

# Medical Students' Exposure to the Humanities Correlates with Positive Personal Qualities and Reduced Burnout: A Multi-Institutional U.S. Survey

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**BACKGROUND:** Literature, music, theater, and visual arts play an uncertain and limited role in medical education. One of the arguments often advanced in favor of teaching the humanities refers to their capacity to foster traits that not only improve practice, but might also reduce physician burnout—an increasing scourge in today's medicine. Yet, research remains limited.

**OBJECTIVE:** To test the hypothesis that medical students with higher exposure to the humanities would report higher levels of positive physician qualities (e.g., wisdom, empathy, self-efficacy, emotional appraisal, spatial skills), while reporting lower levels of negative qualities that are detrimental to physician well-being (e.g., intolerance of ambiguity, physical fatigue, emotional exhaustion, and cognitive weariness).

**DESIGN:** An online survey.

**PARTICIPANTS:** All students enrolled at five U.S. medical schools during the 2014–2015 academic year were invited by email to take part in our online survey.

**MAIN MEASURES:** Students reported their exposure to the humanities (e.g., music, literature, theater, visual arts) and completed rating scales measuring selected personal qualities.

**KEY RESULTS:** In all, 739/3107 medical students completed the survey (23.8%). Regression analyses revealed that exposure to the humanities was significantly correlated with positive personal qualities, including empathy ( $p < 0.001$ ), tolerance for ambiguity ( $p < 0.001$ ), wisdom ( $p < 0.001$ ), emotional appraisal ( $p = 0.01$ ), self-efficacy ( $p = 0.02$ ), and spatial skills ( $p = 0.02$ ), while it was significantly and inversely correlated with some components of burnout ( $p = 0.01$ ). Thus, all hypotheses were statistically significant, with effect sizes ranging from 0.2 to 0.59.

**CONCLUSIONS:** This study confirms the association between exposure to the humanities and both a higher level

of students' positive qualities and a lower level of adverse traits. These findings may carry implications for medical school recruitment and curriculum design.

“[Science and humanities are] twin berries on one stem, grievous damage has been done to both in regarding [them]... in any other light than complementary.” (William Osler, *Br Med J.* 1919;2:1–7).

**KEY WORDS:** humanities; empathy; ambiguity; burnout; wisdom; medical education.

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## INTRODUCTION

Medicine today finds itself caught in a paradox. It has undoubtedly enjoyed many successes, and yet it is also the profession with the highest rate of suicide,<sup>1</sup> a burnout rate greater than 50%,<sup>2</sup> rampant depression,<sup>3</sup> dwindling empathy,<sup>4</sup> a negative view by the public,<sup>5</sup> and a disturbing tendency for physicians to quit.<sup>6</sup> This conundrum has prompted a search for a more balanced way to train healing physicians who can maintain their ideals and better cope with the challenges of medical practice. It has also led to a revisiting of the relationship between medicine and the humanities.

The two fields have been diverging for more than 100 years, first as a result of the “two cultures” split between the arts and sciences,<sup>7</sup> and then because of medicine's increasing skepticism of the humanities as being slippery, non-metric, hard to define, and essentially incompatible with an evidence-based approach. Yet given the aforementioned difficulties faced by today's medicine, some educators have advocated a return to the humanistic roots of our craft.<sup>8</sup> Accordingly, some medical schools have incorporated the humanities in their curriculum, and a few have even attempted to broaden students'

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undergraduate education by dropping the Medical College Admission Test (MCAT) as a requirement for admission. Although research has demonstrated that medical students with a humanistic background perform as well academically as their more traditional counterparts,<sup>9</sup> there has not been an assessment of whether they might have advantages in more personal domains. Such work could be fundamental to inform revision of admission standards and curricula.

Physicians undoubtedly need skills, knowledge, and technical competence, and yet there are also other personal qualities that undeniably constitute “a well-rounded doctor.” Among these are wisdom,<sup>10</sup> empathy,<sup>11</sup> tolerance for ambiguity,<sup>12</sup> skilled observation,<sup>13</sup> and emotional resilience.<sup>14</sup> In fact, empathy and tolerance for ambiguity are contained within the Accreditation Council for Graduate Medical Education (ACGME) competencies.<sup>15</sup> We postulated that the humanities might nurture these traits, and we thus designed a study that could assess whether exposure to the humanities is indeed associated with 1) empathy, 2) tolerance for ambiguity, 3) emotional appraisal, 4) prevention of burnout, 5) wisdom, 6) self-efficacy, and 7) spatial skills.

## METHODS

### Participants

To examine the relationship between exposure to the humanities and students' psychosocial qualities, we developed an online survey and then administered it at five U.S. medical schools: 1) Sidney Kimmel Medical College at Thomas Jefferson University, 2) Tulane University School of Medicine, 3) The Warren Alpert Medical School of Brown University, 4) Oregon Health & Science University School of Medicine, and 5) Cooper Medical School of Rowan University.

