

Testing for Implicit Gender Bias among Plastic Surgeons

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Background: The aim of this study was to examine for the presence of implicit bias within the field of plastic surgery using a gender-specific Implicit Association Test (IAT), specifically looking at gender and career stereotypes.

Methods: A Gender-Career/Family Implicit Association Test was developed and distributed to the international plastic surgery community. Mean scores were calculated. Respondents were provided with an automated summary interpretation of their results, categorizing association for a particular grouping of gender and career/family as a little or no, slight, moderate, or strong. Respondents were also asked a series of demographic and post-IAT questions.

Results: Ninety-five responses were available for analysis. Overall, respondents showed a moderate-to-strong association of male + career / female + family compared with the reverse, which was statistically significant. Nearly half of the respondents thought they might have an implicit gender-related bias; however, 50% post-test would not change their behavior based on results, while 9.5% would.

Conclusions: Plastics surgeons may have an unconscious tendency to associate men with a career and women with a family. Further steps must be taken to increase awareness and mitigate the impact of implicit gender bias. (*Plast Reconstr Surg Glob Open* 2021;9:e3612; doi: [10.1097/GOX.0000000000003612](https://doi.org/10.1097/GOX.0000000000003612); Published online 7 June 2021.)

INTRODUCTION

Although overt bias and discrimination in medicine have been extensively highlighted, there has been a recent shift toward understanding the more pervasive culture of implicit gender bias.¹ This refers to the unconscious attitudes that may be present in an individual, which can negatively affect their thoughts and behavior. Patients may view their surgeons differently based on the surgeon's gender: female surgeons displaying more typically "feminine"

characteristics may be perceived by members of the public as less competent than their male counterparts.²

A tool that has been widely used for objective testing of implicit bias is the Implicit Association Test (IAT).^{3,4} The IAT is based on the premise that it is easier to link certain ideas if a mental connection already exists between the 2; for example, a person may readily associate the words "ice-cream" and "summer," or "snow" and "winter." A recent cross-sectional study examined 42,991 healthcare person responses to a Gender-Career IAT.⁵ Results suggested the presence of a strong implicit bias linking men with a career, and women with family. This is important because it may contribute to the gender inequalities present in medicine.

The aim of this study was to examine for the presence of implicit bias within the field of plastic surgery, specifically looking at gender and career stereotypes, in addition to furthering a greater understanding of the utility of such analysis.

METHODS

Recruitment and Demographics

Doctors and medical students with current or previous experience in plastic surgery were invited to participate.

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Recruitment was multimodal. During 2018–2019, a link to the IAT was distributed via plastic surgery society mailing lists, individual emails, word of mouth and relevant social media groups. There was no restriction by country or stage of training. Accompanying text advised that results would remain anonymous and informed participants that the study was to look for the presence of unconscious bias related to gender, defined as “subtle thoughts, attitudes and feelings that you may not be aware of, but that may influence your behaviour.” Respondents were asked to indicate answers to a series of demographic questions on age, race, country of work, sub-specialty area of interest, level of experience, and device type on which test is completed. Respondents were asked whether they thought they had hidden or unconscious gender biases. Ethics approval was not required because this was a non-clinical study that did not involve patients and the Helsinki Doctrine on Human Experimentation was not violated.

The IAT

A Gender-Career/Family IAT was developed by Project Implicit (<https://www.projectimplicit.net>) for the purposes of this study. During the test, the respondent was presented with a series of associations linking male/female words with career/family words. The participant was required to classify the words into 1 of the aforementioned categories by rapidly pressing 1 of the 2 keys on their computer or touch-screen device. For example, with the word “daughter” flashing up on the screen, the participant would be required to choose man or woman. For some, this began with man/career sharing a key and woman/family associations sharing a key; for others, the reverse. The study then changed the keys required to indicate a particular response and the participant was required to categorize further series of words. The premise underlying the IAT is that when words are easier to associate and share the same response key, performance speed increases; when the words are harder to associate and share the same response key, or, are easier to associate but share a different response key, performance time slows. The program measures latencies in response; any demonstration of preference for 1 group over another is derived from analysis of reaction times over a series of trials. After taking the test, respondents were provided with an automated summary interpretation of their results, in which any association for a particular grouping of gender and career/family was categorized as a little or no, slight, moderate, or strong.

