



# Relationship between Psychological Correlates and Empathy in Medical Students: A Cross-Sectional Study

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**Objective** Empathy is important in the education of medical students. Many psychosocial variables are related to empathy. The aim of the study was to investigate the relationship between empathy and psychosocial factors such as burnout, personality, self-esteem, and resilience.

**Methods** The participants completed a set of self-reporting questionnaires, including questions related to socio-demographic characteristics, the Korean edition of the Jefferson Scale of Empathy, student version (JSE-S-K), Maslach Burnout Inventory General Survey (MBI-GS), NEO Five-Factor Inventory (NEO-FFI), Rosenberg Self-esteem Scale (R-SES), and Connor-Davidson Resilience Scale (CD-RISC). Partial correlation and regression analyses were performed.

**Results** In male students, there were positive correlations between JSE-S-K and R-SES ( $r=0.229$ ,  $p=0.002$ ); conscientiousness of the NEO-FFI ( $r=0.153$ ,  $p=0.037$ ) and negative correlations, specifically between JSE-S-K and depersonalization of MBI ( $r=-0.206$ ,  $p=0.005$ ). In female students, there was positive correlations between JSE-S-K and personal accomplishment of MBI ( $r=0.384$ ,  $p=0.004$ ). In the multiple regression model, the JSE-S-K was affected by conscientiousness of the NEO-FFI (adjusted  $R^2=0.245$ ,  $\beta=0.201$ ,  $p=0.001$ ); depersonalization, personal accomplishment of the MBI-GS ( $\beta=-0.188$ ,  $p=0.001$ ,  $\beta=0.143$ ,  $p=0.017$ ); R-SES ( $\beta=0.176$ ,  $p=0.004$ ); sex ( $\beta=0.117$ ,  $p=0.029$ ).

**Conclusion** The present findings suggested that conscientiousness, depersonalization, personal accomplishment, self-esteem and sex have an influence on empathy. Therefore, these must be considered in medical education and can be helpful to nurture more empathetic doctors.

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**Key Words** Medical student, Empathy, Self-esteem, Burnout, Conscientiousness.

## INTRODUCTION

It is well known that empathy defined as understanding the patient's thought and feeling<sup>1</sup> has an impact on interpersonal relationship.<sup>2</sup> People can be empathetic by putting himself or herself at the other's stance.<sup>1</sup> Hence, empathy has long been recognized as important, not only for better communication in

the patient-doctor relationship but also for improved patient compliance, and better prognosis and treatment outcomes.<sup>3-6</sup>

Bringing up empathetic doctors and lowering the increasing stress and burnout among medical students are global priorities.


To develop more empathetic doctors, the Association of American Medical Colleges added empathy as a learning objective in medical education.<sup>4</sup> Domestic medical colleges in Korea also made revisions to the medical curriculum to strengthen the capacity for empathy.<sup>5</sup>

From behavioral and social sciences perspectives, the ability to modify one's empathy is controversial: empathy as trait is highly stable and difficult to change but empathy as state is easy to change.<sup>6</sup> Hojat<sup>7</sup> suggested that empathy resembles the concept of attachment and has its basis in evolutionary, genetic, developmental, experiential, situational, and educational grounds.

In addition, deficits in empathy may be improved by therapeutic or interventional approaches.<sup>7</sup> Although there is a lack

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of consistent positive results in improving empathy through medical education, current evidence supports the need for targeted programs and appropriate experiences for medical students. This is because not everyone develops the capacity for empathy by default.

The Jefferson Scale of Empathy (JSE) was developed to measure empathy among medical students and physicians. The validity and reliability of JSE are well established. It has been translated into various languages and is widely used in many countries, particularly in the field of health and patient care.<sup>8-10</sup>

Up to 60% of physicians experience burnout during their career. Emotionally exhausted physicians are generally less empathetic and may become depersonalized when managing patients.<sup>11</sup> The features of burnout such as depersonalization, emotional exhaustion, and decline in personal accomplishment are prevalent not only among physicians but also frequently affect medical students.<sup>12</sup> Previous studies investigating the association between burnout and empathy in physicians and medical students have reported that emotional exhaustion and depersonalization are inversely correlated with empathy.<sup>11,13,14</sup>

Resilience is also one of the psychosocial factors assumed to be related to empathy. Resilience is the ability to deal with stress and to recover from the adversity.<sup>15</sup> A previous study delineated how resilience, burnout, and empathy in physicians are related.<sup>16</sup> The researchers concluded that only burnout is related to resilience.<sup>16</sup> However, they did point out that additional investigations to further explore this relationship is warranted.<sup>16</sup>