### Data Collection

At each school, a faculty representative introduced the survey and then emailed it to all students enrolled during the 2014–2015 academic year. Representatives also sent periodic reminders, and the survey remained accessible for 7 months. This project was exempted by the institutional review board at each institution.

### Survey Measures

The survey instrument comprised three parts: 1) respondent demographic and background information, 2) questions related to exposure to the humanities, and 3) measurement scales for personal qualities. These were reverse-coded as necessary, scored, and summed to create composites for analyses. Completion of the survey required approximately 45 min.

### Demographic and Background Information

In addition to typical demographics such as gender, age and ethnicity, we collected college major/minor in humanistic/

non-humanistic fields, language proficiency, parental education history, and additional work or time off prior to/during medical school.

### Exposure to the Humanities

To measure respondents' exposure to the humanities, three clinicians, an art educator, and an industrial/organizational psychologist developed a questionnaire measuring variables that included both “active” and “passive” involvement: engaging in visual arts, singing, playing musical instruments, listening to music, dancing, writing for pleasure, reading for pleasure, attending theater, going to museums/galleries, and attending concerts. Students answered on a scale of 0 (*never*) to 4 (*daily*). As there were 10 such questions, a composite score of “humanities exposure” was calculated, with a possible range of 0 to 40.

### Measurement of Personal Qualities

**Wisdom.** We used the 21-item *Brief Wisdom Screening Scale*<sup>16</sup> ( $\alpha = 0.82$ ), which reflects the various dimensions of wisdom and is presented on a five-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). Sample items are: “I don't worry about other people's opinions of me,” and “I've learned valuable life lessons from others.”

**Empathy.** We used the 20-item *Jefferson Scale of Empathy* (JSE;  $\alpha = 0.85$ ), as it is specifically focused on students' empathy in the context of patient care.<sup>11</sup> Possible scores range from 20 to 140, with a higher score indicating greater empathy. A sample item is: “It's difficult for a physician to view things from patients' perspectives.”

**Tolerance for Ambiguity.** Defined by Budner as “the tendency to perceive ambiguous situations as desirable,”<sup>17</sup> this was measured by the 16-item *Tolerance for Ambiguity Scale* ( $\alpha = 0.88$ ), using a seven-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). Scores were reverse-coded, so that higher scores indicated greater tolerance for ambiguity (range = 16–112,  $M = 76.42$ ). A sample item is: “Often the most interesting and stimulating people are those who don't mind being different and original.”

**Emotional Intelligence.** To measure individuals' ability to monitor their own and others' feelings/emotions and the ability to incorporate this information into thinking and actions,<sup>18</sup> we used two four-item subscales from Wong and Law's *Emotional Intelligence Scale*<sup>19</sup>: self-emotional appraisal ( $\alpha = 0.88$ ) and appraisal of others' emotions ( $\alpha = 0.90$ ). These subscales consist of four questions each, ranging across a seven-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). Sample items are: “I have a good understanding of my own

emotions" (self-emotional appraisal), and "I always know how my friends are feeling from their behavior" (appraisal of others' emotions).

**Self-Efficacy.** This was measured by a 10-item generalized self-efficacy scale ( $\alpha = 0.85$ ).<sup>20</sup> Responses range across a four-point Likert scale (1 = *not at all true* to 4 = *exactly true*). A sample item is: "Thanks to my resourcefulness, I can handle unforeseen situations."

**Burnout.** This was measured by the three subscales of the *Shirom-Melamed Burnout Measure* (physical fatigue,  $\alpha = 0.92$ ; cognitive weariness,  $\alpha = 0.92$ ; and emotional exhaustion,  $\alpha = 0.90$ ).<sup>21, 22</sup> Sample items are: "I feel physically drained" (physical fatigue), "I have difficulty concentrating" (cognitive weariness), and "I feel I am unable to be sensitive to the needs of coworkers" (emotional exhaustion). Responses range across a seven-point Likert scale (0 = *never/almost never* to 6 = *almost always/always*).

**Spatial Skills.** We included a measurement of spatial ability, since it not only plays a role in creativity,<sup>23</sup> but also represents a key component of medical practice ("The whole art of medicine is in observation," said Osler).<sup>24</sup> To measure spatial skills we used the *Santa Barbara Solids Test*,<sup>25</sup> which comprises 30 multiple choice questions consisting of 3D geometric shapes bisected by a plane. Respondents must determine which of the four possible 2D answer choices would result from the bisection. Answers are scored as 1 for correct and 0 for incorrect ( $\alpha = 0.86$ ).