Respondents were then asked a series of post-IAT questions, inviting them to reflect on their result. These included asking how they felt about their results, whether it would impact on their behavior, and any free-text thoughts.

For the purposes of analysis, a higher score in the IAT indicated a stronger man + career / woman + family than the reverse. Mean score, SD, and Cohen’s *d* statistic were calculated for the sample. To examine the relationship between IAT scores and demographics, the demographics were subsequently grouped as follows: gender (man, woman), race (White, non-White),

country (United States, elsewhere), experience (in medical school or in training, completed training), device type (computer, mobile).

A one-way analysis of variance was performed with self-reported gender-career bias (yes, no, not sure) as the independent variable and IAT as the dependent variable. Simultaneous multiple regression was performed, in which the IAT score was predicted from the listed predictors while controlling for all other variables listed. Where appropriate, statistical significance was taken when $P < 0.05$.

RESULTS

Of the 112 plastic surgeons or medical students that commenced the study, 95 completed the IAT and their results were analyzed (85% response rate). A majority of respondents were White (65.3%) and working in the United States (69.5%). Just under half of the respondents were women (47.4%) who had completed medical school but were in plastic surgery training (54.7%). Full demographic details are shown in Table 1.

Overall, the respondents showed a moderate-to-strong association of man + career / woman + family compared with the reverse, which was statistically significant. The mean IAT score was 0.25 (SD = 0.41), Cohen’s *d* = 0.61. This was considered to be a medium-to-large-effect size. The distribution of scores is shown in Figure 1.

As shown in Table 2, nearly half of respondents thought they might have an implicit gender-related bias; however, 50% post-test would not change their behavior based on results, whereas 9.5% would. One possible reason for this may be a lack of belief in the accuracy of the results: 14.7% felt the results were not accurate, whereas 32.6% were unsure. Moreover, 58.9% of respondents were not surprised by their results. A one-way analysis of variance revealed no significant difference in IAT score depending on self-reported bias of “no,” “yes,” or “not sure,” $F(2, 92) = 2.733, P = 0.068, \text{partial } \eta^2 = 0.057$. Results

Table 1. Participant Demographics

Age, y (mean/SD)	38.0/10.8
Race	
White	65.3%
Black	3.2%
Asian	18.9%
Hispanic	4.2%
Other/multiple	8.4%
Country	
USA	69.5%
UK	25.3%
Other	5.3%
Gender	
Women	47.4%
Men	52.6%
Experience	
Medical student	5.3%
In training	54.7%
<5years post training	9.5%
5–10 years post training	10.5%
11+ years post training	17.9%
Retired	2.1%
Device type	
Computer	71.6%
Touch screen	28.4%

