Experiences and Perceptions of Gender Discrimination and Equality among Korean Surgeons: Results of a Survey of the Korean Surgical Society

Jihyeon Choi, Jeong-Eun Lee, Bora Choi, Jungook Kim, and Seung Eun Lee

Address for Correspondence:
Seung Eun Lee, MD, PhD, FACS
Department of Surgery, Chung-Ang University Hospital, 102 Heukseok-ro, Dongjak-gu, Seoul 06973, Korea.
E-mail: selee508@cau.ac.kr

© 2021 The Korean Academy of Medical Sciences. This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (https://creativecommons.org/licenses/by-nc/4.0/) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ORCID iDs
Jihyeon Choi https://orcid.org/0000-0002-4756-8416
Jeong-Eun Lee https://orcid.org/0000-0001-6104-3168
Bora Choi https://orcid.org/0000-0002-5193-0035
Jungook Kim https://orcid.org/0000-0001-6901-9680
Seung Eun Lee https://orcid.org/0000-0003-1830-9666

ABSTRACT

Background: Previous studies that have focused on the challenges faced by female surgeons, such as the gender pay gap, gender biases, lower likelihood of promotion, and gender differences in the perception of discrimination against women, are reviewed. A more comprehensive understanding of explicit and implicit gender discrimination and experiences and perceptions of discrimination is needed. This study aims to determine the current prevalence and degree of gender discrimination in the Korean Surgical Society and to compare the experiences and perceptions of gender discrimination between male and female surgeons.

Methods: We analyzed 400 responses from a survey sent to all members of the Korean Surgical Society. This electronic survey included 16 items on experiences of gender discrimination and 17 items on perceptions of gender discrimination. We conducted χ² tests and binary logistic regression on the data regarding these experiences and perceptions of gender discrimination.

Results: Adjusted analyses found that female surgeons were more likely to experience gender discrimination than their male counterparts across all categories of discrimination. Furthermore, adjusted analyses showed that female surgeons were more likely to confirm the presence of gender discrimination than male surgeons.

Conclusion: Female surgeons were more likely to experience implicit and explicit gender biases and discrimination throughout all stages of their career progression. We also discovered significant gender differences in the perception of gender discrimination, as well as the experience of it. Changing the male-dominated culture and raising awareness of gender biases and discrimination among male surgeons are crucial steps toward addressing gender discrimination in surgery.

Keywords: Gender Discrimination; Gender Bias; Experienced Discrimination; Perceived Discrimination; Male-Dominated Culture
INTRODUCTION

Women remain underrepresented in surgery despite the growing female presence in the medical field in the last decades, both in Korea and worldwide. The numbers and percentages of female medical students, physicians, surgical trainees, surgeons, and academics have been consistently increasing.1-6 In Korea, women accounted for 38.7% of all graduates of the medical schools and the graduate schools of medicine in 2020,7 and 22.8% of all physicians were female in 2018; however, only 8.9% of surgical physicians were women.8 In the U.S., the Association of American Medical Colleges reported that 51% of all medical students in the U.S. were female in 2018,9 and 35.2% of all active physicians were women in 2017, although they only accounted for 20.6% of surgeons.10 In the U.K., 35% of all licensed doctors are females while the only 12% of surgeons are women.5

Surgical specialties may not be an attractive career option for female medical students.11-13 Studies have argued that a male-dominant culture or “old boys’ club” mentality, gender biases, and gender discrimination are the main reasons for this.1,14-18 Female students report greater exposure to gender discrimination and sexual harassment during medical school than male students, and the exposure gap is largest in general surgery among all medical specialties.19,20 After becoming a surgeon, women are likely to experience more perceived gender discrimination than male surgeons21-22 and more gender-based disadvantages in terms of promotions, salaries, editorial board membership, and so on.1,14,23-26

Although prior studies have provided rich evidence of gender discrimination against female surgeons, the definition and measures of this discrimination have not fully reflected recent trends or more subtle and less visible types of discrimination. As explicit discrimination becomes less acceptable in society and in many organizations, discrimination continues implicitly, in covert forms.18 For instance, some recent studies have found gender differences in the feedback given during surgery training,27 autonomy in the operating room,28 and networking opportunities in the surgery society.29 These findings necessitate further research that reflects and attempts to measure the various broader phenomena of gender discrimination in surgery throughout the entire career path. Moreover, while prior studies on gender discrimination or gender gaps in surgery have focused on academic surgery, surgical trainees, or single surgical subspecialties,21,30 the present study addresses more broadly defined categories of gender discrimination in the entire field of surgery including academic/clinic and surgical subspecialties.

In Korea, significant gender discrimination and inequality still exist in the surgical community; however, to date, there has been no study on gender discrimination among the members of the Korean Surgical Society. Consequently, this study aims to determine the current prevalence and degree of gender discrimination in the Korean Surgical Society and to compare the experiences and perceptions of gender discrimination between male and female Korean surgeons.

METHODS

Survey design
The items used to measure experiences and perceptions of gender discrimination were developed in a multistep process. First, we reviewed the literature focusing on items
measuring gender discrimination in the fields of surgery, medicine, and human resource management. We also conducted in-depth interviews with eight female surgeons and consulted two professionals, one in the medical ethics field and one from the field of gender equality, regarding the developed questionnaire. The final questionnaire comprised of 16 items on experiences of gender discrimination and 17 items on perceptions of gender discrimination. We obtained the content validity of the survey items by having experts in medicine and gender equality review the questions. The reliability (Cronbach's alpha) of the 16 items on experiences of gender discrimination was 0.906, and the reliability of the 17 items on perceptions of gender discrimination was 0.951.