**Statistical Analysis.** Analyses of multiple dependent variables (DVs) can be used to identify significant relationships between multiple outcomes and a single predictor. However, such tests should be conducted only for variables that are (a) *moderately* correlated (i.e., related through an underlying construct), avoiding (b) cases where variables are *highly* correlated.<sup>26</sup> Thus, to determine suitability for analysis, we examined the correlation matrix (Table 1) to ensure that variables were moderately correlated (e.g.,  $r = \sim 0.5$ ). Correlations among DVs ranged from 0.4 to 0.6, satisfying the suitability requirement. To identify which of the outcome variables were part of an underlying construct, we then subjected all our DVs to exploratory factor analysis.<sup>27, 28</sup> This revealed a four-factor structure (Table 2), wherein Factor 1 comprised wisdom, the emotional intelligence subscales, and self-efficacy (*personal qualities*); Factor 2 comprised the *burnout* subscales; Factor 3 comprised tolerance for ambiguity and empathy (*openness*); and Factor 4 comprised *spatial skills*. All correlations for variables in each of the four factors of our analysis fell below the 0.70 range, thus satisfying the second condition of multivariate general linear modeling. Together, these tests provided ample rationale for testing study hypotheses using a multiple DV approach, reducing the chance of a type I error that is inherent in running multiple independent regressions.<sup>29</sup>

We then conducted multivariate linear regression analyses using the general linear model in SPSS version 22 software (IBM Corp., Armonk, NY) and the four factors identified in our exploratory factor analysis (Table 3). To determine the general effect that humanities exposure had on each of these variables, we calculated Cohen's  $d$  (herein referred to as  $d$ ) using the partial eta squared ( $\eta_p^2$ ) resulting from the regression analyses. According to the operational definition, effect sizes around 0.50 were considered moderate, and effect sizes greater than 0.75 were considered highly important.

## RESULTS

Out of 3107 students enrolled at the participating institutions, 912 (29.3%) responded. Of these, 173 individuals failed to complete at least 80% of the survey, which was deemed the minimum required for a valid response. The remaining 739 respondents (81%) were included in the final analysis. Participant demographics, broken down by medical school, are reported in Table 4.

Respondents were slightly more likely to be female (53%) than male (47%), and ranged in age as follows: 18–21 (1%), 22–24 (30%), 25–27 (45%), and >27 years (24%). Respondents identified as Caucasian (69%), Asian (16%), Hispanic/Latino (4%), African-American (3%), and American Indian/Alaskan Native (<1%). The remainder selected two or more ethnic backgrounds.

Results from our first multivariate regression showed that humanities exposure significantly predicted all *personal qualities* in Factor 1. Specifically, exposure to the humanities most strongly predicted wisdom ( $B = 0.59$ ,  $SE[B] = 0.07$ ,  $p < 0.001$ ,  $d = 0.59$ ), followed by appraisal of others' emotions ( $B = 0.12$ ,  $SE[B] = 0.03$ ,  $p < 0.001$ ,  $d = 0.29$ ) and self-emotional appraisal ( $B = 0.09$ ,  $SE[B] = 0.03$ ,  $p = 0.01$ ,  $d = 0.20$ ). Humanities exposure also significantly predicted self-efficacy, the final personal quality in Factor 1 ( $B = 0.08$ ,  $SE[B] = 0.03$ ,  $p = 0.02$ ,  $d = 0.20$ ).

A second multivariate regression showed that humanities exposure was a significant negative predictor of the various components of burnout (Factor 2). Specifically, as levels of humanities exposure increased, physical fatigue ( $B = -0.19$ ,  $SE[B] = 0.06$ ,  $p = 0.001$ ,  $d = 0.29$ ), emotional exhaustion ( $B = -0.09$ ,  $SE[B] = 0.03$ ,  $p < 0.001$ ,  $d = 0.29$ ), and cognitive weariness ( $B = -0.11$ ,  $SE[B] = 0.04$ ,  $p = 0.01$ ,  $d = 0.20$ ) all decreased. The effect sizes ( $d$ ) also suggested that exposure to the humanities had a stronger negative association with physical fatigue and emotional exhaustion than cognitive weariness.

Results of a final multivariate regression showed that humanities exposure was significantly associated with *openness* (Factor 3). In fact, exposure to the humanities significantly predicted tolerance for ambiguity by the largest effect size of all variables analyzed ( $B = 0.58$ ,  $SE[B] = 0.07$ ,  $p < 0.001$ ,  $d = 0.63$ ). Humanities exposure also significantly predicted

