












# Effect of Attending Rheumatologists' Big 5 Personality Traits on Patient Trust in Patients With Systemic Lupus Erythematosus: The TRUMP2-SLE Project

Nao Oguro<sup>1</sup> , Nobuyuki Yajima<sup>2</sup> , Yuichi Ishikawa<sup>3</sup> , Natsuki Sakurai<sup>4</sup>, Chiharu Hidekawa<sup>4</sup>, Takanori Ichikawa<sup>5</sup> , Dai Kishida<sup>6</sup> , Keigo Hayashi<sup>7</sup> , Kenta Shidahara<sup>7</sup>, Yoshia Miyawaki<sup>8</sup> , Ryusuke Yoshimi<sup>4</sup> , Ken-ei Sada<sup>9</sup> , Yasuhiro Shimojima<sup>6</sup> , and Noriaki Kurita<sup>10</sup> 

**ABSTRACT.** *Objective.* Differences in communication styles based on physicians' personality traits have been identified, particularly in primary care, and these physician-related factors can be important in building patient-physician trust. This study examined the effects of rheumatologists' personality traits on patients' trust in their attending rheumatologists.

*Methods.* This cross-sectional study included adult Japanese patients with systemic lupus erythematosus (SLE) at 5 academic medical centers between June 2020 and August 2021. The exposures were the Big 5 personality traits (ie, extraversion, agreeableness, openness, conscientiousness, and emotional stability) of attending rheumatologists using the Japanese version of the 10-Item Personality Inventory scale (1-7 points each). The outcome was the patients' trust in their attending rheumatologist using the Japanese version of the 5-item Wake Forest Physician Trust Scale (0-100 points). A general linear model was fitted.

*Results.* The study included 505 patients with a mean age of 46.8 years; 88.1% were women. Forty-three attending rheumatologists (mean age: 39.6 years; 23.3% female) were identified. After multivariable adjustment, higher extraversion and agreeableness were associated with higher trust (per 1-point increase, 3.76 points [95% CI 1.07-6.45] and 4.49 points [95% CI 1.74-7.24], respectively), and higher conscientiousness was associated with lower trust (per 1-point increase, -2.17 points [95% CI -3.31 to -1.03]).

*Conclusion.* Whereas higher extraversion and agreeableness of attending rheumatologists led to higher patient trust in their rheumatologist, overly high conscientiousness may lead to lower trust resulting from the physicians' demand of responsibility and adherence to instructions from patients with SLE.

*Key Indexing Terms:* Big Five personality traits, physician trust, systemic lupus erythematosus

This study was supported by the Japan Society for the Promotion of Science (JSPS KAKENHI; grant no. JP 19KT0021). The funder had no role in the study design, analyses, interpretation of the data, writing of the manuscript, or the decision to submit it for publication.

<sup>1</sup>N. Oguro, MD, PhD, Division of Rheumatology, Department of Medicine, Showa University School of Medicine, Tokyo, Department of Clinical Epidemiology, Graduate School of Medicine, Fukushima Medical University, Fukushima, and Department of Healthcare Epidemiology, School of Public Health in the Graduate School of Medicine, Kyoto University, Kyoto;

<sup>2</sup>N. Yajima, MD, PhD, MPH, Division of Rheumatology, Department of Medicine, Showa University School of Medicine, Tokyo, Department of Clinical Epidemiology, Graduate School of Medicine, Fukushima Medical University, Fukushima, Department of Healthcare Epidemiology, School of Public Health in the Graduate School of Medicine, Kyoto University, Kyoto, and Center for Innovative Research for Communities and Clinical Excellence, Fukushima Medical University, Fukushima; <sup>3</sup>Y. Ishikawa, MD, The First Department of Internal Medicine, University of Occupational and Environmental Health Japan, Kitakyushu, and Graduate School of Health Innovation, Kanagawa University of Human Services, Yokosuka;

<sup>4</sup>N. Sakurai, MD, C. Hidekawa, MD, R. Yoshimi, MD, PhD, Department of Stem Cell and Immune Regulation, Yokohama City University Graduate School of Medicine, Yokohama; <sup>5</sup>T. Ichikawa, MD, PhD, Department of Clinical Epidemiology, Graduate School of Medicine, Fukushima Medical University, Fukushima, and Department of Medicine (Neurology and

Rheumatology), Shinshu University School of Medicine, Matsumoto; <sup>6</sup>D. Kishida, MD, PhD, Y. Shimojima, MD, PhD, Department of Medicine (Neurology and Rheumatology), Shinshu University School of Medicine, Matsumoto; <sup>7</sup>K. Hayashi, MD, PhD, K. Shidahara, MD, PhD, Department of Nephrology, Rheumatology, Endocrinology and Metabolism, Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama University, Okayama; <sup>8</sup>Y. Miyawaki, MD, PhD, MPH, Department of Nephrology, Rheumatology, Endocrinology and Metabolism, Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama University, and Center for Innovative Clinical Medicine, Okayama University Hospital, Okayama; <sup>9</sup>K. Sada, MD, PhD, Department of Nephrology, Rheumatology, Endocrinology and Metabolism, Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama University, Okayama, and Department of Clinical Epidemiology, Kochi Medical School, Kochi University, Nankoku; <sup>10</sup>N. Kurita, MD, PhD, Department of Clinical Epidemiology, Graduate School of Medicine, Fukushima Medical University, and Department of Innovative Research and Education for Clinicians and Trainees (DiRECT), Fukushima Medical University Hospital, Fukushima, Japan.