The survey questionnaire consisted of four sections: experiences of gender discrimination, perceptions of gender discrimination, the reasons for and methods of gender discrimination in the surgical field, and participants' demographic characteristics and affiliations. Participants responded to the questions regarding their experiences of gender discrimination with either “yes” or “no” answers, and to the questions regarding their perceptions of gender discrimination with a 4-point Likert scale with 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree. Responses of agree or strongly agree were reported as positive, while those of disagree or strongly disagree were considered negative.

Ten experts including female surgeons and expert panels in the fields of industrial welfare and labor relations participated in the pilot test of the survey questionnaire. We revised the survey items guided by the pilot test results so that the items have greater clarity and there is as little room for misunderstanding or ambiguity as possible. The survey questionnaire was distributed via the web-based survey tool SurveyMonkey® (https://ko.surveymonkey.com).

Participants
All registered members of the Korean Surgical Society were invited to participate via email. The general terms of the study, information on the survey, and a request for consent were included with the invitation, which was linked to individualized accounts. Participation was voluntary and anonymous, and no compensation was provided. The survey was conducted from November 11, 2019, to January 11, 2020, and three reminder emails were sent out at three-week intervals. Of the 4,525 surgeon members invited to participate, 432 responded (9.5% response rate). Incomplete responses were excluded from data analysis; we analyzed 400 responses after excluding any cases with a significant amount of missing information.

Statistical analysis
We estimated unadjusted comparisons of experienced gender discrimination and perceptions of gender discrimination by gender using \( \chi^2 \) tests. We also used binary logistic regression to estimate the effects of gender on experienced gender discrimination and perceptions of gender discrimination while adjusting for age, subspecialty, etc. Two-tailed significance was assessed. All analyses were performed using SPSS Statistics (IBM Corp., Armonk, NY, USA).

Ethics statement
The Institutional Review Board of Chung-Ang University Hospital approved the study (CAUH 1971-004-378). All of the participants submitted informed consent when they replied.
RESULTS

Respondents' characteristics
The final sample was 70.7% male and 29.3% female. Table 1 describes the participants' demographic characteristics and practice settings, stratified by gender. When compared with the male surgeons, the female surgeons were younger (mean age: 39.5 vs. 46.8, \( P < 0.001 \)) and less experienced in practice (mean years of practice: 14.2 vs. 21.8, \( P < 0.001 \)). There was a difference in the distribution of subspecialty by gender (\( P < 0.001 \)) in which the male respondents were mostly concentrated in the hepatobiliary–pancreas and colorectal fields (25.4% and 24.0% of all male surgeons, respectively). Female respondents, meanwhile, were mostly concentrated in breast-thyroid-endocrine surgery (41.0% of all female surgeons). More female surgeons than men were either fellows or non-tenured academic faculty, and disproportionately more male surgeons than women were working in private practices (\( P < 0.001 \)).

| Table 1. Respondents' characteristics by gender |
|-----------------------------------------------|
| Characteristics | Male (n = 283) | Female (n = 117) | \( P \) value |
| Age, yr | 46.8 ± 10.0 | 39.5 ± 5.9 | < 0.001 |
| < 35 | 21 (7.4) | 21 (17.9) | < 0.001 |
| 35–39 | 50 (17.7) | 40 (34.2) | |
| 40–44 | 65 (23.0) | 40 (34.2) | |
| 45–49 | 60 (21.2) | 11 (9.4) | |
| 50–54 | 29 (10.2) | 3 (2.6) | |
| 55–59 | 27 (9.5) | 1 (0.9) | |
| 60+ | 31 (11.0) | 1 (0.9) | |
| Years of practice, yr | 21.8 ± 10.4 | 14.2 ± 6.4 | < 0.001 |
| < 10 | 28 (9.9) | 31 (26.5) | < 0.001 |
| 10–14 | 44 (15.5) | 30 (25.6) | |
| 15–19 | 61 (21.6) | 40 (34.2) | |
| 20–24 | 61 (21.6) | 10 (8.5) | |
| 25–29 | 28 (9.9) | 4 (3.4) | |
| 30+ | 61 (21.6) | 2 (1.7) | |
| Surgical subspecialty | | | < 0.001 |
| Upper GI | 29 (10.2) | 7 (6.0) | |
| Colorectal | 68 (24.0) | 22 (18.8) | |
| Hepatobiliary-pancreas | 72 (25.4) | 15 (12.8) | |
| Breast-thyroid-endocrine | 43 (15.2) | 48 (41.0) | |
| Pediatric | 8 (2.8) | 6 (5.1) | |
| Vascular | 18 (6.4) | 6 (5.1) | |
| General surgery\(^a\) | 45 (15.9) | 13 (11.1) | |
| Rank | | | < 0.001 |
| Fellow | 21 (7.4) | 23 (19.7) | |
| Academic, non-tenured | 58 (20.5) | 34 (29.1) | |
| Academic, tenure track | 80 (28.3) | 29 (24.8) | |
| Hospital-employed | 64 (22.6) | 20 (17.1) | |
| Private practice | 49 (17.3) | 7 (6.0) | |
| Other | 11 (3.9) | 4 (3.4) | |
| Practice setting | | | 0.250 |
| University hospital | 134 (47.3) | 70 (59.8) | |
| General hospital (> 100 beds) | 67 (23.7) | 23 (19.7) | |
| Hospital (< 30 beds) | 26 (9.2) | 8 (6.8) | |
| Private clinic | 45 (15.9) | 13 (11.1) | |
| Other | 11 (3.9) | 3 (2.6) | |
| Geographical area of practice setting | | | 0.003 |
| Metropolitan area | 188 (66.4) | 97 (82.9) | |
| Urban area | 91 (32.2) | 20 (17.1) | |
| Rural area | 4 (1.4) | 0 | |

Values are presented as mean ± standard deviation or number of patients (%).
GI = gastrointestinal.
\(^a\)Which means not having subspecialty.
Experiences of gender discrimination

Table 2 illustrates the differences in respondents’ experiences of gender discrimination according to gender. Female surgeons were more likely to report experiences of gender discrimination than male surgeons (all \( P < 0.001 \)): The female surgeons reported they had experienced disrespect from a patient or caregiver (80.0%), had to perform better to receive equivalent performance evaluations to their male colleagues (63.6%), had experienced discrimination or disadvantage from nurses or other support staff (55.5%), and had experienced discrimination in informal networking and relationships within an organization (50.0%).

