We chose to treat Psychology as a Helping Profession to assist in isolating the social sciences majors in the data set. In other words, by placing Psychology within the Helping Professions category, we teased apart the Economics and Political Sciences majors in the Positivistic Social Sciences category from the Anthropology, Environmental Studies, and Sociology majors in the Interpretive Social Sciences category. See Appendix for analyses run with Psychology categorized as Positivistic Social Science.

**Demographic controls.** Given the research on empathy and social background, we controlled for race, class, and gender in our analyses. Extant literature shows that the most consistent and strongest relationship between social background and empathy levels is between gender and empathy (Berg et al., 2011; McCue and Gopoian, 2000; O'Brien et al., 2013; Ward et al., 2009). Most of the literature expects to find that people of color exhibit more empathy than white people, but scholars find very little evidence for it (Sherman and Cramer, 2005; Ward et al., 2009). In one study of medical students, Berg et al. (2011) found that white and Asian American medical students had no difference in empathy. Finally, with SES, scholars note that people with higher SES have lower compassion (Piff and Moskowitz, 2017; Stellar et al., 2012).

The covariates of race, sex/gender, and SES were created based upon self-reported designations from applicants in the AMCAS. In the AMCAS survey, sex and gender were conflated; students had a choice between selecting "male" or "female" and we use the language of "identifying as male" or "identifying as female" to reflect students' selections of sex/gender. 51% of the matriculating students who answered both waves of empathy questions identified as female. With an applicant's socioeconomic status (SES), the AAMC created a SES indicator premised on the applicant's self-reported parental income, education, and occupation, which they report as a binary "Disadvantaged" variable. In line with the broader trends in medical school admissions, only 9% of the sample was categorized as Disadvantaged.

With regard to race, the AAMC created a dichotomous underrepresented minority indicator variable based on a student's self-reported racial background and calculation of whether that racial group is adequately represented in the profession of medicine—from 2002 forward, URM racial groups were Black, Native American, Mexican American, and Mainland Puerto Rican. We use the URM indicator as well as a binary nonwhite/white variable, to measure both the effects of underrepresentation as well as that of whiteness on empathy. While 13% of the sample was categorized as URM, 31% identified as nonwhite.



## Analysis

We engaged in ordinary least squares (OLS) regressions to model total empathy scores, perspective-taking empathy scores, and empathic concern empathy scores at medical students' time of matriculation and graduation. The first set of models estimated the effect of college major background on the total empathy of medical students at matriculation and graduation; the second set of models estimated the effect of college major background on the empathy subscale of perspective-taking and the empathic concern for others at matriculation and graduation. We also created a change variable for total empathy, perspective-taking, and empathic concern, and report those findings in our third set of models. In the Appendix, we also include models of empathy scores at matriculation and graduation, where we did not drop any cases, to show that there were no major differences due to panel attrition.

## Results

As the descriptive statistics shown in Table 1 indicate, the mean empathy scores for all medical students at matriculation are lower (23.50) than the mean empathy scores at graduation (23.84). When examining the mean empathy scores further, divergent trends emerge with the subscales of perspective-taking and empathic concern. As captured by the change variables, the mean perspective-taking score for all medical students *increases* by 0.66, whereas the mean empathic concern score *decreases* by 0.32. We will proceed by describing differences in total empathy scores by college major and then turn our attention to the differences in empathy subscales.

Our central finding with regard to disciplines and total empathy is that while it is clear that the humanities and social sciences matter, it is also clear that disciplinary nuance is important. In all of the models, STEM major is the constant and all of the different majors are compared against STEM majors. In the first model in Table 2, we show total empathy scores by college major at time of matriculation. Medical students matriculating with either interpretive social sciences, humanities, or helping professions majors had a statistically significant higher empathy score than their STEM, positivistic social sciences, and miscellaneous major peers, with interpretive social sciences and humanities showing the highest levels of total empathy at matriculation. In the second column in Table 2, we show total empathy at graduation, where the same general findings as the preceding model hold. In other words, interpretive social sciences, humanities, and helping professions majors have a statistically significant higher empathy score than their STEM, positivistic social sciences, and miscellaneous major counterparts at graduation.<sup>5</sup>

