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Exploring the Relationship between Stereotypical Beliefs and Residents' Well-Being

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Abstract

Background—Medicine has historically been a male-dominated field, and there remains a stereotype that men are better physicians than women. For female residents, and in particular female surgical residents, chronically contending with this stereotype can exact a toll on their psychological health. The objective of this study was to determine the relationship between women surgeons' psychological health and their perception of other people's endorsement of the stereotype (stereotype perception).

Study Design—This is a correlational study based on survey data collected from 14 residency programs at one medical center from September 2010 to March 2011. The participants were 384 residents (representing an 80% response rate). The main survey measures were the Dupuy Psychological General Well-Being Scale and the Maslach Burnout Inventory.

Results—Among female surgical residents, we found that those with higher degrees of stereotype perception had poorer psychological health than those with lower degrees of stereotype perception, $B = -0.44$, $P = 0.002$. For men, there was no relationship between stereotype perception and psychological health, $B = 0.015$, $P = 0.92$. Among non-surgeons, there was no relationship between stereotype perception and psychological health for either women or men, $B = -0.016$, $P = 0.78$; $B = -0.0050$, $P = 0.97$, respectively.

Conclusions—The data suggest that women in surgical training, but not men, may face a stressor, stereotype perception, that is negatively associated with their psychological health. This same relationship does not seem to exist for women in non-surgical training programs. Efforts should be made to further understand this relationship and investigate possible interventions to level the playing field for male and female surgical trainees.

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Introduction

Although approximately 50% of medical students are women,¹ some specialties, such as surgery, have not yet reached parity.² In fact, the Association of American Medical Colleges (AAMC) reports that only 36% of surgical residents are female.³ Improving the recruitment and retention of women into specialties such as these is an important step in increasing the nation's supply of physicians. This is particularly important given the imminent shortage of surgeons in the United States.⁴

One factor that may affect women's decisions to pursue and remain in training in medicine, and particularly in male-dominated fields, may be a social-psychological factor known as stereotype threat. Stereotype threat is defined as the fear of confirming a negative stereotype about a group to which one belongs.⁵ In the present research we assess (A) whether female residents perceive others to hold stereotypical views about female residents' ability, and (B) whether this stereotype perception is associated with poorer psychological health. We examine these questions at one academic medical center, sampling residents in 14 prominent programs. We focus on burnout and psychological distress because they are important outcomes that are likely precursors to the costly problem of attrition.⁶⁻⁷

Even when negative stereotypes are neither accurate nor endorsed, the mere perception that one could be judged in light of them can have a host of consequences including increased stress and poorer performance. For example, African American participants in a research study were found to have higher blood pressure when taking a test of intellectual ability under stereotype threat.⁸ In medical training, women may experience stereotype threat because of the stereotype that women have less ability than men. This stereotype may be particularly strongly held with regard to surgical ability because surgery has historically been and continues to be dominated by men. Thus, stereotypes about women's ability in medicine may constitute a chronic stressor for female residents, particularly those in surgical fields. This may, in turn, contribute to poorer psychological health.⁹

We first set out to understand whether residents perceive there to be a negative stereotype about women's ability in medicine. We then proceed to assess whether the degree of this stereotype perception is related to women's psychological health. We examine a broad range of fields but focus in particular on the surgical specialties because in these specialties women are still heavily outnumbered (making up only one-third of trainees²⁻³) and have a high rate of attrition.¹⁰⁻¹⁷ The per annum attrition rate of the specialties included in this study ranges from 1.4% to 5%.¹⁰⁻¹⁷ The specialties with the lowest attrition rates are Ophthalmology, Orthopedic Surgery, Otolaryngology and Head and Neck Surgery, Urology, and Internal Medicine (1.4–1.5%). General Surgery has the highest attrition rate at 5% per annum. The gender makeup of these specialties varies widely. Obstetrics and Gynecology has the highest percentage of female residents, 81%, followed closely by Pediatrics (73% women). The specialties with the fewest women are Orthopedic Surgery (13% women) and Neurosurgery (14% women).³

We make two predictions: 1) residents in surgical specialties will perceive the negative stereotype about women's ability to a greater extent than those in non-surgical specialties,

and 2) the more women residents perceive the stereotype the worse their psychological well-being will be.