**Table 1 Means, Standard Deviations, and Intercorrelations of Measured Variables**

		1	2	3	4	5	6	7	8	9	10	11
1. Humanities exposure	<i>M</i> = 13.26 <i>SD</i> = 4.65	–										
2. Wisdom	<i>M</i> = 76.66 <i>SD</i> = 9.68	0.28 <sup>†</sup>	(0.82)									
3. Emotional appraisal – others	<i>M</i> = 21.19 <i>SD</i> = 3.94	0.14 <sup>†</sup>	0.40 <sup>†</sup>	(0.90)								
4. Emotional appraisal – self	<i>M</i> = 20.28 <i>SD</i> = 4.33	0.09*	0.47 <sup>†</sup>	0.53 <sup>†</sup>	(0.88)							
5. Self-efficacy	<i>M</i> = 31.82 <i>SD</i> = 3.89	0.09*	0.48 <sup>†</sup>	0.25 <sup>†</sup>	0.34 <sup>†</sup>	(0.85)						
6. Burnout: cognitive weariness	<i>M</i> = 9.41 <i>SD</i> = 4.91	–0.10 <sup>†</sup>	–0.22 <sup>†</sup>	–0.05	–0.16 <sup>†</sup>	–0.23 <sup>†</sup>	(0.92)					
7. Burnout: physical fatigue	<i>M</i> = 15.25 <i>SD</i> = 7.16	–0.12 <sup>†</sup>	–0.24 <sup>†</sup>	0.01	–0.09*	–0.16 <sup>†</sup>	0.67 <sup>†</sup>	(0.92)				
8. Burnout: emotional exhaustion	<i>M</i> = 4.07 <i>SD</i> = 3.33	–0.13 <sup>†</sup>	–0.32 <sup>†</sup>	–0.31 <sup>†</sup>	–0.25 <sup>†</sup>	–0.17 <sup>†</sup>	0.40 <sup>†</sup>	0.36 <sup>†</sup>	(0.90)			
9. Empathy	<i>M</i> = 115.61 <i>SD</i> = 12.18	0.22 <sup>†</sup>	0.42 <sup>†</sup>	0.42 <sup>†</sup>	0.32 <sup>†</sup>	0.11 <sup>†</sup>	–0.06	–0.07	–0.30 <sup>†</sup>	(0.88)		
10. Tolerance for ambiguity	<i>M</i> = 76.12 <i>SD</i> = 8.98	0.30 <sup>†</sup>	0.33 <sup>†</sup>	0.18 <sup>†</sup>	0.05	0.11 <sup>†</sup>	0.01	–0.05	–0.14 <sup>†</sup>	0.38 <sup>†</sup>	(0.88)	
11. Spatial skills	<i>M</i> = 23.84 <i>SD</i> = 4.78	0.08*	0.12 <sup>†</sup>	0.02	0.01	0.09*	0.01	0.05	0.02	0.02	0.15 <sup>†</sup>	(0.86)

\*Correlation is significant at the 0.05 level (two-tailed). <sup>†</sup>Correlation is significant at the 0.01 level (two-tailed). Cases were excluded listwise; therefore, correlations are based on a final sample size of 739. Cronbach's alphas are presented in italics and parentheses along the diagonal

empathy—the other variable in Factor 3 ( $B = 0.60$ ,  $SE[B] = 0.09$ ,  $p < 0.001$ ,  $d = 0.46$ ).

Lastly, linear regression results showed that humanities exposure also significantly predicted spatial skills (Factor 4;  $B = 0.09$ ,  $SE[B] = 0.04$ ,  $p = 0.02$ ,  $d = 0.20$ ).

**Table 2 Factor Analysis of Dependent Variables**

	<i>Factors</i>			
	1	2	3	4
Wisdom	<b>0.66</b>	–0.24	0.35	0.25
Emotional appraisal – others	<b>0.70</b>	0.05	0.37	–0.19
Emotional appraisal – self	<b>0.82</b>	–0.07	0.08	–0.12
Self-efficacy	<b>0.69</b>	–0.19	–0.15	0.38
Cognitive weariness	–0.11	<b>0.89</b>	–0.01	–0.09
Physical fatigue	–0.00	<b>0.88</b>	–0.01	–0.09
Emotional exhaustion	–0.24	<b>0.58</b>	–0.36	0.17
Jefferson Scale of Empathy	0.32	–0.05	<b>0.77</b>	–0.13
Tolerance for ambiguity	–0.02	–0.02	<b>0.78</b>	0.33
Spatial skills	0.01	0.02	0.10	<b>0.83</b>

Rotation converged in five iterations, extraction method: principal component analysis. Rotation method: varimax with Kaiser normalization. Bolded values indicate to which factor the variable belongs. Factor membership suggests that the variables within a factor are highly correlated and have an underlying similarity or shared construct. Results indicate that there are four unique factors: personal qualities (wisdom, appraisal of others' emotions, self-emotional appraisal, and self-efficacy), burnout (cognitive weariness, physical fatigue, emotional exhaustion), openness (empathy and tolerance for ambiguity), and spatial skills

## DISCUSSION

This multi-institutional study supports the research hypothesis: students' exposure to the humanities is linked to important personal qualities and prevention of burnout. The qualities we measured are neither part of the admissions process nor regularly tested during standardized board examinations, and yet they may affect both patient satisfaction and outcome,<sup>30</sup> as well as cost and quality of care.<sup>31, 32</sup> Hence, this study may carry implications for both admission standards and professional development.