In the third column, we model the results of total empathy by college major at matriculation and in the fourth model we display total empathy by college major at graduation, but in both of these models control for the demographic covariates. We want to highlight that the trends by college major largely remain, with regard to empathy, but that there are also significant patterns with regard to race, class, and gender, too, which are consistent with the extant literature on social identity and empathy (cf. Berg et al., 2011). In this sample, medical students who identify as female have higher total empathy scores than those who identify as male and medical students who are low-SES—captured by the

**Table 2.** College major and total empathy.

College major	Total matriculation	Total graduation	Total matriculation (controls)	Total graduation (controls)
Positivistic SS	-0.64* (0.32)	-0.54 (0.34)	-0.40 (0.31)	-0.27 (0.34)
Interpretive SS	1.04** (0.33)	0.70* (0.35)	0.70* (0.32)	0.32 (0.35)
Humanities	0.61** (0.18)	0.78** (0.20)	0.52** (0.18)	0.67** (0.19)
Helping professions	0.41** (0.12)	0.38** (0.12)	0.29* (0.11)	0.25* (0.12)
Miscellaneous	-0.48 (0.32)	-0.63 (0.34)	-0.19 (0.31)	-0.30 (0.33)
Non-White			0.07 (0.11)	-0.02 (0.12)
URM			0.09 (0.15)	0.26 (0.16)
Disadvantaged			0.77** (0.16)	0.67** (0.17)
Female			1.60** (0.09)	1.84** (0.10)
cons	23.40** (0.06)	23.72** (0.06)	22.51** (0.08)	22.73* (0.08)

N = 8255.

\* $p < 0.05$ . \*\* $p < 0.01$ .

AAMC's Disadvantaged indicator—have higher total empathy scores than students who are not low-SES, both findings are statistically significant. The effects of racial backgrounds, measured by underrepresented minority and non-white, are more modest and are not statistically significant.

In sum, with regard to total empathy at matriculation and graduation, students who major in the humanities and interpretive social sciences—as well as the helping professions—have higher empathy scores than their biomedical and positivistic social sciences peers.

With regard to the empathy scores, as we noted in the methods, we tabulated total empathy scores and then utilized two subscales that are of interest: the perspective-taking and empathic concern. It is important to note that total empathy scores are higher at graduation than matriculation, which seems at odds with what the literature would expect (Hojat et al., 2009; Newton et al., 2000; Silver and Glick, 1990; Spiro, 2009). When we tease apart the total empathy scores into perspective taking and empathic concern, we find two divergent trends: the mean perspective-taking score is higher at time of graduation than at matriculation, whereas the opposite is true for the mean empathic concern score.

In Table 3, we report our findings on the subscales by college major at time of matriculation and graduation, with controls. In the first column, we show that interpretive social sciences, humanities, and helping professions majors have statistically significant, higher perspective-taking scores at time of matriculation than their STEM, positivistic social sciences, and miscellaneous major peers. Like with total empathy scores, medical students who identify as female have statistically significant, higher perspective-taking scores at time of matriculation than their peers who identify as male. In addition, medical students who are low-SES have statistically significant, higher perspective-taking scores at time of matriculation than their peers who are not low-SES. In the second column of Table 3, we examine perspective-taking scores at graduation; humanities majors are the only group of students by major who have a higher perspective-taking score that is

**Table 3.** College major and perspective-taking and empathic concern.

College major	Perspective taking at matriculation	Perspective taking at graduation	Empathic concern at matriculation	Empathic concern at graduation
Positivistic SS	-0.08 (0.19)	0.01 (0.19)	-0.32 (0.17)	-0.28 (0.18)
Interpretive SS	0.38* (0.19)	0.14 (0.20)	0.32 (0.17)	0.18* (0.19)
Humanities	0.32** (0.11)	0.35** (0.11)	0.20* (0.10)	0.31** (0.10)
Helping professions	0.18** (0.07)	0.12 (0.07)	0.11 (0.06)	0.13 (0.07)
Miscellaneous	-0.04 (0.19)	-0.14 (0.19)	-0.22 (0.17)	-0.16 (0.18)
Non-White	0.003 (0.06)	-0.07 (0.07)	0.07 (0.06)	0.05 (0.06)
URM	0.08 (0.09)	0.19* (0.09)	0.004 (0.08)	0.08 (0.09)
Disadvantaged	0.55** (0.10)	0.38** (0.10)	0.22* (0.09)	0.29** (0.09)
Female	0.60** (0.06)	0.71** (0.06)	1.00** (0.05)	1.12** (0.05)
cons	10.95** (0.05)	11.59** (0.05)	11.55** (0.04)	11.14** (0.05)

*N* = 8255.