Methods

After obtaining approval from the Institutional Review Board at Stanford University, we surveyed 384^a residents (constituting an 80% overall response rate; 86% response rate within surgical specialties, 77% response rate in non-surgical specialties) at one academic medical center from 14 different specialties, nine of which were surgical. The residents spanned all postgraduate years. The surveys were conducted from the fall of 2010 to the fall of 2011. Table 1 shows the number of residents and the percentage of female residents in each specialty as well as the percentage of respondents (total and female) by specialty. It also indicates which specialties were considered to be surgical and which were considered to be non-surgical. The non-surgical specialty with the lowest percentage of women was radiology, with 35% women. This is consistent with the national average of approximately 27%.¹⁸ We define surgical specialties to be those in which over 50% of rotations are operative. We chose a broad range of specialties to include both procedural (Obstetrics and Gynecology, Anesthesiology) and non-procedural (Internal Medicine, Pediatrics) as well as male-dominated (Radiology) and female-dominated (Pediatrics, Obstetrics and Gynecology) to ensure we had a diverse population of respondents.

All residents in the selected specialties were eligible to participate. The surveys were distributed at mandatory resident education meetings. Those who were not present received an email link to the survey on the same day as their program's meeting.

The survey was presented as a study in which residents could participate or not as they wished. The survey first assessed a proxy for stereotype threat, the extent to which residents perceived women to be negatively stereotyped in their specialty. We did this using three items of the following form: "Do you think residents in your program expect men or women to generally be better [participant's profession]?" For surgery, then, this item was worded "Do you think residents in your program expect men or women to generally be better surgeons?" There were seven response options ranging from 1 ("They expect women to be much better [participant's profession] than men") to 7 ("They expect men to be much better [participant's profession] than women") with a neutral option, 4 ("They expect men and women to be equally good [participant's profession]"). The items asked, in turn, about the views of other residents in the participant's program, the faculty in the participant's department, and the general public. We combined the three items into one measure, stereotype perception (internal consistency reliability $\alpha = 0.72$), which was the average of the three items.

In order to measure psychological health, we asked residents questions from two established, validated scales: the Dupuy Psychological General Well-Being Scale (DPGWB)¹⁹ and the Maslach Burnout Inventory (MBI).^{20–21} Those in the surgical residencies were asked all 22

^aThe degrees of freedom vary slightly throughout based on the number of participants who answered particular items within the survey.

questions of both scales, for a total of 44 items. Due to practical constraints, those in the non-surgical residencies were asked three items from the MBI Emotional Exhaustion scale and four items from the DPGWB. The selected items were those with the highest item-rest correlations within the MBI Emotional Exhaustion scale and the DPGWB, respectively. In all cases, we averaged the data from the DPGWB Scale with the data from the reverse-scored MBI Emotional Exhaustion data to create a composite score which is our main outcome measure, psychological health ($\alpha = 0.80$). Consequently, higher scores are indicative of better well-being. In both versions of the survey, the psychological questions were later in the survey than the stereotype perception items and were separated by several other scales.

Analytic Strategy

First, we performed descriptive statistics and *t* tests in order to assess whether residents were aware that women might be negatively stereotyped. Then, to try to understand any associations of type of specialty and stereotype perception with well-being, we created two regression models. The first examined the relationship among psychological health, gender, and type of specialty (surgical or non-surgical). The second added another predictor, stereotype perception, which we used as a proxy for stereotype threat.

To test our hypothesis, we sought to determine whether the independent variable, stereotype perception, had an effect among women and not among men, in particular among surgical residents.

All analyses were conducted in Stata/SE 10.1.

Results

Stereotype Perception

All residents, surgical or otherwise, perceived the general public to believe that men are better physicians than women, $t(373)=13.46$, $P<0.001$. They also perceived faculty to endorse this stereotype, $t(373)=7.82$, $P<0.001$. When it came to their perception of other residents, though, surgeons and non-surgeons' views differed. The surgical residents perceived other residents to be stereotyped against women, $t(144)=6.19$, $P<0.001$, whereas the non-surgical residents did not perceive their colleagues to maintain this belief, $t(227)=-0.84$, $P=0.40$. In addition, as shown in Figure 1 and Table 2, the stereotype was viewed more strongly in the surgical specialties. Residents in surgical specialties had higher levels of stereotype perception than did their non-surgical counterparts, $t(371)=-6.41$, $P<0.001$; $t(372)=-4.00$, $P<0.001$; $t(372)=-10.10$, $P<0.001$, respectively.