NK is a member of the Committee on Clinical Research at the Japan College of Rheumatology, has received grants from the Japan Society for the Promotion of Science, consulting fees from GSK, and payments for speaking and educational events from Chugai Pharmaceutical, Sanofi, Mitsubishi Tanabe Pharma, and Japan College of Rheumatology. KS has received a

Patients' trust in their physicians is the foundation of patient-centered care in rheumatology practice<sup>1</sup> and is an important source of empowerment for patients with systemic lupus erythematosus (SLE).<sup>2,3</sup> A higher level of patient trust in their physicians has been shown to be associated with better clinical outcomes in a primary care study,<sup>4</sup> and this is associated with better adherence to medications in patients with SLE.<sup>3,5</sup> Therefore, methods for enhancing patients' trust in their physicians are important in SLE management. To date, studies on SLE have shown that health literacy<sup>6</sup> and psychological factors, such as hope<sup>3</sup> on the patient's part and misdiagnosis or missing SLE diagnosis on the physician's part, have an effect on patients' trust in their physicians.<sup>2,7,8</sup> However, there is insufficient evidence regarding the influence of attending physicians' personality traits, which affect their communication styles,<sup>9</sup> on the development of patient trust.

Previous studies examining physicians' personality characteristics have focused mainly on medical education.<sup>10,11</sup> In particular, the Big 5 personality traits (also known as the 5-factor model of personality), consisting of extraversion, agreeableness, openness, conscientiousness, and emotional stability, have been examined.<sup>12-14</sup> A study examining physician personality traits associated with physician satisfaction ratings in primary care settings showed that a high level of openness, related to imagination and intellectual curiosity,<sup>14</sup> was associated with greater level of patient satisfaction, suggesting the importance of an empathetic response and an atmosphere that allows for discussion.<sup>15</sup> Moreover, an average level—rather than an overly high level—of physician conscientiousness was associated with higher physician ratings. However, the ways in which the attending physicians' personality affects trustworthiness (which reflects patients' expectations from their attending physicians in the future), as opposed to patient satisfaction (which reflects physician ratings based on previous interactions), remain unclear. Studying the effect of specific physician personality traits may be useful in developing strategies to improve the patient care process since personality traits have been shown to change with intentional efforts.<sup>16</sup> The importance of physicians' personality traits in physician-patient interactions is supported by interviews with patients with SLE who have highlighted the importance of a personable physician, which may be related to agreeableness (comprising compassion and politeness),<sup>14</sup> in physician-patient communication and relationships.<sup>2,17</sup>

Therefore, the present study, using cross-sectional data from the multicenter Trust Measurement for Physicians and Patients with SLE (TRUMP2-SLE) project, examined the association between attending physicians' Big 5 personality traits and

patients' trust in their physicians in a setting in which patients and physicians were racially concordant.

## METHODS

**Study design and setting.** Our cross-sectional study used baseline information from the TRUMP2-SLE project, an ongoing multicenter cohort study at 5 academic medical institutions (Showa University Hospital, Okayama University Hospital, Shinshu University Hospital, Yokohama City University Hospital, and Yokohama City University Medical Center).

The inclusion criteria for patient participation were as follows: (1) an SLE diagnosis according to the revised 1997 American College of Rheumatology classification criteria, (2) age of  $\geq 20$  years, (3) receiving rheumatology care at a participating center during the study period, and (4) the ability to respond to the questionnaire. Patients with dementia or total blindness were excluded. All the rheumatologists who treated the patients were Japanese. Rheumatologists participating in the TRUMP2-SLE project were recruited from the participating hospitals and they voluntarily completed self-reported questionnaires. The attending rheumatologists of patients participating in the TRUMP2-SLE study were included, regardless of their status as researchers. The resulting response rate of the attending rheumatologists was 100%.

**Exposure.** Physicians' personality traits were measured using the Japanese version of the 10-Item Personality Inventory (TIPI-J) scale,<sup>18,19</sup> which measures the Big 5 personality traits, a generally accepted taxonomy of personality traits (Supplementary Table S1, available with the online version of this article). The TIPI-J scale consists of 10 items, with 2 questions for each domain, and is scored on a 7-point Likert scale. The 5 domains comprise extraversion, agreeableness, conscientiousness, emotional stability, and openness. The Big 5 personality dimensions have been widely applied in studies of personality traits. A high level of extraversion indicates sociability and emotional expressiveness, whereas a low level indicates introversion and shyness. A high level of agreeableness indicates kindness and altruism, whereas a low level indicates argumentativeness and coldness. A high level of conscientiousness indicates orderliness and dutifulness, whereas a low level indicates careless and disorderly behavior. A high level of emotional stability indicates stability and calmness, whereas a low level indicates anxiety and moodiness. A high level of openness indicates wide areas of interest and imagination, whereas a low level indicates commonplace and narrow interests.<sup>20</sup>

Doctors were instructed to score each item on a scale of 1 to 7, with 1 signifying "disagree strongly" and 7 corresponding to "agree strongly." After reversing the scores for negatively worded items, each domain's score was calculated by summing the item scores and then calculating the average of the scores. The TIPI-J scale was validated and demonstrated to have good reliability ( $\alpha$  coefficients of 0.92, 0.85, 0.82, 0.91, and 0.86 for extraversion, agreeableness, conscientiousness, emotional stability, and openness, respectively) and construct validity.