\**p* < 0.05. \*\**p* < 0.01.

statistically significant. In addition, we observe that students who identify as female have higher perspective-taking scores at graduation relative to students who identify as male and low-SES students have higher perspective-taking scores at graduation than students who are not low-SES. We also find that students who are underrepresented minorities have higher perspective-taking scores at graduation relative to students who are not underrepresented in medical schools.

This general relationship between college major, social background, and empathy scores holds for the other subscale of empathic concern, as reflected in the third and fourth columns of Table 3. At both matriculation and graduation, humanities majors have a statistically significant higher empathic concern score than all other majors. Medical students who identify as female have statistically significant, higher empathic concern scores than students who identify as male and students who are low-SES have statistically significant, higher empathic concern scores than students who are not low-SES. In addition, as captured in the fourth column, interpretive social sciences majors also have statistically significant higher empathic concern scores than all other majors, besides humanities majors, at graduation.

In both Tables 2 and 3, we reported results on differences of total empathy, perspective-taking, and empathic concern by college major at time of matriculation and graduation.

In our final set of models, displayed in Table 4, we measure change over time. As the first column notes, with regard to total empathy, STEM majors appear to have a net increase in their total empathy scores over time; relative to the STEM majors, positivistic social sciences and humanities majors also have an increase in total empathy scores, whereas interpretive social sciences, helping professions, and miscellaneous majors have a decrease in total empathy scores. It is important to note that none of these attain statistical significance, however. Students who identify as female have the highest positive change in empathy scores of any group, and it is also statistically

**Table 4.** Change over time by total empathy, perspective change, and empathic concern change.

College major	Empathy change (T2-T1)	Perspective change	Concern change
Positivistic SS	0.13 (0.30)	0.09 (0.19)	0.04 (0.17)
Interpretive SS	-0.38 (0.31)	-0.25 (0.19)	-0.13 (0.18)
Humanities	0.14 (0.17)	0.03 (0.11)	0.11 (0.10)
Helping professions	-0.04 (0.11)	-0.06 (0.07)	0.02 (0.06)
Miscellaneous	-0.11 (0.30)	-0.18 (0.19)	0.06 (0.06)
Nonwhite	-0.08 (0.10)	-0.07 (0.06)	-0.01 (0.06)
URM	0.18 (0.15)	0.11 (0.09)	0.07 (0.08)
Female	0.23* (0.09)	0.11* (0.05)	0.12* (0.05)
Disadvantaged	-0.10 (0.16)	-0.17 (0.09)	0.07 (0.09)
cons	0.22** (0.08)	0.63** (0.05)	-0.41** (0.04)

N=8,255.

\* $p < 0.05$ . \*\* $p < 0.01$ .

significant. What we find to be most interesting are the divergent trends by which the total empathy score of STEM majors is reached. In comparing the constant – or, STEM majors – in the second and third column of Table 4, we can compare the change in perspective-taking scores and empathic concern scores over time. The STEM majors increase perspective-taking by 0.63 but decrease in empathic concern by 0.41. Similar relationships hold for the other majors but are not statistically significant.

In sum, as Table 4 suggests, there are divergent trends with regard to empathy over the course of medical school, whereby medical students' perspective-taking goes up and their empathic concern goes down. We now will discuss this finding, in addition to the other findings reported in Tables 2 and 3 on the differences in empathy scores by college major.

## Discussion

Our empirical analysis of medical students' empathy scores by college major from the 2012 to 2016 cohort of U.S. medical students demonstrates that the assumption undergirding medical educators and social scientist admissions and curricular debates is correct: humanities and social sciences majors exhibit more empathy than their STEM counterparts at both matriculation and graduation. Critically, the interpretive social sciences have this effect, as positivistic social sciences majors exhibited *less* empathy than their STEM peers. Moreover, by exploring the subscales of empathy with regard to college major, we observe that the humanities majors, in particular, have the highest graduating empathy scores, suggesting a boost and buffering effect of the humanities disciplines.