Our survey suffered from a few limitations, including recall and reporting biases, plus a relatively low return rate, not uncommon in survey-driven designs,<sup>33</sup> especially one like ours that required significant time. Additionally, removing participants who failed to complete at least 80% of the survey further reduced responses from 912 to 739. We did not attempt to measure whether censored responses would have made a significant impact, and of course a low response rate might have invited selection bias. Yet our return was still close to 24%, which is nearly double the average of 10–15% for external surveys. Furthermore, by conducting the study at multiple locations, we increased our response representativeness, which has been cited as being more important than the actual response rate.<sup>34</sup> Lastly, the observational nature of our cohort study identifies only correlations, not causation. Further



Table 3 Regression Analyses of Variables of Interest as Outcomes of Humanities Exposure

Dependent variable	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% Confidence interval		Partial $\eta^2$	<i>d</i>
					Lower bound	Upper bound		
Multivariate regression – Factor 1: Personal qualities								
Wisdom	0.59	0.07	8.00	<0.001	0.44	0.73	0.08	0.59
Emotional appraisal – others	0.12	0.03	3.73	<0.001	0.05	0.18	0.02	0.29
Emotional appraisal – self	0.09	0.03	2.53	0.01	0.02	0.15	0.01	0.20
Self-efficacy	0.08	0.03	2.43	0.02	0.01	0.14	0.01	0.20
Multivariate regression – Factor 2: Burnout								
Cognitive weariness	–0.11	0.04	–2.74	0.01	–0.18	–0.03	0.01	0.20
Physical fatigue	–0.19	0.06	–3.35	0.001	–0.30	–0.08	0.02	0.29
Emotional exhaustion	–0.09	0.03	–3.54	<0.001	–0.14	–0.04	0.02	0.29
Multivariate regression – Factor 3: Openness								
Empathy	0.60	0.09	6.38	<0.001	0.42	0.78	0.05	0.46
Tolerance for ambiguity	0.58	0.07	8.62	<0.001	0.45	0.72	0.09	0.63
Univariate regression: Spatial skills								
Spatial Skills	0.09	0.04	2.33	0.02	0.14	0.16	0.01	0.20

*SE*, standard error

studies in which exposure to the humanities serves as intervention would be needed to better clarify their role.

Nevertheless, our results suggest that the humanities do correlate with important physician qualities. Of interest, the three personal qualities that correlated most strongly with exposure to the humanities were tolerance of ambiguity, empathy, and wisdom. This is intuitive considering that the humanities are not only a way to teach compassion and tolerance, but also represent the wisdom of those who came before us. In fact, wisdom might very well be *the* single trait that encompasses all of those other traits which define a well-rounded doctor: empathy, openness to possibilities, emotional resilience, mindfulness, humility, altruism, a knack for learning from life, plus a cathartic sense of humor. However, wisdom is not a focus of today's medical education, which concentrates primarily on information and knowledge. Ironically, knowledge without wisdom might be dangerous.<sup>35</sup> As Socrates put it in *Menexenus*, “all knowledge, when separated from justice and virtue, is seen to be cunning, and not wisdom.”<sup>36</sup>

Forty years ago, bioethicist Edmund Pellegrino suggested that well-rounded physicians share three main characteristics: competence, compassion, and education.<sup>37</sup> Few would disagree with the need for competence and compassion, but the

issue of “education”—in Pellegrino's description, a “liberal arts” education, i.e. *culture*—has received much less attention. Yet, it is the one ingredient whose presence was considered fundamental until the 1910 Flexner report. Writing in 1902 about the “four great features of [our] guild,”<sup>38</sup> Osler described medicine as the profession of a “cultivated” person. Flexner himself included in his 346-page report an often forgotten passage where he mentioned the “varied and enlarging cultural experience” he considered so important to the education of physicians.<sup>39</sup> More recently, Lewis Thomas<sup>8</sup> and Sherwin Nuland<sup>40</sup> urged a return to the humanities as the ideal repository of the moral and cultural knowledge required of physicians. However, being “cultivated” is no longer a tenet of the profession.

In fact, humanistic fields are often spoken of as though they were a waste of time. But as was reported to Congress by Richard H. Brodhead, the president of Duke University and co-chair of the Commission on the Humanities & Social Sciences, “this facile negativism forgets that many of the country's most successful and creative people had exactly this kind of education.”<sup>41, 42</sup> Others have echoed his opinion,<sup>43, 44</sup> and business leaders like Google prioritize applicants with a liberal arts education.<sup>45</sup> The humanities may even foster a different way of seeing, thinking, and feeling,<sup>46</sup> that can then

Table 4 Respondent Demographics Broken Down by Medical School

	All	TJU	Tulane	Brown	Oregon	Rowan
Age (years)						
18–21	8 (1.1%)	3 (1.7%)	0 (0%)	3 (1.8%)	0 (0%)	2 (1.9%)
22–24	214 (29.8%)	43 (24.9%)	51 (26.4%)	62 (36.7%)	14 (18.7%)	44 (40.7%)
25–27	316 (44.0%)	90 (52.0%)	83 (43.0%)	71 (42.0%)	29 (38.7%)	43 (39.8%)
>27	178 (24.8%)	36 (20.8%)	59 (30.6%)	32 (18.9%)	32 (42.7%)	19 (17.6%)
Sex						
Female	372 (51.8%)	91 (52.6%)	91 (47.2%)	89 (52.7%)	45 (60.0%)	56 (51.9%)
Male	341 (47.5%)	81 (46.8%)	102 (52.8%)	79 (46.7%)	29 (38.7%)	50 (46.3%)
Race						
Asian	17 (16.3%)	29 (16.8%)	17 (8.8%)	47 (27.8%)	7 (9.3%)	17 (15.7%)
Black	23 (3.2%)	0 (0%)	5 (2.6%)	9 (5.3%)	0 (0%)	9 (8.3%)
Latino	28 (3.9%)	3 (1.7%)	4 (2.1%)	17 (10.1%)	0 (0%)	4 (3.7%)
White	493 (68.7%)	129 (74.6%)	152 (78.8%)	82 (48.5%)	64 (85.3%)	66 (61.1%)
Other	49 (6.82%)	10 (5.8%)	13 (6.7%)	11 (6.5%)	4 (4.3%)	11 (10.2%)