**Outcome.** The main outcome was trust in one's physician, which was measured by the Japanese version of the 5-item Wake Forest Physician Trust Scale.<sup>21,22</sup> It comprised 5 items scored on a 5-point Likert scale. Patients were asked to choose 1 response for each item ranging from "strongly disagree" (1 point) to "strongly agree" (5 points). After inverting the score for negatively worded items, the sum of the scores was converted into a scale of 0-100. To inquire about trust in their rheumatologist, the following instructive statement was presented to patients: "Please answer these questions keeping in mind the physician who has been treating you regularly for SLE. We refer to this physician as 'your doctor.' For the next question, we are interested in the honest opinion of your doctor. For each of these questions, please state whether you strongly agree, agree, are neutral, disagree, or strongly disagree." The coefficient  $\alpha$  value for the Japanese version of the Interpersonal Trust in Physician Scale was 0.85, demonstrating construct validity.

**Measurement of covariates.** The covariates included were patient age, sex, highest academic level, disease activity, and duration of illness, as well as

---

research grant from Pfizer and payments for speaking and educational events from GSK. The remaining authors declare no conflicts of interest relevant to this article.

Address correspondence to Dr. N. Kurita, Department of Clinical Epidemiology, Graduate School of Medicine, Fukushima Medical University, 1 Hikarigaoka, Fukushima City, Fukushima 960-1295, Japan.  
Email: kuritanoriaki@gmail.com.

Accepted for publication October 6, 2023.

doctor age,<sup>23</sup> sex,<sup>24,25</sup> employment position,<sup>25</sup> and treatment duration with the doctor.<sup>7</sup> These covariates were selected because they could be associated with trust in physicians and/or the physicians' personality traits. Disease activity was measured by the attending physician using the SLE Disease Activity Index 2000 (SLEDAI-2K). Since there are only full professor and associate professor job titles in Japan that contain the Kanji character that translates to "professor" in English, and because health information from an authority figure is more likely to be trusted,<sup>26</sup> the job titles were divided into associate professor or higher and lecturer or lower. Questionnaires were administered to each facility between June 2020 and August 2022. Patients were allowed to complete the questionnaire either in the waiting room or at home. The questionnaire included assurances that the attending physician would not view the responses and that the responses would only be used at the central facility for analysis.

**Statistical analysis.** All statistical analyses were performed using Stata/SE, version 16.1 (StataCorp LLC). Patient and rheumatologist characteristics were described as n (%) for categorical variables and mean (SD) for continuous variables. Using unpaired *t* tests, rheumatologists' Big 5 personality trait scores were compared with the representative values reported in the literature for the development of the TIPI-J.<sup>18</sup> A general linear model was fitted to examine the association between the Big 5 personality traits of rheumatologists and patients' trust in their physicians. In the model, explanatory variables included the 5 personality domains, physician characteristics (ie, age, sex, and job title), patient characteristics (ie, age, sex, education, disease duration, and SLEDAI-2K), and duration of the physician-patient relationship. To address the clustering of outcomes resulting from multiple patient ratings with similar trust levels for the same physician, a cluster-robust variance estimation was used, with each physician as the cluster unit.<sup>27</sup> Missing data on covariates were addressed by multiple imputation. Twenty imputations were done using chained equations, with the assumption that the data were missing at random. To calculate the corresponding standardized effect size (ES; Cohen *d*), the point estimate was divided by the SD of the trust in the rheumatologist score. Statistical significance was set at *P* < 0.05.

**Patient and public involvement.** The general public and patients with SLE did not participate in the design, recruitment, or execution of the study.

**Statement of ethics and consent.** This study followed the Declaration of Helsinki and Good Clinical Practice guidelines, and was approved by the Ethics Review Board of Showa University (no. 22-298-B).

## RESULTS

**Study flow.** In total, 521 patients with SLE met the inclusion criteria. Of these, 4 did not provide their physicians' names. After excluding 12 patients with missing outcomes data, 505 patients were included in the analysis. Fifty-one physicians responded to the questionnaire, but 8 physicians were excluded because they were not listed as attending rheumatologists for participating patients with SLE. As a result, 43 attending physicians participated in the study.

**Patient and physician characteristics.** Patient characteristics are presented in Table 1. The mean age of the patients was 46.8 (SD 14.1) years and 445 (88.1%) were women. The mean disease activity, as determined by the SLEDAI-2K scale, was 4.0 (SD 3.9) points. A total of 301 (62.8%) patients were treated by their attending rheumatologists for > 3 years. The mean score for patients' trust in their physicians was 80.1 (SD 16.0).

The mean age of the physicians was 39.6 (SD 7.2) years and 10 of them (23.3%) were women. The mean number of patients who participated in the study was 11.7 (SD 19.8) per attending rheumatologist.

Table 1. Patient and rheumatologist characteristics.