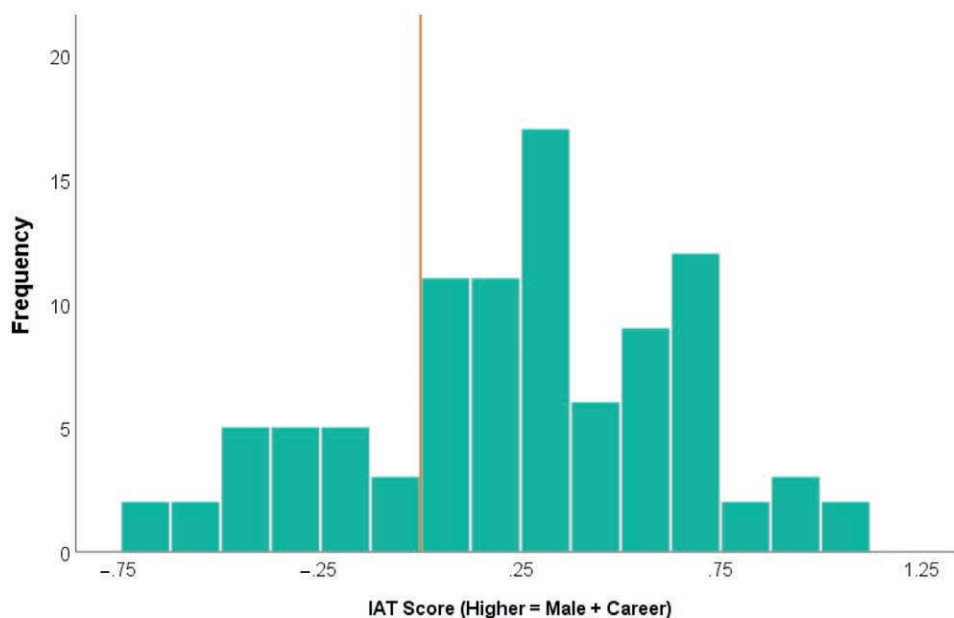


Fig. 1. Histogram showing distribution of IAT scores.

Table 2. Summary of Post-IAT Questions and Answers

Do you think you have hidden/unconscious gender bias?	
Yes	45.3%
No	31.6%
Not sure	23.2%
Were you surprised by your results?	
Yes	14.7%
No	58.9%
Not sure	15.8%
Missing data	10.5%
Do you believe your results were accurate?	
Yes	42.1%
No	14.7%
Not sure	32.6%
Missing data	10.5%
Will you change your behavior towards any of your plastic surgery colleagues after receiving these results?	
Yes	9.5%
No	50.5%
Not sure	27.4%
Missing data	12.6%

of multiple regression analysis, in which IAT score is predicted from an individual variable, while controlling for the other variables listed, are shown in Table 3. There were no significant results. Therefore, although there was a potential gender bias identified in the present cohort, this was not affected by any of the respondent characteristics surveyed—notably, gender, race, place of work, age, or stage of training.

However, post hoc tests revealed that those who responded “no” and those who responded “yes” to self-reported gender-career bias differed significantly, $M_{diff} = 0.22$, $P = 0.021$. Higher IAT scores (ie, more bias toward association of man + career / woman + family) predicts a greater likelihood of responding “no” than “not sure” about self-reported bias ($P = 0.005$, odds-ratio = 0.138).

Sample of free-text comments:

“Had the test started with Male and Family and Female and Career then the result would have been different. There was a learned association because of the order of

Table 3. Results of Simultaneous Multiple Regressions Predicting IAT Scores

Predictor	B	SE	P	95% CI	
Age	0.004	0.101	0.006	0.537	-0.008, -0.016
Race	0.076	0.089	0.092	0.411	-0.107, 0.259
Gender	-0.017	-0.022	0.086	0.839	-0.188, 0.153
Country	0.138	0.157	0.104	0.188	-0.069, 0.345
Experience	-0.261	-0.316	0.136	0.058	-0.531, 0.009
Device type	-0.061	-0.068	0.096	0.514	-0.252, 0.129
IAT block order	-0.088	-0.109	0.085	0.302	-0.257, 0.081

the test.” This sentiment appeared 8 times when man/career and woman/family presented first and was never commented on for the reverse.

“The pendulum has swung too far. There is a gender bias toward women in medicine. I have seen ‘women in medicine’ advocacy groups since I started in this field... I have yet to see a ‘white males in medicine’ advocacy group, which sounds ridiculous but holds some truth.”

“The question about ‘do I praise my male and female colleagues the same?’ has made me think that I am harsher on females, therefore I plan on addressing this.”