TJU, Thomas Jefferson University

be used in any field of endeavor—and especially in one like medicine, which deals primarily with the human condition. The humanities might actually provide an indispensable *language* for exploring that strange, nuanced, and often nonsensical land called the human condition.

The humanities may indeed promote the very personal qualities we measured. For instance, observing drama increases empathy,<sup>47</sup> as does the performance of acting techniques;<sup>48</sup> an elective course in medical humanities nurtures empathy;<sup>49</sup> reflective writing may help improve medical students' well-being;<sup>50</sup> drawing enhances the reading of faces;<sup>51</sup> and observation of art improves the art of observation.<sup>52</sup> Even good literature prompts better detection of emotions<sup>53</sup>—all fundamental skills for a physician, although not prerequisites for medical school admission. Lastly, *creativity*, a quality we did not measure, has also been linked to a broad education and a multifaceted mind. In fact, Nobel laureates in science are often polymaths: 22 times as likely to perform as actors, dancers, or magicians; 12 times as likely to write poetry, plays, or novels; seven times as likely to dabble in arts and crafts; and twice as likely to play an instrument or compose music.<sup>54</sup>

The importance of wide-ranging interests raises the issue of whether exposure to the humanities might not be the true correlate of students' desirable qualities, but instead a reflection of some other variable we did not measure. In a 1999 essay, Dr. Faith Fitzgerald asked this question,<sup>55</sup> and concluded that what may really determine students' desirable traits is *curiosity*. This has received limited attention in medical education research. In fact, current education practices may even hamper curiosity.<sup>56</sup> But it is possible that interest in other activities, such as religious practice or meditation, volunteer work, sports, or politics, may similarly benefit the mental lives of our medical students.

Lastly, if exposure to the humanities plays a role in fostering important traits, what is more beneficial: an active or a passive student's involvement? In our study, post hoc analyses remained significant regardless of whether we included active, passive, or both types of involvement. This suggests that the link between our variables of interest is robust, but also prompts further questions as we seek to better understand the role played by the humanities, whether in fact they can be taught or instead should be a prerequisite for medical school admission, and lastly, how an omnivorous curiosity might not only be of benefit but also be preserved during medical education.

In summary, our study empirically confirms what many have intuitively suspected for years: exposure to the humanities is associated with both important personal qualities and prevention of burnout. In fact, one could argue that some of the qualities we measured (tolerance for ambiguity, empathy, emotional appraisal of self and others, resilience) are, together with wisdom, fundamental components of *professionalism*.<sup>57</sup> Hence, if we wish to create wiser, more tolerant, empathetic, and resilient physicians, we might want to reintegrate the humanities in medical education. This is nothing new.

Commenting more than 100 years ago on the risk of burnout, Rudolf Virchow exhorted students to cultivate the humanities: “You can soon become so engrossed in study, then [in] professional cares, [then] in getting and spending, you may so lay waste your powers that you find too late with hearts given away that there is no place in your habit-stricken souls for those gentler influences that make life worth living.”<sup>58</sup>