	Values
Patient characteristics, n = 505	
Demographics	
Age, yrs, mean (SD)	46.8 (14.2)
Sex, female	445 (88.1)
Education	
Junior high school or lower	21 (4.4)
High school or college	323 (68.3)
University or graduate school	129 (27.3)
Missing, n	32
Disease duration, n (%)	
≤ 5 yrs	93 (18.9)
> 5 yrs to ≤ 10 yrs	98 (19.9)
> 10 yrs to ≤ 20 yrs	177 (36)
> 20 yrs	124 (25.2)
Missing, n	13
SLEDAI-2K, points, mean (SD)	4.0 (3.9)
Missing, n	6
Duration with their rheumatologist, n (%)	
< 6 mos	44 (9.2)
≥ 6 mos to < 1 yrs	46 (9.6)
≥ 1 yrs to < 3 yrs	88 (18.4)
≥ 3 yrs	301 (62.8)
Missing, n	26
Rheumatologist characteristics, n = 43	
Demographics	
Age, yrs, mean (SD)	39.6 (7.2)
Sex, female	10 (23.3)
Job title	
Lecturer or lower	36 (83.7)
Associate professor or higher	7 (16.3)
No. of patients in care who participated in the study, mean (SD)	11.7 (19.8)

Values are presented as n (%) unless otherwise indicated. SLEDAI-2K: Systemic Lupus Erythematosus Disease Activity Index.

**Physician personality and comparison with the TIPI-J representative values.** Among the attending physicians' Big 5 personality traits, agreeableness scores were the highest and conscientiousness scores were the lowest (Table 2). These characteristics differ from those of representative values described in the TIPI-J development study.<sup>18</sup> Compared to the representative values, attending physicians' conscientiousness and emotional stability were significantly higher (differences: 0.42 and 0.49 points, respectively).

**Relationship between physicians' Big 5 personality traits and patients' trust in physicians.** The relationship between physicians' personality traits and patient trust is shown in Table 3. Trust in the rheumatologist increased with higher extraversion and agreeableness personality scores (adjusted mean difference per 1-point increase: 3.76 [95% CI 1.07-6.45] and 4.49 [95% CI 1.74-7.24], respectively). In contrast, the conscientiousness personality trait was associated with reduced trust in the rheumatologist (adjusted mean difference per 1-point increase:

Table 2. Rheumatologists' personality scores and comparison with their representative scores.

Personality Domain	Rheumatologist Personality, n = 43			TIPI-J Representative Scores, n = 902	
	Range	Median	Mean (SD)	Mean (SD)	P <sup>a</sup>
Extraversion	1.5-7	4	4.05 (1.41)	3.92 (1.49)	0.56
Agreeableness	2-6	5	4.80 (0.94)	4.74 (1.08)	0.68
Conscientiousness	1.5-7	3	3.49 (1.24)	3.07 (1.21)	0.04
Emotional stability	1.5-6.5	3.5	3.88 (1.24)	3.40 (1.24)	0.02
Openness	1.5-7	4	3.98 (1.22)	4.02 (1.24)	0.84

Representative scores were cited from the TIPI-J development paper, and the scores were obtained from healthy university students from the 4 prefectures.<sup>18</sup> The representative scores in this table were converted in the following order to match the scoring algorithm in the original TIPI: (1) because the domain scores in the TIPI-J development paper were not averaged (ie, not halved), the reported means and SDs were divided by 2; (2) because the emotional stability score in the Japanese version is calculated in the opposite direction, the mean for emotional stability in this table was transformed by  $(8 - [\text{half of the domain score in the TIPI-J development paper}])$  to match the direction of the original version. For more details on the scoring rules for the TIPI and TIPI-J, see Supplementary Table S1 (available with the online version of this article).<sup>a</sup> Unpaired *t* test. TIPI: 10-item Personality Inventory scale; TIPI-J: Japanese version of the 10-Item Personality Inventory scale.

-2.17 [95% CI -3.31 to -1.03]). Disease duration > 20 years was associated with lower trust in the rheumatologist (adjusted mean difference: -5.7 [95% CI -10.48 to -0.92]).

## DISCUSSION

Our study examined the association between the Big 5 personality traits of attending physicians and patients' trust in their physician among patients with SLE. Our results showed that higher levels of extraversion and agreeableness in the attending physician were associated with higher levels of patient trust; conversely, higher levels of conscientiousness in the attending physician were associated with lower levels of patient trust.

Several studies have investigated the effect of physicians' Big 5 personality traits on their medical practice, communication style, and patient ratings. Many of these studies reported positive effects for extraversion, openness, and agreeableness, whereas there were conflicting results for conscientiousness. Physicians with higher conscientiousness and extraversion were more likely to choose intensive treatment for older leukemia patients,<sup>28</sup> and pathologists with higher conscientiousness were more accurate in diagnosing lung cancer.<sup>29</sup> During the investigation of physicians' patient-centered communication with patients with depressive symptoms, physicians with higher openness were more likely to explore their medical history; however, physicians with higher conscientiousness were less likely to find a common ground and elicit patients' preferences during the treatment plan phase.<sup>9</sup> Although the present study is the first to our knowledge to investigate the effect of rheumatologists' Big 5 personality traits on SLE patients' trust in their attending physicians, it is worth noting that the positive effect of agreeableness and the negative effect of conscientiousness were similar to the results of a previous study examining their associations with patient satisfaction.<sup>15</sup>

Outside of personality traits, the low trust in the attending rheumatologist by patients with a disease duration > 20 years contradicts the results of several previous studies, which failed to show any association between disease duration with trust in

physician score.<sup>6,30</sup> The reason for the discrepancy from previous studies and the mechanism underlying the present association remains unclear.