DISCUSSION

Results from the present study suggest an unconscious tendency of plastic surgeons to associate men with a career and women with a family, the implication being that the latter may be at the exclusion of a successful career. This has been extensively covered in previous literature and so after a brief comment, we will move on to the important issue of the utility of an IAT and why engagement with this test may have been lacking, as well as recommendations for future work.

Decisions and actions made through the lens of implicit gender bias, particularly one suggesting that women are less career-oriented than men, can place significant

occupational and lifestyle constraints on women plastic surgeons. As is widely known, women have traditionally been viewed as homemakers, earn less than their male counterparts, have lower visibility as plastic surgeons, and lack representation in leadership positions and academia.^{6–8} Women are underrepresented on the podium at plastic surgery educational meetings and are less likely to be considered in selection for prestigious awards.^{9,10} However, women are not less career-oriented than men: a study of 149,000 adults in 142 countries carried out by the International Labor Organization found that 70% of women would prefer to be working in paid jobs, rather than caring for their families, or doing both.¹¹

There is a balance to be struck: although women may be just as career-oriented as men, they are inherently different. For example, it is the woman who carries a pregnancy, undergoes the physical changes associated with this, delivers the child, and may breastfeed. Historically, women have had to adapt to the training demands placed on them by delaying having children until they have finished training, potentially increasing the risk of infertility, fewer children, and not having children at all.^{12,13} Moreover, women are the most likely caregiver to a family member or friend with a disability or chronic illness.¹⁴ In plastic surgery, we must support women in their dual role as parents and plastic surgeons, without considering that they are less committed to their careers than men.

All of this is widely known and so next, we consider the utility of the IAT itself. There is evidence that the process of formally self-testing for implicit bias may be beneficial for medical departments aiming to improve diversity and reduce the effects of implicit bias. Kallianos and colleagues invited radiology faculty members and prospective residents to take an IAT before residency interviews.¹⁵ After completing the tests, all respondents agreed that they were aware of their personal results when interviewing and 27% felt that this changed how they ranked candidates. Another study by Capers and colleagues examined implicit racial bias among admissions' faculty at I United States' Medical College.¹⁶ Results suggested that there were high levels of racial bias favoring White candidates, and a subsequent survey found that 68% of the 100 faculty respondents felt that the IAT might be helpful in reducing bias. One year after the results were made available, the next matriculating class was the most diverse in the history of that college. Although no direct causal link could be ascribed through the study, the authors suggested increased awareness among admissions' faculty of their own biases may have positively improved their interactions with candidates.

Furthermore, research suggests that automatic preferences and associated prejudice may be altered by changing the social context of the stigmatized groups.²⁰ Devine and colleagues created an “intervention” with five mutually-reinforcing strategies (stereotype, replacement, counter-stereotypic imaging, individuation, perspective taking, and increasing opportunities for contact), which they felt, when compared with a control group, showed encouraging evidence in promoting lasting reductions in implicit bias.²¹ Although it is unclear if these types of interventions applied

in the context of racial bias would also be effective for gender bias, in America, the Association of Women Surgeons' 2019 Task Force reported the practice of “counter-stereotyping,” suggesting that departments give conscious consideration to inviting women and ethnic minority speakers to grand rounds and other local conferences.¹⁷ Another study, focused on advancing female faculty careers, used a 20-minute educational presentation, which did have a small, but significant effect in reducing implicit gender bias among all participants, regardless of age or gender.¹⁸ In the UK, the Royal College of Surgeons of England has published guidance and developed an e-learning module aimed at understanding and reducing the impact of unconscious bias.¹⁹ This is particularly important given that 50% of respondents in the present study would not change their behavior in light of their IAT result alone.