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## REFERENCES

1. Agerbo E, Gunnell D, Bonde JP, Mortensen PB, Nordentoft M. Suicide and occupation: the impact of socio-economic, demographic and psychiatric differences. *Psychol Med*. 2007;37(8):1131–40.
2. Shanafelt TD, Hasan O, Dyrbye LN, et al. Changes in Burnout and Satisfaction With Work-Life Balance in Physicians and the General US Working Population Between 2011 and 2014. *Mayo Clin Proc*. 2015;90(12):1600–13.
3. Mata DA, Ramos MA, Bansal N, et al. Prevalence of Depression and Depressive Symptoms Among Resident Physicians: A Systematic Review and Meta-analysis. *JAMA*. 2015;314(22):2373–83.
4. Hojat M, Mangione S, Nasca TJ, et al. An empirical study of decline in empathy in medical school. *Med Educ*. 2004;38(9):934–41.
5. Flores G. Mad scientists, compassionate healers, and greedy egotists: The Portrayal of Physicians in Movies. *J Nat Med Ass*. 2002;94(7):636–58.
6. Krauthammer, C. Why doctors quit. *Washington Post*. May 28, 2015. [https://www.washingtonpost.com/opinions/why-doctors-quit/2015/05/28/1e9d8e6e-056f-11e5-a428-c984eb077d4e\\_story.html](https://www.washingtonpost.com/opinions/why-doctors-quit/2015/05/28/1e9d8e6e-056f-11e5-a428-c984eb077d4e_story.html). Accessed 20 Nov 2017.
7. Snow CP. *The Two Cultures and the Scientific Revolution*. The 1959 Rede Lecture. New York: Cambridge University Press; 1961.
8. Thomas L. Notes of a biology-watcher. How to fix the premedical curriculum. *N Engl J Med*. 1978;298:1180–1.
9. Muller D, Kase N. Challenging traditional premedical requirements as predictors of success in medical school: the Mount Sinai Humanities and Medicine Program. *Acad Med*. 2010;85:1378–83.
10. Papagiannis A. Eliot's Triad: Information, Knowledge and Wisdom in Medicine. *Hektoen International Journal of Medical Humanities*. Spring 2014. <http://hekint.org/2017/01/29/eliot-triad-information-knowledge-and-wisdom-in-medicine/>. Accessed 20 Nov 2017.
11. Hojat M. *Empathy in patient care: Antecedents, development, measurement, and outcomes*. New York: Springer; 2007.
12. Geller G. Tolerance for Ambiguity: An Ethics-Based Criterion for Medical Student Selection. *Acad Med*. 2013;88:581–4.
13. Belkin BM, Neelon FA. The Art of Observation: William Osler and the Method of Zaidig. *Ann Intern Med*. 1992;116(10):863–6.
14. Sotile WM, Sotile MO. Beyond Physician Burnout. *J Med Pract Manage*. 2003;18(6):314–8.
15. Association of American Medical Colleges (AAMC). Core Entrustable Professional Activities for Entering Residency: Curriculum Developers'