There are several possible explanations for how rheumatologists' Big 5 personality traits affect patients' trust in their attending physicians through their communication style. The reason underlying the high level of trust associated with highly agreeable rheumatologists is straightforward, as agreeableness is associated with the tendency to maintain pleasant and harmonious interpersonal relationships<sup>14</sup>; accordingly, highly agreeable rheumatologists communicate with their patients with compassion and respect. One study suggested that compassionate and patient-centered behavior may help build trust in patients with SLE and rheumatoid arthritis.<sup>31</sup> In addition, it is possible to hypothesize that a physician's active empathic communication may explain the association between agreeableness and patients' trust in their physicians, according to a study that demonstrated a moderate correlation between high agreeableness and active empathic listening in the general population.<sup>32</sup>

Regarding the higher level of patient trust in physicians with higher extraversion, one possible explanation is that extroverted physicians are more sociable, and more likely to initiate conversations and to positively influence their patients.<sup>14</sup> In contrast, a lack of extraversion tends to lead physicians to keep their thoughts and feelings to themselves, and the atmosphere around such a physician prevents patients from expressing what they need to say, which may impede the development of a trusting relationship.<sup>14</sup> In one study, medical students who were extremely shy, did not engage in nonverbal communication such as eye contact, and did not actively participate in conversations received poor ratings in their clinical performance, confirming that poor rapport building was associated with a lack of extraversion.<sup>33</sup>

Although the reasons for the lower trust in attending rheumatologists with higher conscientiousness—generally considered a good trait—are unclear, several hypotheses and observations support the present findings. Conscientiousness is

Table 3. Associations of trust in patients' attending rheumatologists with rheumatologists' Big 5 personality traits and covariates.

	Corresponding Standardized ES	Adjusted Mean Difference, Point Estimate (95% CI)	P
<b>Rheumatologist characteristics</b>			
Extraversion, per 1 point	0.23	<b>3.76 (1.07 to 6.45)</b>	<b>0.01</b>
Agreeableness, per 1 point	0.28	<b>4.49 (1.74 to 7.24)</b>	<b>0.002</b>
Conscientiousness, per 1 point	-0.14	<b>-2.17 (-3.31 to -1.03)</b>	<b>&lt; 0.001</b>
Emotional stability, per 1 point	0.002	0.038 (-1.11 to 1.18)	0.95
Openness, per 1 point	-0.07	-1.15 (-2.55 to 0.24)	0.10
Age, per 10 years	-0.02	-2.82 (-7.97 to 2.32)	0.27
Sex, female vs male	-0.05	-0.86 (-6.63 to 4.9)	0.76
Job title, associate professor or higher vs lecturer or lower	0.10	1.63 (-5.55 to 8.81)	0.65
<b>Patient characteristics</b>			
Age, per 10 yrs	0.004	0.66 (-0.67 to 1.98)	0.32
Sex, female vs male	-0.14	-2.17 (-10.1 to 5.75)	0.58
<b>Education</b>			
Junior high school or lower		Reference	
High school or college	-0.23	-3.65 (-9.4 to 2.1)	0.21
University or graduate school	-0.22	-3.57 (-9.69 to 2.54)	0.24
<b>Disease duration</b>			
≤ 5 yrs		Reference	
> 5 yrs to ≤ 10 yrs	0.18	2.93 (-0.97 to 6.84)	0.14
> 10 yrs to ≤ 20 yrs	-0.05	-0.78 (-4.55 to 2.99)	0.68
> 20 yrs	-0.36	<b>-5.7 (-10.48 to -0.92)</b>	<b>0.02</b>
SLEDAI-2K, per 1 point	0.01	0.17 (-0.25 to 0.59)	0.41
<b>Duration with their rheumatologist</b>			
< 6 mos		Reference	
≥ 6 mos to < 1 yr	0.001	0.01 (-8.57 to 8.59)	0.998
≥ 1 yr to < 3 yrs	0.20	3.27 (-2.97 to 9.51)	0.23
≥ 3 yrs	0.19	3.00 (-2.85 to 8.86)	0.31

A general linear model with cluster-robust standard estimation was fit with the inclusion of all variables listed above, with 43 patients' attending rheumatologists treated as a cluster. To calculate the corresponding standardized ES (Cohen *d*), the point estimate was divided by the SD of the trust in the rheumatologist score. The adjusted mean differences shown in this table translate into group differences for the categorical variable predictors. On the other hand, they do not indicate group differences for the continuous variable predictors but rather indicate differences per unit of the predictors. Therefore, the adjusted mean differences will also change if the scales of the units are changed. For example, an adjusted mean difference of -2.17 points for 1 point of conscientiousness corresponds to an adjusted mean difference of -10.85 points for 5 points of conscientiousness. Bold values indicate significance at  $P < 0.05$ . ES: effect size; SLEDAI-2K: Systemic Lupus Erythematosus Disease Activity Index 2000.