This now lends us to the next, important part of the discussion. Given that the beneficial effect of raising awareness of implicit biases is widely recognized, why was there so little engagement with the IAT? There are, of course, the usual questionnaire-related barriers, including lack of convenience, lack of engagement with the topic, and lack of time. However, given that the efforts to distribute widely were significant, we must consider that this is a subject that people are happy to talk about, but do not wish to actively confront in themselves. There is a multitude of research highlighting that we are more likely to recognize biases in others, than in ourselves.²⁰ Moreover, the more firmly-held an individual's belief about the widespread presence of bias, the more likely they are to see this bias in others, but not themselves. Therefore, it may be that although plastic surgery as a community has been extremely vocal about recognizing and articulating the presence of bias, at an individual level it is perhaps easier to ascribe that bias to others.

Indeed, most healthcare professionals may consider that they serve the public on a daily basis, fairly and in an overwhelming positive way.²¹ For those who actively consider themselves to be “open-minded,” or advocates for equality in its various forms, the realization that biases may be nonetheless be a part of their nature may challenge their perception of self. This concept is nicely summarized in an article by Marcelin and colleagues, outlining that the actual impact of any behaviors may be entirely different to what was intended. An individual must, therefore, accept—regardless of wanting not to cause harm—that their words or actions may, in fact, do just that. They must demonstrate a commitment to changing their behavior, despite great belief that their behavior was not intended to cause harm.

We, therefore, suggest that individuals and institutions looking to combat gender bias consider the following:

- Use of a gender-specific tool such as the IAT to increase awareness of possible implicit biases (see following link for IAT website and further information: <https://www.projectimplicit.net>). For example, as part of a departmental induction, or before situations where biases have the potential to impact on outcomes, such as interviewing prospective candidates or performing an appraisal.
- Given that, in our study, 50% of people would not change their behavior in light of an IAT result,

encourage the process of reflecting constructively on results. Understand that the *effect* of any actions may be separate and distinct from the *intent*, and reflect on situations where inadvertent harm may have been caused as a result of implicit bias.²²

- Conduct a staff survey to ascertain experiences of inclusivity and be transparent about the results and areas for improvement.
- Engage in the process of active counter-stereotyping. Seek out women speakers for seminars, grand rounds and conferences; ensure that women are represented in leadership positions.
- Consider ways that departmental policies may be inadvertently disadvantaging female surgeons, particularly in times of a pandemic, which many feel has been “gender-regressive”²³:
 - Are maternity leave policies transparent and fair? Do they allow for shared paternal responsibility? Could childcare responsibilities be aided (eg, on-site childcare facilities)?
 - Is flexible working an easily accessible option that does not incur huge financial penalties?
 - Are their provisions to ensure women do not miss out on educational opportunities (eg, avoiding poorly-timed evening/weekend sessions)?

Limitations

We were unable to estimate the total number of recipients of the survey. Emails were sent to program directors and coordinators to forward to their faculty and residents, but it is unknown how many passed the survey on to the intended recipients. Furthermore, multimodal recruitment tactics were employed, such as social media posts and word of mouth; therefore, it is difficult to estimate the true response rate. However, the overall number of responses was low and limits the generalizability of the findings. We have assumed that “career” means successful work life, and “family” likely means home life at the exclusion of a career, which may not be the case. Moreover, the results presented cannot determine whether implicit gender bias does, or does not, exist among plastic surgeons. Even if the cognitive association is there, this does not mean that stereotyping of women as family-oriented and men as career-oriented would necessarily lead to any negative behavior. Furthermore, considering the reverse, there is the possibility that an IAT score suggesting neutral bias could be falsely reassuring. Blanton and colleagues established that individuals who are behaviorally neutral tend to have positive IAT scores and that current scoring conventions do not necessarily take this into account.²⁴

However, we found the IAT to be a quick, easily administered tool and it is certainly a useful means of beginning a conversation about implicit gender biases.

CONCLUSIONS

Results of the present study suggest that plastic surgeons may have an unconscious tendency to associate men with a career and women with a family. The study highlights that

there may be a reluctance to engage in the process of tackling implicit bias on an individual level within the Plastic Surgery community. Increasing awareness of implicit gender bias may be the first step in combatting gender inequality, but concrete steps need to be made by individuals and the systems they work in to move toward a meaningful change.

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