- Guide. 2014. <https://members.aamc.org/eweb/upload/Core%20EPA%20Curriculum%20Dev%20Guide.pdf>. Accessed 20 Nov 2017.
16. **Glück J, König S, Naschenweng K, et al.** How to measure wisdom: content, reliability, and validity of five measures. *Front Psychol.* 2013;4:405.
  17. **Bunder S.** Intolerance of ambiguity as a personality variable. *J Pers.* 1962;30(1):29–50.
  18. **Salovey P, Mayer JD.** Emotional intelligence. *Imagin Cogn Pers.* 1990;9(3):185–211.
  19. **Wong C-S, Law KS.** The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study. *Leadersh Q.* 2002;13(3):243–74.
  20. **Schwarzer R, Jerusalem M.** Optimistic self-beliefs as a resource factor in coping with stress. In: **Hobfoll SE, de Vries MW, eds.** *Extreme Stress and Communities: Impact and Intervention.* NATO ASI Series (Series D: Behavioural and Social Sciences). Dordrecht, Netherlands: Springer; 1995:159–77.
  21. **Shirom A.** Burnout in Work Organizations. In: Cooper CL and Robertson I, eds. *International Review of Industrial and Organizational Psychology.* New York: Wiley; 1989:25–48.
  22. **Shirom A, Melamed S.** A Comparison of the Construct Validity of Two Burnout Measures in Two Groups of Professionals. *Int J Stress Manag.* 2006;13(2):176–200.
  23. **Kell HJ, Lubinski D, Benbow CP, Steiger JH.** Creativity and technical innovation: spatial ability's unique role. *Psychol Sci.* 2013;24(9):1831–6.
  24. **Osler W.** The natural method of teaching the subject of medicine. *JAMA.* 1901;36:1673–9.
  25. **Cohen CA, Hegarty M.** Inferring cross sections of 3D objects: A new spatial thinking test. *Learn Individ Differ.* 2012;22(6):868–74.
  26. **Anderson TW.** *An Introduction to Multivariate Statistical Analysis.* New York: Wiley; 1958.
  27. **Gorsuch RL.** *Factor Analysis.* 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.; 1983.
  28. **McDonald RP.** *Factor Analysis and Related Methods.* Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.; 1985.
  29. **Tabachnick BG, Fidell LS.** *Using multivariate statistics.* 5th ed. New York: Harper & Row; 1989.
  30. **Hojat M, Louis DZ, Markham FW, Wender R, Rabinowitz C, Gonnella JS.** Physicians' Empathy and Clinical Outcomes for Diabetic Patients. *Acad Med.* 2011;86(3):359–64.
  31. **Del Canale S, Louis DZ, Maio V, et al.** Physicians' empathy and disease complications: An empirical study of primary care physicians and their diabetic patients in Parma, Italy. *Acad Med.* 2012;87(9):1243–9.
  32. **Merrill JM, Camacho Z, Laux LF, et al.** How medical schools shape students' orientations to patients' psychological problems. *Acad Med.* 1991;66(Suppl 9):4–6.
  33. **Baruch Y.** Response rate in academic studies – A comparative analysis. *Human Relations.* 1999;52(4):421–38.
  34. **Cook C, Heath F, Thompson RL.** A meta-analysis of response rates in web- or internet-based surveys. *Educ and Psychol Meas.* 2000;60(6):821–36.
  35. **Zuger A.** The Real World Is Not an Exam. *New York Times.* Feb 10, 2014. <http://well.blogs.nytimes.com/2014/02/10/the-real-world-is-not-an-exam/>. Accessed Nov 20 2017.
  36. **Plato.** *Plato in Twelve Volumes.* Vol. 9 translated by W.R.M. Lamb. Menexenus 247a. Cambridge, MA: Harvard University Press; (London, UK: William Heinemann Ltd.); 1925.
  37. **Pellegrino E.** Educating the Humanist Physician: An Ancient Ideal Reconsidered. *JAMA.* 1974;227(1):1288–94.
  38. **Osler W.** Chauvinism in medicine. In: *Aequanimitas with other addresses to medical students, nurses and practitioners of medicine.* Philadelphia, PA: P. Blakiston's Son & Co.; 1906:277–306.
  39. **Flexner A.** *Medical Education in the United States and Canada: A Report to the Carnegie Foundation for the Advancement of Teaching.* New York: The Carnegie Foundation for the Advancement of Teaching; 1910. <http://www.nejm.org/doi/full/10.1056/NEJMra055445#t=article>
  40. **Nuland SB.** *Where is Wisdom? Restraint in a Time of Biomedical Miracles.* The Great Lectures Library. Chautauqua, NY: Chautauqua Institution; 2006.
  41. **Schuessler J.** Humanities Committee Sounds an Alarm. *New York Times.* June 18, 2013. <https://www.nytimes.com/2013/06/19/arts/humanities-committee-sounds-an-alarm.html>. Accessed 20 Nov 2017.
  42. **American Academy of Arts and Sciences Commission on the Humanities and Social Sciences.** *The Heart of the Matter: The Humanities and Social Sciences for a Vibrant, Competitive, and Secure Nation.* [www.humanitiescommission.org/\\_pdf/hss\\_report.pdf](http://www.humanitiescommission.org/_pdf/hss_report.pdf). Accessed Nov 20 2017.
  43. **Kristof, N.** Starving for Wisdom. *New York Times.* April 16, 2015. <http://www.nytimes.com/2015/04/16/opinion/nicholas-kristof-starving-for-wisdom.html>. Accessed 20 Nov 2017.
  44. **Zakaria F.** *In Defense of a Liberal Education.* New York: W. W. Norton & Company; 2015.
  45. **Reisz M.** Google leads search for humanities PhD graduates. *Times Higher Education.* May 19, 2011. <http://www.timeshighereducation.co.uk/416190.article>. Accessed 20 Nov 2017.
  46. **Mangione S, Kahn MJ.** A Tale of Two Brains: How to Rekindle the Artist Within. *The Pharos.* 2015;78(4):1–47.
  47. **Hojat M, Axelrod D, Spandorfer J, Mangione S.** Enhancing and sustaining empathy in medical students. *Med Teach.* 2013;35(12):996–1001.
  48. **Dow AW et al.** Using Theater to Teach Clinical Empathy: A Pilot Study. *J Gen Intern Med.* 2007;22:1114–8.
  49. **Graham J, Benson LM, Swanson J, Potyk D, Daratha K, Roberts K.** Medical Humanities Coursework Is Associated with Greater Measured Empathy in Medical Students. *Am J Med.* 2016;129(12):1334–7.
  50. **Shapiro J, Kasman D, Shafer A.** Words and Wards: A Model of Reflective Writing and Its Uses in Medical Education. *J Med Humanit.* 2006;27:231–44.
  51. **Brechet C, Baldy R, Picard D.** How does Sam feel? Children's labelling and drawing of basic emotions. *Br J Dev Psychol.* 2009;27(Pt 3):587–606.
  52. **Naghshineh S et al.** Formal Art Observation Training Improves Medical Students' Visual Diagnostic Skills. *J Gen Intern Med.* 2008;23(7):991–7.
  53. **Comer Kidd D, Castano E.** Reading Literary Fiction Improves Theory of Mind. *Science.* 2013;342(6156):377–80.
  54. **Grant A.** *Originals: How Non-Conformists Move the World.* New York: Viking; 2016.
  55. **Fitzgerald FT.** Curiosity. *Ann Intern Med.* 1999;130(1):70–2.
  56. **Dyche L, Epstein RM.** Curiosity and Medical Education. *Med Educ.* 2011;45(7):663–68.
  57. **Byyny RL, Papadakis MA, Paaup DS, eds.** *Medical Professionalism: Best Practices.* Menlo Park, CA: Alpha Omega Alpha Honor Medical Society, 2015. <http://alphaomegaalpha.org/pdfs/2015MedicalProfessionalism.pdf>. Accessed 20 Nov 2017.
  58. **Virchow R, MD,** from an address to medical students at the Pathological Institute, Berlin (as quoted in Lawson K. *Spirituality in Medicine: What Is Its Role, Today and Tomorrow?* Word & World. 2010;30(1):71.