characterized by industriousness, such as the thorough completion of tasks, self-control to delay short-term gratification, and responsibility to fulfill obligations and follow rules<sup>34</sup>; therefore, conscientiousness predicted higher performance in medical skills, such as objective structured clinical examinations and surgery.<sup>35</sup> However, conscientiousness is observed to have a potential disadvantage,<sup>35</sup> since overly conscientious physicians may excessively adhere to norms and adversely influence patient interaction as a result. For example, 1 patient with SLE reported that the symptoms acknowledged by the rheumatologist differed from the symptoms presented by the patient because the rheumatologist was too engrossed with typical symptoms from medical text or experiences with other patients: "[rheumatologists] say,

'you have symptom A, symptom B, C. I have symptom A plus this other thing. And they said, 'well...you're supposed to have symptom A, B, C. That's normal.' So I think it would just be better if [rheumatologists] receive the information that they're getting [but] most of them throw at me what they read. Or what happened in another patient. With lupus, everyone is not the same.'<sup>36</sup> Such patient perception of difficulty in communicating with their rheumatologist may cause the patient to feel that the rheumatologist does not believe their reports,<sup>2</sup> which can result in a fragile physician-patient relationship. An alternative explanation for patients' low trust in excessively conscientious rheumatologists is the hypothesis that conscientious physicians may overestimate their patients' ability to follow recommendations.<sup>37</sup>

This may result in physicians viewing patients as more confrontational and less conscientious than they actually are, without realizing patient limitations in assimilating health information during physician-patient interaction.

The clinical implications of this study are noteworthy. First, the integration of communication education, specifically one that addresses the doctor-patient relationship, in medical school or specialized training programs may affect the impact of physicians' personalities on rapport with their patients. Although personality traits are often considered invariant, a previous study indicated that they can be modified by life events and intentional efforts.<sup>16</sup> For example, considering that a physician with low agreeableness may have a poor level of empathic communication,<sup>32</sup> the physician can improve the expression of empathy through communication training.<sup>38</sup> Empathy has been shown to have the potential to reduce patient anxiety and improve patient satisfaction in general practice settings.<sup>39</sup> Second, recognizing and reflecting on one's personality traits can provide opportunities to apply the traits in communicating with patients. For example, high conscientiousness can provide an opportunity for the physician's self-reflection on whether they are overly adhering to treatment guidelines without eliciting and integrating patient preferences into treatment choices. A previous study suggested that a rheumatologist persisting in reducing glucocorticoids to achieve low disease activity in SLE will eventually be unsuccessful in achieving that goal.<sup>40</sup> Further, given that an agreeable personality was slightly protective against medical negligence claims in a study of Australian practicing physicians selected from a national directory,<sup>41</sup> a retrospective analysis of physicians' personality traits in doctor-patient disputes might provide an opportunity to attribute the cause of the dispute to a specific communication style and find a way to resolve the dispute. Finally, the observed differences in patients' trust levels based on their rheumatologists' personality traits may be clinically relevant. According to a study showing that the minimally important difference empirically corresponds to  $0.5 \times \text{SD}$  in general,<sup>42</sup> a  $0.5 \times \text{SD}$  corresponds to the magnitude of 0.5 on standardized ES (8.0 point-difference in the trust score) in the present study. Thus, given that a rheumatologist with extreme conscientiousness (conscientiousness score of 7 points) would have a 0.49-point lower standardized ES than that of the average (conscientiousness score of approximately 3.5 points) rheumatologist (ie,  $-0.14 \text{ standardized ES} \times 3.5$ ), we believe this scenario would qualify as a minimally clinically important difference.

This study has several strengths that are worth noting. First, this was a multicenter study; therefore, the observed effects of rheumatologists' personality traits on trust are generalizable to similar academic medical centers, instead of reflecting the specific culture of a particular institutional department. Second, we adjusted for the physician-level clustering of trust with an appropriate multilevel analysis, based on the merging on a rheumatologist-by-rheumatologist basis of data from the attending rheumatologists and those from a large number of patients. As a result, the observed association between rheumatologists' personality traits and trust was not reflective of

a particular rheumatologist's traits. Third, it is worth noting that we demonstrated the association between the rheumatologist's personality traits and the patient's trust in their rheumatologist by studying a single race, eliminating racial differences, and adjusting for educational status.

This study has some limitations. First, the Big 5 personality traits were rated using a self-report questionnaire and were therefore not objective. However, the consistency between self-reported and objective assessments was verified in a previous study.<sup>43</sup> Second, unlike other scales of trust in one's physician,<sup>7</sup> the scale used in this study does not include confidentiality. Consequently, it may not be able to measure the aspect of trust in conscientious physicians that is maintained as a result of adherence to the principles of confidentiality. Third, although this is a multicenter study, it represents only academic centers in Japan. Further research is warranted to examine whether our findings are applicable to other countries with different cultural and social backgrounds. Fourth, because we did not examine whether patients completed the questionnaire in their waiting rooms or at home; the difference in response location may have introduced a desirability bias. Finally, female rheumatologists constituted 23.3% of rheumatologists included in this study; this percentage is smaller than the percentage of female rheumatologists globally. This percentage conforms with the finding that 21.8% of physicians in Japan are women, according to the 2021 Organization for Economic Cooperation and Development (OECD) report, which is the lowest in the OECD countries.<sup>44</sup> However, the association between rheumatologists' personality traits and patients' trust in their rheumatologist was adjusted for sex among patients and rheumatologists.