Even after adjusting for years of practice, surgical subspecialty, rank, and geographical area of practice setting, female surgeons were more likely to experience gender discrimination than male surgeons across all discrimination types (odd ratio \([OR] = 3.447-230.242, P < 0.001; \) Table 3). We examined the group of surgeons with less than 20 years of practice experience, who were on average younger and higher in terms of the proportion of female surgeons, separately from the entire sample to test if there was generational difference in the experience of gender discrimination. In this group, female surgeons were still more likely to experience gender discrimination than male surgeons across the twelve items, although the gender gap was smaller than for the entire sample (\( OR = 4.135-80.761, P < 0.050; \) Table 3). In the entire sample and in the group with less than 20 years of practice experience, female surgeons were more likely to experience discrimination than male surgeons in terms of their career progression toward academic faculty positions and responses from patients or caregivers and were more likely to be told they were not suited to surgery because of their gender.

Perceptions of gender discrimination

The unadjusted statistics indicated that gender differences were significant in the perception of the disadvantages faced by female surgeons. Female surgeons were significantly more likely to agree to the 16 items regarding discrimination against female surgeons (\( P < 0.001; \)

### Table 2. Experiences of gender discrimination by gender

| Because of my gender, I have experienced discrimination, disadvantage, or exclusion related to: | Unadjusted* |
| --- | --- |
| 1. Career progression | |
| Application for a surgical resident position | 2.6 | 23.2 | < 0.001 |
| Application for a fellow position | 1.1 | 13.4 | < 0.001 |
| Choosing a surgical subspecialty | 1.5 | 13.4 | < 0.001 |
| Application for an academic faculty position | 1.9 | 26.8 | < 0.001 |
| Hiring by a medical institution | 4.9 | 23.2 | < 0.001 |
| 2. Compensation and promotion | |
| Salary or incentive | 1.6 | 16.4 | < 0.001 |
| Promotion | 2.3 | 29.1 | < 0.001 |
| Obtaining a leadership position | 3.5 | 40.9 | < 0.001 |
| 3. Participation, communication, and resources | |
| Participating in administrative decision-making | 2.3 | 31.8 | < 0.001 |
| Informal networking and relationships within an organization | 6.6 | 50.0 | < 0.001 |
| Accessing necessary resources (operating rooms, surgical instruments, etc.) | 2.7 | 12.7 | < 0.001 |
| Accessing necessary information | 3.1 | 23.6 | < 0.001 |
| 4. Disrespect from non-surgeons | |
| Because of my gender, I have experienced discrimination or disadvantages from nursing or other support staff | 4.3 | 55.5 | < 0.001 |
| Because of my gender, I have experienced discrimination or disadvantages from a patient or caregiver | 7.8 | 80.0 | < 0.001 |
| 5. Gender-based biases | |
| I was told I was not suited to surgery because of my gender | 1.1 | 46.4 | < 0.001 |
| I had to perform better to receive an equivalent performance evaluation to my colleague of the opposite gender | 8.2 | 63.6 | < 0.001 |

*Frequency was defined as having experienced the item via a “yes” response. Each row is from a separate \( \chi^2 \) test. \( P \) values are based on the \( \chi^2 \) tests.
Gender Discrimination among Korean Surgeons

Because of my gender, I have experienced discrimination, disadvantage, or exclusion related to:

| Gender variable Model | All respondents | Adjusted* | Less than 20 years' practice |
|-----------------------|----------------|-----------|-----------------------------|
|                       | Gender variable | P value   | χ² (−2 Log likelihood) | P value | χ² (−2 Log likelihood) | P value |
|                       | OR (95% CI)b    |           |                           |          |                           |         |
| 1. Career progression | Application for a surgical resident position | 10.148 (3.818–26.973) | < 0.001 | 48.347 (757.618) | < 0.001 | 3.072 (1.109–8.507) | 0.031 | 14.928 (137.616) | 0.245 |
|                       | Application for a fellow position | 12.132 (2.865–51.373) | < 0.001 | 38.382 (106.349) | < 0.001 | 4.661 (1.106–19.641) | 0.036 | 23.766 (86.314) | 0.022 |
|                       | Choosing a surgical subspecialty | 11.570 (3.027–44.294) | < 0.001 | 33.773 (116.893) | 0.001 | 3.635 (0.958–13.796) | 0.058 | 23.004 (87.077) | 0.028 |
|                       | Application for an academic faculty position | 37.124 (10.964–125.704) | < 0.001 | 80.579 (352.644) | < 0.001 | 40.530 (7.178–228.841) | 0.001 | 56.665 (104.177) | 0.001 |
|                       | Hiring by a medical institution | 7.798 (3.299–18.432) | < 0.001 | 42.620 (208.374) | 0.001 | 4.135 (1.497–11.421) | 0.006 | 22.393 (134.346) | 0.033 |
| 2. Compensation and promotion | Salary or incentive | 14.733 (3.839–56.545) | < 0.001 | 37.681 (128.680) | < 0.001 | 3.969 (0.992–15.886) | 0.051 | 17.374 (96.697) | 0.136 |
|                       | Promotion | 20.985 (6.923–63.608) | < 0.001 | 63.047 (181.007) | < 0.001 | 11.238 (3.477–36.322) | < 0.001 | 36.301 (134.082) | < 0.001 |
|                       | Obtaining a leadership position | 19.063 (7.772–47.220) | < 0.001 | 90.822 (215.491) | < 0.001 | 8.631 (3.457–21.549) | < 0.001 | 42.347 (181.567) | < 0.001 |
| 3. Participation, communication, and resources | Participating in administrative decision-making | 16.624 (5.764–47.945) | < 0.001 | 71.048 (185.680) | < 0.001 | 7.648 (2.630–22.243) | < 0.001 | 33.986 (147.231) | 0.001 |
|                       | Informal networking and relationships within an organization | 11.351 (5.548–23.223) | < 0.001 | 104.629 (258.314) | < 0.001 | 8.657 (3.891–19.257) | < 0.001 | 55.807 (199.437) | 0.084 |
|                       | Accessing necessary resources (operating rooms, surgical instruments, etc.) | 3.447 (1.777–10.090) | < 0.001 | 32.685 (128.127) | 0.001 | 1.846 (0.582–5.858) | 0.298 | 19.197 (99.858) | < 0.001 |
|                       | Accessing necessary information | 8.342 (3.246–21.440) | < 0.001 | 48.214 (178.111) | < 0.001 | 4.769 (1.784–12.750) | 0.002 | 27.659 (146.659) | < 0.001 |
| 4. Disrespect from non-surgeons | Because of my gender, I have experienced discrimination or disadvantages from nursing or other support staff | 16.949 (7.873–36.485) | < 0.001 | 135.777 (227.166) | < 0.001 | 13.906 (5.874–32.920) | < 0.001 | 72.863 (186.111) | 0.001 |
|                       | Because of my gender, I have experienced discrimination or disadvantages from a patient or caregiver | 51.251 (22.636–116.040) | < 0.001 | 213.897 (230.164) | < 0.001 | 58.543 (21.278–161.075) | < 0.001 | 142.447 (150.965) | < 0.001 |
| 5. Gender-based biases | I was told I was not suited to surgery because of my gender | 230.242 (45.652–1,161.199) | < 0.001 | 139.063 (774.547) | < 0.001 | 80.761 (16.552–394.046) | < 0.001 | 76.762 (145.182) | < 0.001 |
|                       | I had to perform better to receive an equivalent performance evaluation to my colleague of the opposite gender | 18.182 (9.074–36.431) | < 0.001 | 143.908 (266.619) | < 0.001 | 10.648 (5.055–22.428) | < 0.001 | 62.849 (219.703) | < 0.001 |

OR = odds ratio, CI = confidence interval.

*Each row is from a separate binary logistic regression model with gender as an independent variable. Covariates include years of practice, surgical subspecialty, rank, and geographical area of practice setting; Female vs. male.

Table 4), except for one item, “application for a surgical resident position.” The female surgeons perceived discrimination in the following items the most; obtaining a leadership position (female vs. male: 87.9% vs. 55.0%), discrimination by patients or caregivers against female surgeons (female vs. male: 86.9% vs. 61.8%), general biases against female surgeons in surgery (female vs. male: 84.1% vs. 48.2%), gaining promotions (female vs. male: 79.4% vs. 27.9%), and having to perform better to receive equivalent performance evaluations to male surgeons (female vs. male: 79.4% vs. 19.1%).

After adjustment for years of practice, surgical subspecialty, rank, and geographical area of practice setting, the female surgeons were still more likely to agree about the presence of gender discrimination than the male surgeons across all discrimination items (OR = 2.438–16.842, P < 0.010; Table 5). Gender differences in the perceptions of gender discrimination were particularly significant regarding salary, promotions, accessing necessary information,
and the pressure to perform better to receive equivalent performance evaluations to that of the opposite sex. In terms of perceived gender discrimination in the group of surgeons with less than 20 years of practice experiences, female surgeons perceived more gender discrimination than male surgeons across the 15 items (OR = 2.531 – 20.000, \( P < 0.010 \); Table 5). However, the gender differences of the perception of this group was not significantly different from the entire sample, indicating that the perception gap persists among the younger generation surgeons.

**Reasons for gender discrimination and suggestions to decrease it**

We asked respondents to choose the three most important reasons for gender discrimination in surgery from among 10 possible items. The two most frequently chosen responses by male surgeons were “differences in physical capacity and activity between women and men” (57.3%) and “performance hindrance due to pregnancy and childbirth” (51.8%). The two most frequent responses chosen by female surgeons were “performance hindrance due to pregnancy and childbirth” (68.7%) and “general favoritism towards male surgeons” (65.7%). We also asked respondents to choose the three most necessary policies or efforts that could reduce gender discrimination from among 11 items. The two most frequent answers given by male surgeons were “bringing in a substitute when a female surgeon takes maternity leave” (62.8%) and “awareness of the need for a work–family life balance for surgeons” (51.4%). On the other hand, the two most frequently chosen responses by female surgeons were “improving the male-dominated culture in medicine” (55.6%) and “awareness of the need for a work–family life balance for surgeons” (49.5%).