It is also well known that personality, a construction of behavioral tendencies and characteristics,<sup>17</sup> has an impact on the empathy of medical students.<sup>10,17-19</sup> The five factor model, characterized by five personality dimensions (neuroticism, extraversion, conscientiousness, agreeableness, openness to experience), is often applied to evaluate the personality of medical students in relation to empathy.<sup>17-19</sup> It has been shown that medical students who are more open to experience and agreeable tend to be more empathetic because they can build better doctor-patient relationships and handle the unexpected.<sup>18,19</sup> Self-esteem is defined as the value that individuals places on themselves.<sup>20</sup> There have been many studies that tried to figure out the relation between empathy and self-esteem.<sup>20-22</sup> It is already known that self-esteem may be affected by empathy.<sup>23-25</sup> However, the impact of self-esteem on empathy, especially among medical students, has remained inconclusive.

A number of studies in the literature have investigated the factors relating to empathy among medical students or physicians in Korea.<sup>10,26-28</sup> Relationship between empathy and personality of medical students were figured out using the Jefferson Scale of Empathy, Student-version, Korean edition (JSE-S-K) and Temperament and Character Inventory (TCI).<sup>10</sup>

According to Lee et al.,<sup>10</sup> the empathy was related to Reward Dependence, Cooperativeness subscales of TCI.<sup>10</sup> Another study conducted on training residents with various specialties, reported that emotional exhaustion and depersonalization subscales of Maslach Burnout Inventory were negatively related to empathy. To our knowledge, our study is the first to investigate the correlates between empathy and the multiple psychological variables such as self-esteem, resilience in a single medical student group in Korea. In particular, the aim of this study was to investigate the relationships among empathy, burnout, personality, resilience, and self-esteem within one medical students group. Our hypothesis is that empathy is inversely correlated with burnout and neuroticism; and positively correlated with resilience, self-esteem, and four of the domains in the five-factor model (extraversion, conscientiousness, agreeableness, and openness to experience).

## METHODS

### Participants

In this cross-sectional study, 285 students from the Seonam University in South Korea were invited to participate. The medical college of Seonam University has the 6-year curriculum with students from high school graduates. The 6-year curriculum is divided into 2-year premedical, basic, and clinical courses.

A survey was completed in the middle of the academic year (from November to December 2016). The students received the survey via postal mail, or directly from one of the researchers. In total, 271 students (197 men, 74 women; response rate: 95%) responded. Participation in this study was voluntarily and students were not compensated.

### Ethics approval and consent to participate

This study was approved by the Institutional Review Board of Myongji Hospital (approval No. MJH-16-115). Informed consent was submitted by all subjects when they were enrolled.

### Measurement tools

#### Socio-demographic characteristics

The questionnaire included items assessing sex, age and year level.

#### Korean edition of the Jefferson Scale of Empathy-student version (JSE-S-K)

The Jefferson Scale of Empathy was developed by Hojat et al.<sup>8</sup> to assess the empathic capacity of health professions. The JSE-S was translated into Korean in 2010 and was reported to have a Cronbach's alpha of 0.84.<sup>29</sup> The JSE-S-K is a self-report-

ing questionnaire consisting of 20 items, with a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). Among the 20 items, 10 are reverse items, with responses from 1 (strongly agree) to 7 (strongly disagree). The total score was obtained by summing all items (maximum score=140). A higher total score indicates higher degree of empathy.

#### **Maslach Burnout Inventory-general survey version (MBI-GS)**

The MBI<sup>30</sup> is a widely used self-reporting scale to assess burnout states related to occupational stress. There are two versions of MBI: the general survey and human services survey versions. We used the general survey version translated by Kang and Kim.<sup>31</sup> The MBI consists of 22 items with three subscales: emotional exhaustion (EE, 9 items), depersonalization (DP, 5 items), and personal accomplishment (PA, 8 items). Responses are provided on a 7-point Likert scale from 1 to 7. A higher burnout state is associated with higher EE and DP, and lower PA scores.<sup>13</sup>