Our finding that the trust patients with SLE have in their physicians is related to their physicians' Big 5 personality trait components indicates that such personality traits potentially affect physicians' dialogue patterns and underlie the formation of the doctor-patient relationship. It is necessary to incorporate behaviors and dialogue that are effective in intentionally maintaining the therapeutic relationship, so that the attending physician may reflect on whether their conscientiousness is excessive in this situation, or whether their extraversion or agreeableness is insufficient. In addition, it is necessary to focus on awareness of rheumatologists' personality traits and their association with patients' trust in order to enhance communication training for rheumatologists.

#### ACKNOWLEDGMENT

The authors thank Hiroko Nagasato, Kumi Sasaki, and Yukari Hosaka from Showa University and Miyuki Sato from Fukushima Medical University for their support. A part of this study was presented at the 67th Annual General Assembly and Scientific Meeting of the Japan College of Rheumatology.

#### DATA AVAILABILITY

The datasets generated and/or analyzed during the study are available from the corresponding author upon reasonable request.

#### ONLINE SUPPLEMENT

Supplementary material accompanies the online version of this article.

## REFERENCES

1. Décarry S, Toupin-April K, Légaré F, Barton JL. Five golden rings to measure patient-centered care in rheumatology. *Arthritis Care Res* 2020;72 Suppl 10:686-702.
2. Sloan M, Naughton F, Harwood R, et al. Is it me? The impact of patient—physician interactions on lupus patients' psychological well-being, cognition and health-care-seeking behaviour. *Rheumatol Adv Pract* 2020;4:rkaa037.
3. Kurita N, Oguro N, Miyawaki Y, et al. Trust in the attending rheumatologist, health-related hope and medication adherence among Japanese systemic lupus erythematosus patients. *Rheumatology* 2023;62:2147-53.
4. Thom DH, Kravitz RL, Bell RA, Krupat E, Azari R. Patient trust in the physician: relationship to patient requests. *Fam Pract* 2002;19:476-83.
5. Georgopoulou S, Nel L, Sangle SR, D'Cruz DP. Physician—patient interaction and medication adherence in lupus nephritis. *Lupus* 2020;29:1168-78.
6. Oguro N, Yajima N, Miyawaki Y, et al. Effect of communicative and critical health literacy on trust in physicians among patients with systemic lupus erythematosus (SLE): the TRUMP2-SLE Project. *J Rheumatol* 2023;50:649-55.
7. Suzuki R, Yajima N, Sakurai K, et al. Association of patients' past misdiagnosis experiences with trust in their current physician among Japanese adults. *J Gen Intern Med* 2022;37:1115-21.
8. Sloan M, Harwood R, Sutton S, et al. Medically explained symptoms: a mixed methods study of diagnostic, symptom and autoit experiences of patients with lupus and related systemic autoimmune diseases. *Rheumatol Adv Pract* 2020;4:rkaa006.
9. Chapman BP, Duberstein PR, Epstein RM, Fiscella K, Kravitz RL. Patient-centered communication during primary care visits for depressive symptoms: what is the role of physician personality? *Med Care* 2008;46:806-12.
10. Clack GB, Allen J, Cooper D, Head JO. Personality differences between doctors and their patients: implications for the teaching of communication skills. *Med Educ* 2004;38:177-86.
11. Abe K, Niwa M, Fujisaki K, Suzuki Y. Associations between emotional intelligence, empathy and personality in Japanese medical students. *BMC Med Educ* 2018;18:47.
12. Sier VQ, Schmitz RF, Putter H, Schepers A, van der Vorst JR. The big five: studying the surgical personality. *Surgery* 2022; 172:1358-63.
13. Liu M, Cai J, Chen H, Shi L. Association of personality traits with life and work of medical students: an integrative review. *Int J Environ Res Public Health* 2022;19:12376.
14. Soto CJ, Kronauer A, Lian JK. Five-factor model of personality. In: Whitebourne SK, editor. *The encyclopedia of adulthood and aging*. Hoboken: Wiley; 2015:506-10.
15. Duberstein P, Meldrum S, Fiscella K, Shields CG, Epstein RM. Influences on patients' ratings of physicians: physicians demographics and personality. *Patient Educ Couns* 2007;65:270-4.
16. Hudson NW, Fraley RC. Volitional personality trait change: can people choose to change their personality traits? *J Pers Soc Psychol* 2015;109:490-507.
17. Case S, Sinnette C, Phillip C, et al. Patient experiences and strategies for coping with SLE: a qualitative study. *Lupus* 2021;30:1405-14.
18. Oshio A, Abe S, Cutrone P. [Development, reliability, and validity of the Japanese version of Ten Item Personality Inventory (TIPI)]. [Article in Japanese] *Jpn J Pers* 2012;21:40-52.
19. Gosling SD, Rentfrow PJ, Swann WB. A very brief measure of the Big-Five personality domains. *J Res Pers* 2003;37:504-28.