In the surgical specialties, where the stereotype about men and women's abilities was predicted to be most prevalent, we found that women had higher levels of stereotype perception than did their male colleagues. This was true when asked about all three target groups: residents, faculty, and the general public, $t(143)=3.41$, $P<0.001$; $t(144)=4.58$, $P<0.001$; $t(143)=4.91$, $P<0.001$, respectively. As shown in Figure 1 and Table 3, women in surgical training, on average, perceived the stereotype more strongly than did their male counterparts. Non-surgical residents' perception of the stereotype did not differ by gender

for any of the three target groups: residents, faculty, and the general public, all t s <1.45 , all P s $>.14$. As one would predict, there was a gender-by-specialty interaction $B=0.66$, $P<0.001$, such that in the surgical specialties women perceived the stereotype to a greater degree than men while there was no difference in stereotype perception by gender among non-surgical residents. The full results of this regression are shown in Table 4.

Within the surgical specialties, there was no difference in the level of stereotype perception for any of the target groups by post-graduate year (F s <1 , P s >0.43). Similarly, there was no difference in the level of stereotype perception for any of the three target groups between interns and all other residents (P s >0.21). There were no significant differences in responses to the stereotype perception items across surgical specialties (F s <1.2 , P s >0.26).

Psychological Health

Gender gap and specialty type—When we examined the relationship between gender and psychological health across all specialties, we found that there was a trend toward women having poorer psychological health, on average, than men, $t(372)=1.73$, $P=0.08$. We then assessed whether the gender gap in psychological health might be greater among surgical than non-surgical residents. Men and women in non-surgical specialties had similar levels of psychological health, $t(227)= -1.18$, $P=0.24$, whereas women in surgical specialties fared significantly worse, on average, than their male counterparts, $M=0.08$, $SD=0.80$ for women; $M=0.41$, $SD=0.88$ for men; $t(143)=2.27$, $P<0.05$. Thus the trend toward an overall difference between men and women's psychological health seems to be driven by the difference between the male and female surgical residents. As shown in Table 5, the gender-by-specialty type interaction was significant, $B=-0.41$, $P<0.01$. In summary, men and women in non-surgical residencies had similar psychological health whereas women in surgical specialties had significantly poorer psychological health than their male counterparts.

Gender gap and stereotype perception—Finally, we examined the relationship between stereotype perception and the gender gap in psychological well-being. Table 6 shows that, among surgical residents, there was an interaction between gender and stereotype threat, $B=-0.44$, $P<0.05$. Women higher in stereotype perception tended to have poorer psychological health, on average, than women lower in stereotype perception, $B=-0.44$, $P<0.01$. Stereotype perception did not predict psychological health for men, $B=0.015$, $P=0.92$. Moreover, women with higher stereotype perception tended to have poorer psychological health than men, $B=-0.52$, $P<0.05$. There was no gender difference in psychological health among surgical residents with lower stereotype perception, $B=0.17$, $P=0.49$.

In summary, women perceived a negative stereotype against them to a greater extent in the surgical fields than in the non-surgical fields. This perception predicted poorer psychological health for women in surgical training but did not predict psychological health among non-surgeons.

Repeating the same regression analyses for non-surgical residents showed no evidence for stereotype perception predicting non-surgical residents' health, interaction $B=-0.01$, $P=0.93$.

Men and women in non-surgical residencies had roughly similar psychological health, regardless of stereotype perception. Unlike the surgical residents, women in non-surgical specialties did not have differing psychological health by level of stereotype perception, $B=0.016$, $P=0.78$.^b

Discussion

We set out to examine how a factor, stereotype threat, might affect women's health in residency. We hypothesized that perhaps stereotype threat would be more prevalent in the surgical as compared to the non-surgical fields and that perhaps women higher in stereotype threat would suffer psychologically facing this chronic stressor. We found supporting evidence for both of these hypotheses.

First, we found that both surgical and non-surgical residents perceived others to hold a negative stereotype about women's ability to be physicians. Even though the non-surgical fields from which we sampled were roughly gender-balanced overall (170 women, 139 men), both male and female residents in these specialties perceived faculty and the general public to endorse this stereotype. Interestingly, these non-surgical residents did not perceive their fellow residents to endorse this stereotype. Surgical residents, on the other hand, perceived all three groups, residents, faculty, and the general public, to believe that men are better physicians than women. They perceived this to a greater degree than did their non-surgical colleagues, and female surgeons perceived this more than male surgeons. The surgical community, then, had higher levels of stereotype perception than the non-surgical community. Perhaps more importantly, this perception seems to lead women surgeons to inhabit a subjective world in which they believe their ability to be doubted by others.