#### **Conner-Davidson Resilience Scale (CD-RISC)**

The CD-RISC is a 25-item, self-reporting scale to estimate psychological resilience and coping ability.<sup>32</sup> Each item is scored on a 5-point scale (0–4). A higher score indicates better psychological resilience. In factor analysis, the CD-RISC is divided into five sub-factors: hardness, persistence, optimism, support, and spirituality. High reliability and validity of the CD-RISC have been established in various groups. The Korean version of the CD-RISC developed in 2010 was applied to our study. Validity (Cronbach's alpha >0.9) and test-retest reliability (Pearson  $r=0.7$ ) were confirmed in samples comprising of university students, nurses, and firefighters.<sup>33</sup>

#### **Rosenberg Self-Esteem Scale (RSES)**

The RSES assesses the attitudes toward the self (i.e., sense of self-worth and self-acceptance).<sup>34</sup> This is a 10-item, self-reporting scale. Items are rated on a 4-point Likert scale (1=strongly disagree, 4=strongly agree). Item ratings are summed to yield a total score (ranges from 10 to 40). A higher score indicates higher self-esteem. In this study, we used the version translated and validated by Lee.<sup>35</sup>

#### **Neuroticism Extraversion Openness Five-Factor Inventory (NEO-FFI)**

The NEO-FFI is one of the self-reporting questionnaires based on the five-factor model of personality.<sup>36</sup> The NEO-FFI is used to assess the five major dimensions of personality traits by means of a questionnaire comprising of 60 items, using a 5-point Likert scale. The five dimensions are neuroticism (N), extraversion (E), openness (O), agreeableness (A), and con-

scientiousness (C). Neuroticism includes characteristics such as anxiety, anger, hostility, and depression. Extraversion comprises dimensions such as warmth, activity, positive emotions, and excitement-seeking. Conscientiousness refers to dimensions such as self-discipline, dutifulness, and competence. Agreeableness consists of trust, altruism, modesty, compliance, and tender-mindedness. Openness to experience includes imagination, ideas, values, feelings, aesthetics, and actions.<sup>37</sup> We used the translated version of the NEO-FFI in this study (Cronbach's alpha 0.718–0.801).<sup>38</sup>

#### **Data analysis and statistics**

Descriptive statistics were computed for the socio-demographic variables and JSE-S-K scores. An independent samples T-test was performed to investigate differences in empathy depending on sex. One-way analysis of variance (ANOVA) was applied to find out difference of empathy by grade. Pearson correlation analysis was applied to examine correlations between empathy and other factors, such as resilience and personality. Following the criteria proposed by Cohen, a relationship between two factors is considered a significant correlation when the calculated value is higher than the median value ( $r=0.300$ ,  $r$ =Pearson correlation coefficients) in this study.<sup>39</sup> To investigate the correlation between empathy and other factors with adjusting confounding factors, partial correlation analysis was used. As sex could be hypothesized as a confounding factor, the relationships between sex and burnout, resilience, self-esteem and personality were figured out with Spearman's rho correlation analysis. Also when partial correlation analysis was applied, it was done for male and female students respectively to minimize sex effects. With partial correlation analysis, statistically significant variables were chosen for multiple regression analysis. Multiple regression analysis with stepwise method was performed to test the degree of effects of scales that were found to have significant correlations with empathy. First, it was applied for each sex and second, it was applied for whole students to identify which independent variable is more influential to empathy, sex or other psychological factors. P value <0.05 was considered statistically significant in all analyses. All statistical analyses were performed using PASW.<sup>18</sup>

## **RESULTS**

#### **Socio-demographic characteristics and empathy**

While there was no statistically significant difference in JSE-S-K scores according to grades (Table 1), the JSE-S-K mean score of female students ( $111.09 \pm 12.66$ ) was significantly higher than that of the male students ( $107.29 \pm 14.37$ ) ( $p=0.046$ ) (Table 2).

**Correlation analysis**

To investigate the relationship among empathy and other psychological factors, Pearson correlation analysis was performed with the total scores of the JSE-S-K, each score of the three subscales in the MBI-GS, each score of the five subscales in the NEO-FFI, total scores of the R-SES and CD-RS. There were statistically significant correlations between empathy and all psychological factors (Table 3), and statistically significant correlations among other psychological variables were also found (Table 3).

With partial correlation analysis, self-esteem, conscientiousness and depersonalization of burnout were related to empathy statistically significantly in male students.