**DISCUSSION**

This study explored the gender discrimination that is prevalent in surgical field of Korea and examined and discovered significant gender differences in the experiences of gender discrimination among male and female surgeons.
discrimination and the perception of such discrimination against female surgeons. The inclusive conceptualization of gender discrimination in this study is consistent with contemporary approaches to the broadened spectrum of gender discrimination, such as the increased interest in microaggression.31,32

This study is the first attempt in Korea to examine the experience and perception of gender discrimination in surgery. There have been only very few academic studies on gender discrimination in medicine. The most recent study by Shin and Lee,33 which analyzed the survey conducted by the Korean Medical Women’s Association and the Korean Intern Resident Association in 2019, is also consistent with our findings. They discovered that women showed significantly higher perception of gender discrimination than men in all surveyed areas of gender inequality, including residency, professorship, employment,

Table 5. Association between gender and perceptions of gender discrimination

|                          | All respondents | Adjusted* | Less than 20 years’ practice |
|--------------------------|-----------------|-----------|-----------------------------|
|                          | Gender variable | Model     | Gender variable              | Model     |
|                          | OR (95% CI)b    | P value   | χ² (-2 Log likelihood)  | P value   |
|                          |                 |          |                             |           |
| 1. Career progression    |                 |          |                             |           |
| Application for a surgical resident position | 2.438 | 0.005 | 38.189 | < 0.001 | 1.792 | 0.127 | 17.826 | 0.121 |
| (1.311–4.535)            |                 |          | (373.790)                   |           | (8.047–3.791) |           | (204.118) |           |
| Application for a fellow position | 2.999 | < 0.001 | 30.132 | 0.003 | 2.670 | 0.002 | 19.734 | 0.072 |
| (1.755–5.126)            |                 |          | (459.330)                   |           | (1.418–5.031) |           | (274.527) |           |
| Choosing a surgical subspecialty | 3.729 | < 0.001 | 36.904 | < 0.001 | 3.657 | < 0.001 | 23.767 | 0.022 |
| (2.185–6.367)            |                 |          | (463.325)                   |           | (1.934–6.913) |           | (279.209) |           |
| Application for an academic faculty position | 4.614 | < 0.001 | 56.688 | < 0.001 | 4.640 | < 0.001 | 36.108 | < 0.001 |
| (2.644–8.052)            |                 |          | (460.491)                   |           | (2.043–8.959) |           | (272.277) |           |
| Hiring by a medical institution | 4.713 | < 0.001 | 51.397 | 0.001 | 5.552 | < 0.001 | 41.231 | 0.001 |
| (2.660–8.351)            |                 |          | (468.461)                   |           | (2.752–11.199) |           | (266.364) |           |
| 2. Compensation and promotion |                 |          |                             |           |
| Salary or incentive      | 10.346 | < 0.001 | 43.844 | < 0.001 | 4.598 | 0.006 | 21.633 | 0.042 |
| (3.893–27.498)           |                 |          | (198.396)                   |           | (1.545–13.686) |           | (128.589) |           |
| Promotion                | 13.438 | < 0.001 | 113.630 | < 0.001 | 10.125 | 0.001 | 58.859 | < 0.001 |
| (6.958–25.954)           |                 |          | (376.208)                   |           | (4.789–21.405) |           | (337.135) |           |
| Obtaining a leadership position | 5.535 | < 0.001 | 47.501 | < 0.001 | 6.801 | < 0.001 | 34.781 | 0.001 |
| (2.790–10.981)           |                 |          | (416.932)                   |           | (3.033–15.249) |           | (231.044) |           |
| 3. Participation, communication, and resources |                 |          |                             |           |
| Participating in administrative decision-making | 6.528 | < 0.001 | 76.649 | < 0.001 | 5.125 | < 0.001 | 44.140 | < 0.001 |
| (3.612–11.796)           |                 |          | (363.407)                   |           | (2.601–10.097) |           | (238.753) |           |
| Informal networking and relationships within an organization | 6.337 | < 0.001 | 69.863 | < 0.001 | 5.795 | < 0.001 | 39.498 | < 0.001 |
| (3.567–11.258)           |                 |          | (403.560)                   |           | (2.974–11.291) |           | (255.972) |           |
| Accessing necessary resources (operating rooms, surgical instruments, etc.) | 4.869 | < 0.001 | 32.446 | 0.004 | 5.343 | 0.004 | 25.114 | 0.014 |
| (1.967–12.050)           |                 |          | (187.760)                   |           | (1.728–16.521) |           | (120.922) |           |
| Accessing necessary information | 10.404 | < 0.001 | 74.999 | 0.001 | 9.228 | < 0.001 | 48.021 | 0.001 |
| (4.910–22.047)           |                 |          | (245.448)                   |           | (3.776–22.550) |           | (177.021) |           |
| 4. Disrespect from non-surgeons |                 |          |                             |           |
| Discrimination against female surgeons from nursing or other support staff | 2.930 | < 0.001 | 38.372 | 0.004 | 2.531 | 0.004 | 22.652 | 0.031 |
| (1.712–5.014)            |                 |          | (435.051)                   |           | (1.353–4.735) |           | (270.847) |           |
| Discrimination against female surgeons from a patient or caregiver | 3.404 | < 0.001 | 53.269 | 0.004 | 5.658 | < 0.001 | 28.620 | 0.004 |
| (1.712–6.767)            |                 |          | (388.427)                   |           | (2.368–13.520) |           | (201.657) |           |
| 5. Gender-based biases   |                 |          |                             |           |
| Female surgeons must perform better to receive equivalent performance evaluations to male surgeons | 16.842 | < 0.001 | 132.137 | < 0.001 | 20.000 | < 0.001 | 88.905 | < 0.001 |
| (8.669–32.719)           |                 |          | (340.247)                   |           | (8.711–46.840) |           | (207.294) |           |
| There are biases against female surgeons in surgery | 5.778 | < 0.001 | 54.553 | < 0.001 | 6.583 | < 0.001 | 35.251 | < 0.001 |
| (3.061–10.910)           |                 |          | (430.238)                   |           | (3.105–13.954) |           | (241.980) |           |
| In surgery, there is more discrimination against female doctors than in other specialties | 6.595 | < 0.001 | 37.241 | 0.001 | 4.418 | < 0.001 | 23.256 | 0.026 |
| (3.142–13.845)           |                 |          | (279.940)                   |           | (1.924–10.141) |           | (185.830) |           |

OR = odds ratio, CI = confidence interval.