Our second important finding was that women in surgical training who perceived the stereotype more strongly had poorer psychological health than women who perceived it less strongly. This shows that perceiving this negative stereotype is associated with poorer psychological health. The nature of our data does not, however, allow us to make a causal conclusion. It is possible that those with poorer psychological health are more likely to perceive the stereotype, and future prospective randomized trials could be used to examine whether there is a causal relationship between stereotype perception and psychological health.

Burnout, one of the factors in our psychological health measure, has been shown to be positively correlated with attrition.⁷ If stereotype threat is a predictor of burnout, it may also be a contributor to the attrition of women from surgery. Although few studies have examined differential attrition from surgery by gender, those that exist suggest that women are up to twice as likely as men to leave surgical training.^{10–12, 15–17} There are multiple factors that contribute to these decisions, but here we have uncovered one factor, stereotype threat, that may be important. Indeed, Burgess et al. recently argued that women's ascension into leadership positions in academic medicine may be impeded by stereotype threat.²² This may occur due to increased anxiety and cognitive load, both of which may undermine the

^bNeither did the non-surgical male residents, $B=-0.0050$, $P=0.97$.

performance of those facing stereotype threat.²³ Interventions targeted at minimizing the impact of stereotype threat may ultimately improve the retention of women.

One of the limitations of this study is that we collected self-report data at one institution. In addition, we made the assumption that stereotype perception can be used as a measure of stereotype threat as has been done in previous work.²⁴ Although this technique has not been previously used in academic medicine, it has been used in other educational settings. As with all survey studies, our data are also susceptible to recall bias.

In light of our findings, there are several possible actions that could be taken to improve women's experiences in medicine and in surgical training in particular. Validated empirical data establishing the lack of a gender gap theoretically might be able to negate the prevalence of the stereotype to some extent. Without that data, increasing the number of women in academic medicine, in particular in top leadership positions, may help positively influence the perception of women's ability in medicine.²² Interestingly, in General Surgery, which had almost as many female trainees as male trainees, there was no interaction of gender with stereotype perception. This suggests that perhaps simply increasing the number of women might mitigate the relationship between stereotype perception and psychological health. This is in agreement with the critical mass theory, first put forward in the 1970s by Kanter²⁵ and further popularized by Dahlerup.²⁶ The theory suggests that as a minority group grows and becomes a "large minority," the group gains sufficient power to be able to effect change. In addition, Dahlerup posits that as the number of minority members in a group increases, stereotyping decreases. There is controversy about what proportion constitutes a critical mass, but 30% is commonly cited. Indeed the German government has recently passed a law requiring that 30% of their legislators be female. Despite these data, residents in Pediatrics and Obstetrics & Gynecology, which are female-dominated, still perceived the stereotype against women in their specialties. However, they did not seem to experience a psychological toll from this stereotype. Thus, increasing the number of women may not obviate the stereotype, but it may alleviate its negative effects.

Although stereotype threat is well-studied in educational communities outside of medicine, there is minimal awareness of it among physicians and surgeons. It will take time to increase the number of women in surgery; however, increased awareness of stereotype threat among residents and faculty members may help decrease its negative consequences in the meantime. In addition to increasing awareness about stereotype threat, faculty members and residents can try to minimize the effects of stereotype threat by examining existing practices that might have differential impact on men and women. For example, it may be best to adjust the way in which feedback is given. In the setting of a negative stereotype, harsh criticism can be interpreted as being related to the stereotype rather than one's performance. Studies have shown that giving wise feedback, defined as setting high standards and providing assurance of one's ability to meet these standards, is more effective than either setting high standards alone or simply providing assurance that the learner can meet the standards.²⁷ In other words, when giving feedback to residents, it may be most effective to state explicitly that the feedback is given because the resident is being held to a high standard and that the resident is thought to be capable of meeting this standard.