Only personal accomplishment of burnout was related to

**Table 1.** Empathy score by grade Unit: N (%)

Grade	Male	Female	Age (mean±SD)	JSE-S-K
1st	32 (73)	13 (27)	20.4±1.2	107.93±14.7
2nd	33 (89)	4 (11)	21.3±1.1	105.65±15.7
3rd	43 (74)	15 (26)	23.7±3.1	111.14±13.3
4th	28 (65)	15 (35)	23.5±2.0	109.26±11.7
5th	31 (67)	15 (33)	24.7±3.4	110.78±13.0
6th	30 (71)	12 (29)	26.2±3.0	103.59±14.5
Total	197 (73)	74 (27)	23.4	108.32±14.0

JSE-S-K: Jefferson Scale of Empathy, Student version, Korean edition

**Table 2.** Empathy score by gender, attachment type, and medical specialty of medical students

Sex	JSE-S-K (mean±SD)	T	p	N
Male	107.29±14.37	-2.01	0.046	197
Female	111.09±12.66			74

JSE-S-K: Jefferson Scale of Empathy, Student version, Korean edition

**Table 3.** Pearson's correlation coefficients among empathy and psychological factors in students

	JSE-S-K	R-SES	N	E	O	A	C	EE	PA	DP	CD-RS
JSE-S-K	1	0.359*	-0.169†	0.191†	0.236*	0.238*	0.365*	0.191†	0.318*	-0.323*	0.375*
R-SES*	0.359*	1	-0.392*	0.468*	0.258*	0.279*	0.364*	-0.416*	0.362*	-0.336*	0.513*
N	-0.169†	-0.392*	1	0.096	0.255*	-0.150†	0.003	0.564*	-0.235*	0.418*	-0.305*
E	0.191†	0.468*	0.096*	1	0.538*	0.266*	0.457*	-0.187†	0.491*	-0.094	0.478*
O	0.236*	0.258*	0.255*	0.538*	1	0.140†	0.436*	0.103	0.326*	-0.030	0.423*
A	0.238*	0.279*	-0.159	0.266*	0.140†	1	0.196†	-0.262*	-0.299*	-0.330*	0.193†
C	0.365*	0.364*	0.003	0.457*	0.436*	0.196†	1	-0.059	0.359*	-0.204*	0.526*
EE	0.191†	-0.416	0.564	-0.187†	0.103*	-0.262*	-0.059*	1	-0.258*	0.579*	-0.304*
PA*	0.318*	0.362*	-0.235*	0.491*	0.326*	-0.299*	0.359*	-0.258*	1	-0.250*	0.641*
DP	-0.323*	-0.336*	0.418*	-0.094	-0.030	-0.330*	-0.204*	0.579*	-0.250*	1	-0.348*
CD-RS	0.375*	0.513*	-0.305*	0.478*	0.423*	0.193†	0.526*	-0.304*	0.641*	0.348*	1

p-value: two tailed, \*p<0.0001, †p<0.05. JSE-S-K: Jefferson Scale of Empathy, Student version, Korean edition, MBI: Maslach Burnout Inventory, NEO-FFI: NEO Five-Factor Inventory, EE: emotional exhaustion, N: neuroticism, A: agreeableness, PA: personal accomplishment, E: extraversion, C: conscientiousness, DP: depersonalization, O: openness, R-SES: Rosenberg Self-Esteem Scale, CD-RISC: Conner-Davidson Resilience Scale

empathy statistically significantly in female students (Table 4).

With spearman's rho correlation analysis, there were no significant correlations between sex and other independent variables.

**Regression analysis**

Multiple regression analysis was performed to investigate how much the scales which showed statistically significant correlations with empathy including self-esteem, depersonalization and personal accomplishment in the MBI, and conscientiousness in the NEO-FFI had effects on empathy. The anal-

**Table 4.** Partial correlation coefficients between burnout, personality, self-esteem, resilience, quality of life and empathy in students

Instruments	Subscale	Male		Female	
		JSE-S-K	p	JSE-S-K	p
MBI	EE	0.096	0.190	-0.048	0.702
	PA	0.077	0.293	0.348*	0.004
	DP	-0.206*	0.005	0.060	0.636
NEO-FFI	N	-0.039	0.592	0.005	0.966
	E	-0.099	0.177	-0.205	0.101
	O	0.094	0.201	-0.069	0.587
	A	0.078	0.290	-0.015	0.903
	C	0.153*	0.037	0.199	0.113
R-SES*		0.229*	0.002	0.021	0.866
CD-RISC		-0.002	0.978	0.062	0.626

p-value: two tailed, \*p<0.05. JSE-S-K: Jefferson Scale of Empathy, Student version, Korean edition, MBI: Maslach Burnout Inventory, NEO-FFI: NEO Five-Factor Inventory, EE: emotional exhaustion, N: neuroticism, A: agreeableness, PA: personal accomplishment, E: extraversion, C: conscientiousness, DP: depersonalization, O: openness, R-SES: Rosenberg Self-Esteem Scale, CD-RISC: Conner-Davidson Resilience Scale

ysis was done for male and female students respectively (Table 5-1, 5-2).