*Each row is from a separate binary logistic regression model with gender as an independent variable. Covariates included years of practice, surgical subspecialty, rank, and geographical area of practice setting; *Female vs. male.
promotion, pay and compensation, participation in decision making. 12.6–47.3% of women in medicine experienced discrimination across the various areas of inequality.33 A similar study by the Korean Women’s Medical Association in 2011 also found that 41.0–74.2% of women in medicine agreed that discrimination existed in hiring, position, promotion, performance evaluation, etc.34 Our current study is consistent with these prior findings such that women showed higher perception of gender discrimination, ranging from 20.6% to 87.9% than men. This study provides additional specified insights on the prevalence of gender discrimination in surgery.

The results were consistent with the findings of previous studies that have identified the challenges that female surgeons and physicians experience, such as the gender pay gap, lack of role models and mentors, gender biases, and the lower likelihood of working in academic surgery and in leadership positions.1,14,16,17,25,30,33 In addition, implicit forms of discrimination, for example, the imbalanced allocation of resources or reduced access to informal networking opportunities, were no less prevalent than the obvious and visible forms in surgery. The results suggest that the traditional conceptualization of gender discrimination may fall short of capturing its full range. However, only a few studies have actually surveyed surgeons about their experiences of gender discrimination, and, although they have critically contributed to our understanding of gender discrimination in medicine and surgery, they have applied too simplistic or very limited sets of questions about gender discrimination.21,35,36 As observed by Stephens et al.,37 implicit bias works at the subconscious level and is not only hard to recognize but can even contradict conscious beliefs. Consequently, this bias is very difficult to assess or challenge. The present study contributes important insights that illustrate the full range of gender discrimination that female surgeons face, including both explicit and implicit biases and discrimination.

The results of this study identified the gender gap in the perceived discrimination against women, consistent with previous studies.22,38,39 In addition to actual experiences of gender discrimination and biases, the fact that mainstream male surgeons have significantly lower awareness of the existence of such prevalent gender biases and discrimination can further aggravate the discrimination female surgeons experience. Although perceptions are largely influenced by experience, without actual experience, people can form a skewed perception of the inequality and discrimination in society. Raising awareness of gender biases and discrimination among male surgeons will be a crucial step toward addressing gender discrimination in surgery.

An additional adjusted analysis of surgeons with less than 20 years of practice experience showed that in this generally younger group, the experience of gender discrimination decreased, although the difference between the male and female respondents’ perceptions of gender discrimination in this group was not significantly different from that of the entire sample. The group with less than 20 years’ experience was younger, lower in rank (fellow, instructor, and associate or assistant professor), and included more women than the older group. However, despite the decreased experience of discrimination, younger female surgeons were still more likely to experience gender discrimination than their male counterparts. Moreover, there was no change in the perceptions of discrimination against female surgeons in the younger generation, and the young female surgeons perceived more discrimination than males.
These results imply that despite the increased number of female surgeons and residents, gender discrimination persists, and there is a significant perception gap between male and female surgeons of this discrimination. Although the increase in the number of women in leadership positions suggests the possibility of improving the situation, the results of our study imply that simply having more women in the field may not be a fundamental solution. In addition, as Dossa and Baxter noted, this strategy will force female surgeons to tolerate various forms of discrimination for the coming decades, and will, eventually, be ineffectual since women will be more likely to leave the surgical field due to the persistent discrimination and disadvantages they will face.

When asked to choose a reason why discrimination persists, both men and women chose performance hindrance due to pregnancy and childbirth as a major reason. However, only female surgeons were acutely aware of general favoritism towards male surgeons as another major cause of persisting gender discrimination, which is consistent with the previous research. Gender difference was also found in terms of the necessary effort to reduce gender discrimination, where female surgeons were significantly more likely to point out changing the male-dominated culture. A 2019 survey by Shin and Lee also found a similar result in which women gave much higher priority to “correcting men-oriented medical practices pattern” as necessary than men did. Such gender differences in the perception of the causes of discrimination and necessary measures to reduce discrimination is evidence that raising male surgeons’ awareness of discrimination against women and creating consensus is the beginning of a positive change.

Improving systems, rules, and procedures is important; however, this kind of approach cannot fully address implicit discrimination or “second-generation gender bias,” which refers to practices that may appear neutral but, when applied, discriminate against one gender by reflecting the values of another gender that created or developed the setting. Such second-generation gender bias can become an organizational barrier limiting women from assuming leadership roles. Instead, what must be at the center of the efforts to reduce discrimination in surgery is the creation of a culture and climate that are gender-neutral and not easily influenced by any specific groups within the medical community.