Finally, we agree with others²² that interventions counteracting stereotype threat should be implemented and studied. Previous studies have shown that values affirmations, writing exercises in which learners write briefly about what they value, can alleviate the negative impact of stereotype threat.^{28–29} In addition, interventions to improve one's sense of belonging can positively impact those who are in the minority.^{30–31} Interventions such as these are targeted and low-cost, with long-lasting impact.^{29, 31}

In this work we build upon prior theoretical papers about the role of stereotype threat in medicine²² presenting compelling data suggesting the negative impact of stereotype threat on female surgeons' psychological health. In the future, it may be useful to explore other measures of mental health, such as the Beck Depression Inventory because this is a more specific measure than the DPGWB. In addition, it is worthwhile to explore the role that other stereotypes, such as those about race and religion, might also have on residents' mental health. Further studies, ideally performed across multiple institutions, could be helpful in understanding the potential impact of stereotype threat in residency training.

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Arghavan Salles contributed to the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, and approval of the manuscript. Geoffrey L. Cohen contributed to the design and conduct of the study; analysis and interpretation of the data; preparation, review, and approval of the manuscript. Claudia M. Mueller contributed to the design and conduct of the study and preparation, review, and approval of the manuscript.

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Figure 1.

Resident's perceptions of stereotype endorsement among residents, faculty, and the public. Among surgical residents, women were much more likely than men to believe that residents, faculty, and the public endorsed the stereotype. There was no gender difference in this belief among non-surgical residents.

Table 1

The Number of Total Residents and Female Residents for Each Specialty as Well as Overall Response Rates and Response Rates for Women by Specialty

Specialty	Number of residents, n	Number of female residents, n (%) [*]	Number of respondents, response rate, n (%)	Number of female respondents, n (%) [†]
Overall	476	230 (48)	384 (81)	189 (49)
Surgical	167	60 (36)	146 (87)	53 (36)
Cardiothoracic	8	2 (25)	5 (63)	1 (20)
General Surgery	47	23 (49)	40 (85)	20 (50)
Neurosurgery	17	3 (18)	14 (82)	2 (14)
Ophthalmology	11	5 (45)	11 (100)	4 (36)
Orthopedic Surgery	26	6 (23)	22 (85)	5 (23)
Otolaryngology, Head and Neck Surgery	20	8 (40)	18 (90)	8 (44)
Plastic Surgery	18	6 (33)	18 (100)	6 (33)
Urology	17	6 (35)	16 (94)	6 (38)
Vascular	3	1 (33)	2 (67)	1 (50)
Non-surgical	309	170 (55)	238 (77)	136 (57)
Anesthesia	69	29 (42)	60 (87)	27 (45)
Internal Medicine	109	48 (44)	74 (68)	36 (49)
Pediatrics	80	66 (83)	61 (76)	50 (82)
Obstetrics and Gynecology	17	15 (88)	16 (94)	14 (88)
Radiology	34	12 (35)	27 (79)	9 (33)

^{*} The percentage here represents the percentage of the residents in the specialty who are female.

[†] The percentage here represents the percentage of respondents in the specialty who are female.

Table 2

Stereotype Perception by Type of Specialty

	Residents*	Faculty*	General Public*
Surgical	4.43	4.50	5.52
Non-Surgical	3.97	4.18	4.39

*
p<0.001

Table 3

Stereotype Perception by Gender within the Surgical Specialties

Gender	Residents*	Faculty*	General public*
Male	4.25	4.25	5.21
Female	4.72	4.93	6.06

*
p<0.001

Table 4

Regression Analysis of Stereotype Perception by Gender, Specialty Type (Surgical or Non-Surgical), and the Interaction of Gender and Specialty Type

Variable	Coefficient	<i>t</i>	p Value
Gender	0.28	4.09	<0.001
Specialty type	0.70	10.16	<0.001
Gender x Specialty interaction	0.66	4.77	<0.001
Constant	4.47	132.74	<0.001

Table 5

Regression Analysis of Psychological Health by Gender, Specialty Type (Surgical or Non-Surgical), and the Interaction of Gender and Specialty Type

Variable	Coefficient	<i>t</i>	p Value
Gender	−0.097	−1.40	0.16
Specialty type	0.11	1.59	0.11
Gender x Specialty interaction	−0.41	−2.89	0.004
Constant	0.035	1.00	0.32

Table 6

Regression Analysis of Psychological Health by Gender, Stereotype Perception, and the Interaction of Gender and Stereotype Perception among Surgeons

Variable	Coefficient	<i>t</i>	p Value
Gender	−0.17	−1.02	0.31
Stereotype perception	−0.14	−1.30	0.20
Gender x Stereotype perception interaction	−0.44	−2.14	0.034
Constant	0.21	2.66	0.009