With stepwise method, the analysis of variance found that the model was statistically significant for each sex ( $F=21.247$ ,  $p<0.0001$ ;  $F=16.462$ ,  $p<0.0001$ ) and adjusted R square is 0.238 and 0.298 for male and female respectively. The multiple variance inflation factor (VIF) of all independent variables was below 10 in both sex, indicating that there was no correlation between the independent variables. Self-esteem ( $\beta=0.248$ ,  $p=0.001$ ), conscientiousness ( $\beta=0.214$ ,  $p=0.002$ ) in the NEO-FFI, depersonalization ( $\beta=-0.221$ ,  $p=0.001$ ) in the MBI were significantly associated with empathy in male students (Table 5-1). In female students, Personal accomplishment ( $\beta=0.433$ ,  $p<0.0001$ ) of MBI and conscientiousness ( $\beta=0.233$ ,  $p=0.031$ ) of NEO-FFI were significantly related to empathy (Table 5-2).

In multiple regression analysis for whole students, the model was statistically significant ( $F=18.415$ ,  $p<0.0001$ ) and adjusted R square is 0.231. Self-esteem ( $\beta=0.176$ ,  $p=0.004$ ), conscientiousness ( $\beta=0.201$ ,  $p=0.001$ ) in the NEO-FFI, depersonalization and personal accomplishment ( $\beta=-0.188$ ,  $p=0.001$ ,  $\beta=0.143$ ,

**Table 5-1.** Multiple linear regression analysis of empathy and related factors in medical students (male)

						JSE-S-K
R <sup>2</sup>						0.249
Adjusted R <sup>2</sup>						0.238
p-value*						<0.0001
F*						21.247
Dependent variables	B	SE	$\beta$	P	VIF	
(Constant)	76.641	8.345		<0.0001		
R-SES	0.695	0.197	0.248	0.001	1.260	
C	0.469	0.149	0.214	0.002	1.175	
DP	-0.599	0.179	-0.221	0.001	1.122	

\*ANOVA. JSE-S-K: Jefferson Scale of Empathy, Student version, Korean edition, R-SES: Rosenberg Self-Esteem Scale, C: conscientiousness, DP: depersonalization

**Table 5-2.** Multiple linear regression analysis of empathy and related factors in medical students (female)

						JSE-S-K
R <sup>2</sup>						0.317
Adjusted R <sup>2</sup>						0.298
p-value*						<0.0001
F*						16.462
Dependent variables	B	SE	$\beta$	P	VIF	
(Constant)	57.185	10.326		<0.0001		
PA	0.906	0.221	0.433	<0.0001	1.161	
C	0.552	0.251	0.233	0.031	1.161	

\*ANOVA. JSE-S-K: Jefferson Scale of Empathy, Student version, Korean edition, C: conscientiousness, PA: personal accomplishment

$p=0.017$ ) in the MBI and sex ( $\beta=0.117$ ,  $p=0.029$ ) were significantly associated with empathy (Table 6).

## DISCUSSION

The present study multi-laterally analyzed factors influencing the empathy of medical students, and identified that conscientiousness, depersonalization, personal accomplishment and self-esteem had significant effects on empathy. Unlike previous studies, this study found that openness and agreeableness in the subscales of the NEO-FFI were not associated with empathy.<sup>18,19</sup> In addition, our results indicate that only conscientiousness was influential. It has been shown that conscientious doctors have better clinical ability<sup>17</sup> and that clinical ability and empathy are positively correlated.<sup>40</sup> Moreover, since conscientious people tend to actively resolve conflicts with others and less likely to cause trouble for others<sup>41</sup> they may be perceived as being more empathetic.<sup>42</sup>

In this study, self-esteem and depersonalization affect empathy more in male students whereas personal accomplishment affects empathy more in female students. Male, in comparison to female, is prone to being depersonalized because of different coping strategies.<sup>30,43,44</sup> Since students with high depersonalization are likely to feel cynicism and emotional distance, it could be speculated that these students would have trouble feeling empathic towards patients.<sup>43</sup> In contrast, female medical students tend to be more keen on their academic performance than male students.<sup>45</sup> This may explain the finding from this study that empathy of female students is affected by personal accomplishment.