20. John OP, Naumann LP, Soto CJ. Paradigm shift to the integrative Big Five trait taxonomy: history, measurement, and conceptual issues. In: John OP, Robins RW, Pervin LA, editors. *Handbook of personality: theory and research*, 3rd edition. New York: The Guilford Press; 2008:114-58.
21. Oguro N, Suzuki R, Yajima N, et al. The impact that family members' health care experiences have on patients' trust in physicians. *BMC Health Serv Res* 2021;21:1122.
22. Dugan E, Trachtenberg F, Hall MA. Development of abbreviated measures to assess patient trust in a physician, a health insurer, and the medical profession. *BMC Health Serv Res* 2005;5:64.
23. Terracciano A, McCrae RR, Brant LJ, Costa PT Jr. Hierarchical linear modeling analyses of the NEO-PI-R scales in the Baltimore Longitudinal Study of Aging. *Psychol Aging* 2005;20:493-506.
24. Weisberg YJ, Deyoung CG, Hirsh JB. Gender differences in personality across the ten aspects of the Big Five. *Front Psychol* 2011;2:178.
25. Mullola S, Hakulinen C, Presseau J, et al. Personality traits and career choices among physicians in Finland: employment sector, clinical patient contact, specialty and change of specialty. *BMC Med Educ* 2018;18:52.
26. Sbaifi L, Rowley J. Trust and credibility in web-based health information: a review and agenda for future research. *J Med Internet Res* 2017;19:e218.
27. Cameron AC, Miller DL. A practitioner's guide to cluster-robust inference. *J Hum Resour* 2015;50:317-72.
28. Wu X, Jiang YN, Zhang YL, et al. Impact of physicians' personalities and behavioral traits on treatment-related decision-making for elderly acute myeloid leukemia. *J Gen Intern Med* 2021;36:3023-30.
29. Butter R, Hondelink LM, van Elswijk L, et al. The impact of a pathologist's personality on the interobserver variability and diagnostic accuracy of predictive PD-L1 immunohistochemistry in lung cancer. *Lung Cancer* 2022;166:143-9.
30. Freburger JK, Callahan LF, Currey SS, Anderson LA. Use of the trust in physician scale in patients with rheumatic disease: psychometric properties and correlates of trust in the rheumatologist. *Arthritis Rheum* 2003;49:51-8.
31. Berrios-Rivera JP, Street RL Jr., Garcia Popa-Lisseanu MG, et al. Trust in physicians and elements of the medical interaction in patients with rheumatoid arthritis and systemic lupus erythematosus. *Arthritis Rheum* 2006;55:385-93.
32. de Vries RE, Bakker-Pieper A, Konings FE, Schouten B. The Communication Styles Inventory (CSI): a six-dimensional behavioral model of communication styles and its relation with personality. *Communication Research* 2013;40:506-32.
33. Murden RA, Way DP, Hudson A, Westman JA. Professionalism deficiencies in a first-quarter doctor-patient relationship course predict poor clinical performance in medical school. *Acad Med* 2004;79 Suppl:S46-8.
34. Jackson JJ, Roberts BW. Conscientiousness. In: Widiger TA, editor. *The Oxford handbook of the five factor model*. Oxford: Oxford University Press; 2015:133-48.
35. Ferguson E, Lievens F. Future directions in personality, occupational and medical selection: myths, misunderstandings, measurement, and suggestions. *Adv Health Sci Educ Theory Pract* 2017;22:387-99.
36. Leung J, Ra J, Baker EA, Kim AHJ. '...Not Having the Real Support That We Need': patients' experiences with ambiguity of systemic lupus erythematosus and erosion of social support. *ACR Open Rheumatol* 2019;1:135-44.
37. Ammi M, Fookan J, Klein J, Scott A. Does doctors' personality differ from those of patients, the highly educated and other caring professions? An observational study using two nationally representative Australian surveys. *BMJ* 2023;13:e069850.
38. Bonvicini KA, Perlin MJ, Bylund CL, Carroll G, Rouse RA, Goldstein MG. Impact of communication training on physician

- expression of empathy in patient encounters. *Patient Educ Couns* 2009;75:3-10.
39. Derksen F, Bensing J, Lagro-Janssen A. Effectiveness of empathy in general practice: a systematic review. *Br J Gen Pract* 2013;63:e76-84.
  40. Sada KE, Miyawaki Y, Shidahara K, et al. Grit personality of physicians and achievement of treatment goals in patients with systemic lupus erythematosus. *Rheumatology* 2022;62:2154-9.
  41. Bradfield OM, Bismark M, Scott A, Spittal M. Vocational and psychosocial predictors of medical negligence claims among Australian doctors: a prospective cohort analysis of the MABEL survey. *BMJ* 2022;12:e055432.
  42. Norman GR, Sloan JA, Wyrwich KW. Interpretation of changes in health-related quality of life: the remarkable universality of half a standard deviation. *Med Care* 2003;41:582-92.
  43. Funder DC, Kolar DC, Blackman MC. Agreement among judges of personality: interpersonal relations, similarity, and acquaintanceship. *J Pers Soc Psychol* 1995;69:656-72.
  44. Organisation for Economic Co-operation and Development (OECD). Health at a glance 2021: OECD indicators. [Internet. Accessed October 31, 2023.] Available from: <https://www.oecd-ilibrary.org/content/publication/ae3016b9-en>