Beyond their empirical importance, these findings have implications for theoretical and policy-related discussions. First, with regard to theory, our findings demonstrate that the relationship between tenure in medical school and empathy scores is much more complex than some of the literature depicts. Not only do total empathy scores increase over time, but the central explanation as to why these scores increase is revealed by the

divergent trends of perspective-taking and empathic-concern, the two empathy subscales. Qualitative work by sociologists may hold some answers as to why. We think it is possible for perspective-taking to lead to empathic concern, and students may stop short of actually feeling, but rather have figured out the skills necessary to perform taking on the perspective of another (Michalec, 2010, 2011; Olsen, 2020; Vinson, 2016). As Vinson and Underman (2020: 3) recently write with regard to instrumental clinical empathy, “medical trainees are taught to use specific interactional techniques to practically accomplish clinical empathy in patient encounters.” Perhaps it is the case that perspective-taking increases in medical school because medical students are taught instrumental clinical empathy, whereas empathic concern is not something that is actively cultivated by educators. Second, if empathy in medical school is a form of emotional labor (Vinson and Underman, 2020) and we observe demographic and educational background differences in empathy, then this raises concerns about the distribution of burden and resulting unequal emotional labor (Joseph and Hirshfield, 2011; Olsen, 2019) or disciplinary “care work” (Balmer et al., 2015; Viseu, 2015).

With regard to policy, these findings are significant for medical school admissions committees as well as leadership of higher education institutions. Similar to debates about what empathy entails, there is widespread disagreement about where empathy comes from (Prinz, 2011). Researchers using neural imaging and early-childhood behavioral data claim that humans are biologically hard-wired for empathic concern yet have flexibility when it comes to who is the target of their concern (Decety and Cowell, 2014). This flexibility is particularly pivotal in terms of medical education, because while empathy toward one’s in-group may be a cause or reifying force of inequality, empathy toward one’s out-groups may inspire actions premised on equality or social justice, and patients may fall into either group. If humanities and interpretive social sciences majors are scoring higher on empathy and this is desired in medical students, then it would behoove admissions officers to admit more humanities and interpretive social sciences applicants. Moreover, medical educators should implement policies aimed at identifying, acknowledging, and improving the causes and consequences of the unequal burden of emotional work placed upon female, low SES, and URM medical students.

Finally, this study is not without its limitations. First, in the sample there are significantly less humanities and social sciences majors than biomedical majors so statistical power is limited. Second, there may be self-selection bias regarding which medical students decided to take the survey and take it twice; it is possible that more empathic students take the survey out of concern for the researchers. Third, it is possible that students are overstating their empathy and that does not capture the reality of their empathic concern in practice. Fourth, like all scales, the Interpersonal Reactivity Index scale, while validated, perhaps is not an adequate measure of empathy. Fifth, and most pressingly, we cannot know whether or not students who decide to major in a humanities or social sciences discipline are more empathic to begin with, and therefore it is possible we are measuring more empathic students who gravitate toward humanities and social sciences rather than real differences in the impacts of these disciplines. While we cannot measure the impact directly, in work measuring empathy of sociology students, Rockwell et al. (2019: 293) found no evidence that students choosing to enroll in sociology classes had higher levels of empathy than others.

Thus, one line of future research could engage in longitudinal studies that track pre-medical students from undergraduate studies through medical school. Another avenue for future research could examine how the cultural and organizational features of medical schools and hospitals stoke or stifle empathy. For example, in a survey study, Carmel and Glick (1996) found that while most physicians in their study believed that empathy was central to their conceptualization of the “good” physician, less of them found empathy pivotal to the promotion process. Because empathy has been stated as a desired outcome for physicians, then it would be incumbent upon medical educators to consider the sociological examination of empathy in medicine—the patterns about who matriculates and graduates with more or less empathy and the cultural and organizational conditions under which empathy is nurtured or eroded—in their efforts toward achieving this goal.