People with high self-esteem are less likely to be caught up

**Table 6.** Multiple linear regression analysis of empathy and related factors in medical student

						JSE-S-K
R <sup>2</sup>						0.259
Adjusted R <sup>2</sup>						0.245
p-value*						<0.0001
F*						18.415
Dependent variables	B	SE	$\beta$	P	VIF	
(Constant)	67.499	7.998		<0.001		
R-SES	0.481	0.166	0.176	0.004	1.327	
C	0.452	0.133	0.201	0.001	1.256	
DP	-0.521	0.158	-0.188	0.001	1.158	
PA	0.328	0.136	0.143	0.017	1.261	
SEX	3.679	1.674	0.117	0.029	1.015	

\*ANOVA. JSE-S-K: Jefferson Scale of Empathy, Student version, Korean edition, R-SES: Rosenberg Self-Esteem Scale, C: conscientiousness, PA: personal accomplishment, DP: depersonalization, CD-RS: Conner-Davidson Resilience Scale

in their own psychological burdens,<sup>22</sup> may pay more attention, and provide help to others. Therefore, self-esteem could have a positive effect on empathy.<sup>20,22</sup> In our study, self-esteem is related to empathy only in male students. Female tend to be more interdependent than male and this tendency is relatively stable regardless of self-esteem in comparison to male.<sup>46</sup> Future studies to further explore self-esteem and empathy is warranted, as there are insufficient data on the influence of self-esteem on empathy among medical students. The findings from this study may provide a basis for supporting the claim that self-esteem positively affects empathy. Furthermore, self-esteem is a result of the accumulation of successful achievements in relationship with parents and developmental tasks, from childhood to adulthood, and it is not gained within a short period of time. Therefore, in order to verify more sophisticated causal relationships, a well-designed longitudinal study is needed.

In the present study, it was difficult to identify a consistent difference when empathy of students in one academic year was compared. However, female students were found to have greater empathy than male students.<sup>43,47</sup> This observation may be attributed to the fact that females tend to understand the experiences and emotions of patients better than males.<sup>2,40</sup>

According to our regression analysis, gender difference ( $\beta=0.117$ ) is less influential than other psychological factors such as conscientiousness, depersonalization, self-esteem and personal accomplishment ( $\beta=0.201, -0.188, 0.176, 0.143$ ) to empathy. This is an encouraging result to the educators of medical college that empathy could be improved by enhancing self-esteem, conscientiousness, personal accomplishment and relieving depersonalization.

It has been controversial whether empathy is the 'traits', highly stable and hard to change, or 'state', relatively unstable personality attributes, easy to change such as moods.<sup>7</sup> The conclusion on whether empathy is the trait or the state was not drawn in this study. But our finding added a part of evidence on Hojat's opinion that it can be improved by therapeutic interventions.<sup>7</sup> Although empathy may not be enhanced during short period, nurturing empathetic clinician is still important and the curriculum of medical school have to be highlighted on this issue.

In terms of enhancing empathy, it has been reported that 2.5 hours of meditation every week, for 8 weeks, resulted in the improvement of scores for depersonalization, emotional exhaustion, and personal accomplishment.<sup>48</sup> This suggests that medical students may be able to recover from burnout using mindfulness. Moreover, self-esteem, conscientiousness and empathy also improved with mindfulness among other college students, in addition to medical students.<sup>48-50</sup> Therefore, interventional or educational approaches, such as mindfulness-based techniques, may be helpful for improving psychosocial

correlates of empathy in medical students.

There are some limitations in the present study. First, it was conducted in a single medical college; therefore, the results may not be generalizable or applicable to all medical students in South Korea. However, since the response rate was very high (95%), the results are representative of the Seonam University College of Medicine. Second, due to a cross-sectional study design, there is a need to conduct a longitudinal or cohort study to prove the causal relationships found in this study. Third, the applied tool was a series of self-reporting questionnaires, with no cross checks. In future studies, we will consider supplementing self-reporting questionnaires with (semi)-structured tools.

This study is the first to comprehensively investigate multiple psychosocial variables affecting empathy in a single medical student group of Korea. From the present findings, it can be concluded that conscientiousness, depersonalization, and self-esteem have a significant impact on empathy. These factors and an interventional approach must be considered when educating medical students to become empathetic doctors.

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#### Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

#### Author Contributions

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