This study has some limitations. First, the survey response rate (9.5%) may raise concern about response biases. Although we admit this concern, similar surveys administered to medical professionals such as dentists, physicians, oncologists, etc. through professional associations showed response rates ranging from 10% to 18%. A similar survey of gender equality by Shin and Lee recorded a 9.2% response rate. Unlike these examples, the current study sent the survey to all members of the Korean Surgical Society regardless of their practice status, in order to guarantee anonymity and voluntary participation. For this reason, the response rate of the current study may appear relatively lower, but we believe that it is comparable to other similar studies of medical professionals. Second, female surgeons were overrepresented in the sample (29.3%), compared to the national population of women registered with the Korean Surgical Society (8.9%). As highlighted by Rogers et al., a selection bias may have been present in that more women may have responded due to the nature of the study: it is possible that female surgeons are more strongly motivated to express the gender discrimination they have experienced or perceived, whereas male surgeons may be less likely to respond to such surveys. In fact, a significant number of male surgeons expressed the opinion that they felt uncomfortable about the survey topic, and some contested that male surgeons experience reverse discrimination. Finally, the survey queried
experiences of gender discrimination throughout the medical and surgery career path; thus, like other self-reported surveys, responses may have been subject to recall bias. Despite these limitations, this study’s major strength is that it covered a wide variety of gender discrimination manifestations, ranging from explicit to implicit forms, and found differences between the genders in both actual experiences and perceptions. The study offers an inclusive description of various forms of gender discrimination in the surgical field and contributes to raising awareness of gender discrimination. It is also the first academic attempt to investigate the current status of gender discrimination across the entire community of surgeons in Korea. The results were generally consistent with prior studies conducted in other countries and can contribute to the generalized understanding of gender biases and discrimination in surgery. While gender discrimination and biases are in and of themselves morally wrong, they are also detrimental to the surgeons who are subject to such discrimination in terms of their personal outcomes. Based on the understanding of the perceptions and experiences of gender discrimination found in this research, future studies can explore how gender discrimination expectations might affect surgeons’ professional career choices and attitudes, including job satisfaction, burnout, psychological well-being, and professional confidence. This study only reported the results of aggregated experiences and perceptions of discrimination, whereas the odds ratios of experiences of each discrimination type ranged from 3.4 to 230. Therefore, it is necessary to more closely examine each discrimination type to better understand the wide range of odds ratios despite the very high probability of female surgeons experiencing and perceiving gender discrimination.

REFERENCES

1. Abelson JS, Chartrand G, Moo TA, Moore M, Yeo H. The climb to break the glass ceiling in surgery: trends in women progressing from medical school to surgical training and academic leadership from 1994 to 2015. Am J Surg 2016;212(4):566-572.e1. [PUBMED] [CROSSREF]

2. Radunz S, Pustu H, Marx K, Mazilescu L, Braun A, Benkő T, et al. Women in surgery: a web-based survey on career strategies and career satisfaction. Innov Surg Sci 2020;5(1-2):11-9. [PUBMED] [CROSSREF]

3. Siotos C, Payne RM, Stone JP, Cui D, Siotou K, Broderick KP, et al. Evolution of workforce diversity in surgery. J Surg Educ 2019;76(4):1015-21. [PUBMED] [CROSSREF]

4. Canadian Institute for Health Information. Physicians in Canada, 2018. https://www.cihi.ca/sites/default/files/document/physicians-in-canada-2018.pdf. Accessed July 15, 2020.

5. General Medical Council (GMC). The State of Medical Education and Practice in the UK. London, UK: GMC; 2017.

6. World Health Organization. European health information gateway, % of physicians by sex, all ages, 2014. https://gateway.euro.who.int/en/indicators/hlthres_137-of-physicians-by-sex-all-ages/. Accessed July 15, 2020.

7. Korean Educational Statistics Service. Number of graduates by department. https://kess.kedi.re.kr. Accessed September 13, 2020.

8. Korean Statistical Information Service. Physicians by sex and specialty, 2018. http://kosis.kr/statHtml/statHtml.do?orgId=350&tblId=TX_35001_A019. Accessed July 15, 2020.

9. Association of American Medical Colleges (AAMC). The majority of U.S. medical students are women, new data show. https://www.aamc.org/news-insights/press-releases/majority-us-medical-students-are-women-new-data-show. Accessed December 1, 2020.

10. Association of American Medical Colleges (AAMC). Active physicians by sex and specialty, 2017. https://www.aamc.org/data-reports/workforce/interactive-data/active-physicians-sex-and-specialty-2017. Accessed July 15, 2020.

11. Fitzgerald JE, Tang SW, Ravindra P, Maxwell-Armstrong CA. Gender-related perceptions of careers in surgery among new medical graduates: results of a cross-sectional study. Am J Surg 2013;206(1):112-9. [PUBMED] [CROSSREF]
12. Dorsey ER, Jarjoura D, Rutecki GW. The influence of controllable lifestyle and sex on the specialty choices of graduating U.S. medical students, 1996–2003. *Acad Med* 2005;80(9):791-6.

13. Tambyraja AL, McCrea CA, Parks RW, Garden OJ. Attitudes of medical students toward careers in general surgery. *World J Surg* 2008;32(6):960-3.

14. Zhuge Y, Kaufman J, Simeone DM, Chen H, Velazquez OC. Is there still a glass ceiling for women in academic surgery? *Ann Surg* 2011;253(4):637-43.

15. Kerr HL, Armstrong LA, Cade JE. Barriers to becoming a female surgeon and the influence of female surgical role models. *Postgrad Med J* 2016;92(1092):576-80.

16. Peel JK, Schlachta CM, Alkhamesi NA. A systematic review of the factors affecting choice of surgery as a career. *Can J Surg* 2018;61(1):58-67.

17. Yu TC, Jain A, Chakraborty M, Wilson NC, Hill AG. Factors influencing intentions of female medical students to pursue a surgical career. *J Am Coll Surg* 2012;215(6):878-89.

18. Webster F, Rice K, Christian I, Seemann N, Baxter N, Moulton CA, et al. The erasure of gender in academic surgery: a qualitative study. *Am J Surg* 2016;212(4):559-65.

19. Nora LM, McLaughlin MA, Fosson SE, Stratton TD, Murphy-Quinlan A, Fincher RM, et al. Gender discrimination and sexual harassment in medical education: perspectives gained by a 14-school study. *Acad Med* 2002;77(12 Pt 1):1226-34.