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### Notes

1. This debate also taps into discussions about what makes elite institutions elite: their education or the students that matriculate into them (cf. Arum and Roksa, 2011; Bourdieu and Passeron, 1990; Karabel, 2005; Stevens, 2007).
2. Historically, proponents of humanities and social sciences disciplines in academia have also argued for their significance based upon their ability to inspire critical thinking, moral reasoning, socially responsible leadership, interest in political and social involvement, and openness to engaging new ideas and diverse people (Seifert et al., 2008). For example, in 2006, the Center for Inquiry launched the Wabash National Study of Liberal Arts Education to measure whether liberal arts colleges and universities were producing such outcomes in their students (Blaich et al., 2004). With some exceptions (Arum and Roksa, 2011), in general, students have exhibited growth in moral reasoning, critical thinking, socially responsible leadership, and universality-diversity awareness over the course of their 4 years (Pascarella et al., 2012).
3. Scholars from sociological, psychological, neurological, and philosophical disciplinary backgrounds have all pointed to the complexity of the concept of empathy (Prinz, 2011). Whether operationalized in empirical research or expounded upon in theoretical work, the concept of empathy can often take on different connotations (Pedersen, 2010). In the Hojat (2007) scale of empathy, empathy is conceptualized as a cognitive attribute premised on communicative capacity; this, perhaps, is similar to instrumental clinical empathy that Vinson and Underman (2020) detail. In contrast, when empathy is understood as an affective attribute, the measure

- of interest is whether the physician is much more emotionally attuned to the patient; however, scholars disagree whether they are truly *feeling* what the patient feels or merely more perceptive (Halpern, 2003).
4. Epistemological styles, according to Lamont (2009: 54) are the “preferences for particular ways of understanding how to build knowledge, as well as beliefs in the very possibility of proving those theories.” Constructivist and comprehensive epistemological styles are reflexive and interested in paying attention to the details whereas positivist epistemological styles are more invested in advancing generalizable claims.
  5. As shown in Table D in the Appendix, when we categorized the college major of Psychology as a positivistic social science rather than a helping profession, we found that the interpretive social sciences, humanities, and helping professions still had statistically significant, higher total empathy and matriculation scores than their STEM, positivistic social sciences, and miscellaneous peers, but that the difference was less pronounced.

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## Appendix

**Table A.** Empathy scores at matriculation (MSQ) and graduation (GQ) by major.

College major	MSQ Mean	MSQ SD	GQ Mean	GQ SD
<i>Humanities</i>				
English	24.27	3.70	24.98	4.48
Art	23.32	4.62	24.16	4.49
Music	25.11	3.89	24.80	4.32
Religion	24.03	4.00	24.17	4.03
Philosophy	24.29	4.31	24.30	4.95
Classics	23.68	4.44	22.93	3.97
Language	23.49	4.84	24.12	4.58
History	22.90	4.44	23.74	4.71

(Continued)

**Table A.** (Continued)

College major	MSQ Mean	MSQ SD	GQ Mean	GQ SD
<i>Social sciences</i>				
Environ. studies	24.62	3.90	24.93	4.08
Anthropology	24.64	4.06	24.76	4.24
Sociology	23.87	4.43	23.97	4.62
Political science	22.87	4.05	23.23	4.10
Economics	22.74	4.44	23.44	4.57
<i>STEM</i>				
Physiology	23.26	3.95	23.14	4.80
Microbiology	23.61	3.98	23.81	4.44
Molecular biology	23.45	4.35	23.77	4.50
Human biology	23.94	4.51	24.16	4.41
Biomedical science	23.50	4.30	23.81	4.82
Biology	23.44	4.26	23.78	4.61
Bioengineering	22.51	4.03	22.75	4.57
Biochemistry	23.28	4.40	23.30	4.66
Chemistry	22.87	4.01	23.16	4.66
Chem. Engineering	22.96	3.60	23.07	4.87
Engineering	22.43	4.90	22.64	5.45
Physics	22.39	4.84	23.60	4.42
Mathematics	23.15	4.33	23.55	3.99
<i>Helping professions</i>				
Psychology	23.76	4.26	24.28	4.61
Public health	24.88	3.55	25.38	4.01
Nutrition	24.45	3.74	24.68	3.79
Nursing	23.4	4.37	24.77	4.26
<i>Miscellaneous</i>				
Interdisc. studies	23.42	4.14	25.59	3.36
Int'l relations	24.31	4.02	24.84	4.78
Business	21.71	4.18	22.69	4.77
N	8,860	13,404	8,860	13,404

**Table B.** Total empathy by college major without dropped cases.

College Major	Total matriculation	Total graduation	Total matriculation (controls)	Total graduation (controls)
Positivistic SS	-0.65* (0.31)	-0.24 (0.27)	-0.40 (0.30)	-0.01 (0.26)
Interpretive SS	1.13** (0.32)	0.99** (0.29)	0.75* (0.31)	0.56* (0.28)
Humanities	0.55** (0.18)	0.73** (0.16)	0.46** (0.18)	0.61** (0.15)
Helping professions	0.41** (0.11)	0.50** (0.16)	0.28* (0.11)	0.34** (0.10)
Miscellaneous	-0.42 (0.31)	-0.19 (0.27)	-0.13 (0.30)	0.11 (0.26)
Nonwhite			0.05 (0.10)	0.14 (0.09)
URM			0.10 (0.15)	0.35** (0.13)
Disadvantaged			0.77** (0.16)	0.62** (0.14)
Female			1.60** (0.09)	1.87** (0.08)
cons	23.42** (0.06)	23.67** (0.05)	22.54** (0.08)	22.62** (0.07)
N	8860	13,404	8860	13,404

\*p < 0.05. \*\*p < 0.01.

**Table C.** Empathy subscales by college major without dropped cases.

College major	Perspective taking at matriculation	Perspective taking at graduation	Empathic concern at matriculation	Empathic concern at graduation
Positivistic SS	-0.06 (0.18)	0.07 (0.15)	-0.29 (0.16)	-0.10 (0.14)
Interpretive SS	0.44* (0.19)	0.28 (0.16)	0.33* (0.16)	0.28 (0.15)
Humanities	0.28** (0.10)	0.31** (0.09)	0.20* (0.09)	0.28** (0.08)
Helping professions	0.18** (0.07)	0.20** (0.06)	0.12* (0.06)	0.15** (0.05)
Miscellaneous	0.04 (0.18)	0.08 (0.15)	-0.17 (0.16)	0.04 (0.14)
Nonwhite	0.002 (0.06)	0.05 (0.05)	0.07 (0.05)	0.09 (0.05)
URM	0.09 (0.09)	0.23** (0.07)	0.01 (0.08)	0.12 (0.07)
Disadvantaged	0.55** (0.09)	0.34** (0.08)	0.23** (0.08)	0.29** (0.07)
Female	0.61** (0.05)	0.72** (0.05)	1.00** (0.05)	1.15** (0.04)
cons	10.97** (0.05)	11.53** (0.04)	11.56** (0.04)	11.10** (0.04)
N	8924	13,492	8970	13,538

\* $p < 0.05$ . \*\* $p < 0.01$ .

**Table D.** Total empathy with psychology categorized as positivistic social science.

College major	Total matriculation	Total graduation	Total matriculation (controls)	Total graduation (controls)
Positivistic SS	0.06(0.18)	0.19(0.19)	0.03(0.18)	0.15(0.19)
Interpretive SS	1.04** (0.33)	0.70* (0.35)	0.70* (0.32)	0.32(0.35)
Humanities	0.61** (0.18)	0.78** (0.20)	0.52** (0.18)	0.66** (0.19)
Helping professions	0.42** (0.13)	0.35* (0.14)	0.31* (0.13)	0.22(0.14)
Miscellaneous	-0.48(0.32)	-0.63(0.34)	-0.19(0.31)	-0.30(0.33)
Nonwhite			0.06(0.11)	-0.02(0.12)
URM			0.10(0.15)	0.27(0.16)
Disadvantaged			0.77** (0.17)	0.68** (0.17)
Female			1.61** (0.09)	1.84** (0.10)
cons	23.40** (0.06)	23.72** (0.06)	22.51** (0.08)	22.73** (0.08)
N	8254	8254	8254	8254

\* $p < 0.05$ . \*\* $p < 0.01$ .