20. Stratton TD, McLaughlin MA, Witte FM, Fosson SE, Nora LM. Does students’ exposure to gender discrimination and sexual harassment in medical school affect specialty choice and residency program selection? *Acad Med* 2005;80(4):400-8.

21. Bruce AN, Battista A, Plankey MW, Johnson LB, Marshall MB. Perceptions of gender-based discrimination during surgical training and practice. *Med Educ Online* 2015;20(1):25923.

22. Cochran A, Haasch T, Elder WB, Neumayer LA, Brasel KJ, Crandall ML. Perceived gender-based barriers to careers in academic surgery. *Am J Surg* 2013;206(2):263-8.

23. Sexton KW, Hocking KM, Wise E, Osgood MJ, Cheung-Flynn J, Komalavilas P, et al. Women in academic surgery: the pipeline is busted. *J Surg Educ* 2012;69(1):84-90.

24. Amrein K, Langmann A, Fahrleitner-Pammer A, Piber TR, Zollner-Schwetz I. Women underrepresented on editorial boards of 60 major medical journals. *Gend Med* 2011;8(6):378-87.

25. Harris CA, Banerjee T, Cramer M, Manz S, Ward ST, Dimick J, et al. Editorial (spring) board? Gender composition in high-impact general surgery journals over 20 years. *Ann Surg* 2019;269(3):582-8.

26. Association of American Medical Colleges (AAMC). Department chairs by gender and department, 2018. https://www.aamc.org/sites/default/files/aa-data-reports-state-of-women-department-chairs-2018_0.jpg. Accessed July 15, 2020.

27. Mueller AS, Jenkins TM, Osborne M, Dayal A, O’Connor DM, Arora VM. Gender differences in attending physicians’ feedback to residents: a qualitative analysis. *J Grad Med Educ* 2017;9(5):577-85.

28. Meyerson SL, Sternbach JM, Zwischenberger JB, Bender EM. The effect of gender on resident autonomy in the operating room. *J Surg Educ* 2017;74(6):e111-8.

29. Longo P, Straehley CJ. Whack! I've hit the glass ceiling! Women's efforts to gain status in surgery. *Gend Med* 2008;5(1):88-100.

30. Blumenthal DM, Bergmark RW, Raol N, Bohnen JD, Eloy JA, Gray ST. Sex differences in faculty rank among academic surgeons in the United States in 2014. *Ann Surg* 2018;268(2):193-200.
31. Basford TE, Offermann LR, Behrend TS. Do you see what I see? Perceptions of gender microaggressions in the workplace. *Psychol Women Q* 2014;38(3):340-9.

CROSSREF

32. Olkin R, Hayward HS, Abbene MS, VanHeel G. The experiences of microaggressions against women with visible and invisible disabilities. *J Soc Issues* 2019;75(3):757-85.

CROSSREF

33. Shin HY, Lee HA. The current status of gender equity in medicine in Korea: an online survey about perceived gender discrimination. *Hum Resour Health* 2020;18(1):78.

PUBMED | CROSSREF

34. Korean Medical Women’s Association. *A Study on the Improvement of Female Doctor Marriage and Childbirth Environment*. Seoul, Korea: Korean Medical Women’s Association; 2011.

35. Carr PL, Ash AS, Friedman RH, Szalacha L, Barnett RC, Palepu A, et al. Faculty perceptions of gender discrimination and sexual harassment in academic medicine. *Ann Intern Med* 2000;132(11):889-96.

PUBMED | CROSSREF

36. Coombs AA, King RK. Workplace discrimination: experiences of practicing physicians. *J Natl Med Assoc* 2005;97(4):467-77.

PUBMED

37. Stephens EH, Heisler CA, Temkin SM, Miller P. The current status of women in surgery: how to affect the future. *JAMA Surg* 2020;155(9):876-85.

PUBMED | CROSSREF

38. Carr PL, Szalacha L, Barnett R, Caswell C, Inui T. A “ton of feathers”: gender discrimination in academic medical careers and how to manage it. *J Womens Health (Larchmt)* 2003;12(10):1009-18.

PUBMED | CROSSREF

39. Rogers AC, Wren SM, McNamara DA. Gender and specialty influences on personal and professional life among trainees. *Ann Surg* 2019;269(2):383-7.

PUBMED | CROSSREF

40. Pories SE, Turner PL, Greenberg CC, Babu MA, Parangi S. Leadership in American surgery: women are rising to the top. *Ann Surg* 2019;269(2):199-205.

PUBMED | CROSSREF

41. Dossa F, Baxter NN. Reducing gender bias in surgery. *Br J Surg* 2018;105(13):1707-9.

PUBMED | CROSSREF

42. Gargiulo DA, Hyman NH, Hebert JC. Women in surgery: do we really understand the deterrents? *Arch Surg* 2006;141(4):405-7.

PUBMED | CROSSREF

43. Lee YG, Oh S, Kimm H, Koo DH, Kim DY, Kim BS, et al. Practice patterns regarding multidisciplinary cancer management and suggestions for further refinement: results from a national survey in Korea. *Cancer Res Treat* 2017;49(4):1164-9.

PUBMED | CROSSREF

44. Chung DB, Chang YI, Kang SN, Kye SY, Yun YH, Lee DR. A comparison of clinical oncologists and family physicians toward complementary and alternative medicine in South Korea: perceptions, attitudes and physician-patient communication. *Korean J Fam Med* 2010;31(1):24-34.

CROSSREF

45. Song KW, Kim HK. Job stress and its related factors among Korean dentists: an online survey study. *Int Dent J* 2019;69(6):436-44.

PUBMED | CROSSREF