

A simple strategy to reduce stereotype threat for orthopedic residents

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Background: Stereotype threat, defined as the predicament felt by people in either positive or negative learning experiences where they could conform to negative stereotypes associated with their own group membership, can interfere with learning. The purpose of this study was to determine if a simple orientation session could reduce stereotype threat for orthopedic residents.

Methods: The intervention group received an orientation on 2 occasions focusing on their possible responses to perceived poor performance in teaching rounds and the operating room (OR). Participants completed a survey with 7 questions typical for stereotype threat evaluating responses to their experiences. The questions had 7 response options with a maximum total score of 49, where higher scores indicated greater degree of experiences typical of stereotype threat.

Results: Of the 84 eligible residents, 49 participated: 22 in the nonintervention and 27 in the intervention group. The overall scores were 29 and 29.4, and 26.2 and 25.8 in the nonintervention and intervention groups for their survey responses to perceived poor performance in teaching rounds ($p = 0.85$) and the OR ($p = 0.84$), respectively. Overall, responses typical of stereotype threat were greater for perceived poor performance at teaching rounds than in the OR ($p = 0.001$).

Conclusion: Residents experience low self-esteem following perceived poor performance, particularly at rounds. A simple orientation designed to reduce stereotype threat was unsuccessful in reducing this threat overall. Future research will need to consider longer-term intervention as possible strategies to reduce perceived poor performance at teaching rounds and in the OR.

Contexte : La menace du stéréotype, définie comme un malaise ressenti chez des individus en situation d'apprentissage positive ou négative où ils pourraient se conformer au stéréotype négatif associé à leur groupe d'appartenance, peut nuire à l'apprentissage. Le but de cette étude était de déterminer s'il est possible de réduire la menace du stéréotype chez des résidents en orthopédie au moyen d'une simple séance d'orientation.

Méthodes : Le groupe soumis à l'intervention a assisté à 2 séances d'orientation visant leurs réactions possibles à un piètre rendement perçu lors de cours cliniques ou au bloc opératoire. Les participants ont répondu à un sondage de 7 questions typiques concernant la menace du stéréotype pour évaluer leurs réactions à de telles expériences. Les questions comportaient 7 choix de réponse, pour un score total maximum de 49; les scores les plus élevés indiquaient un degré plus marqué d'expériences concordant avec la menace du stéréotype.

Résultats : Parmi les 84 résidents admissibles, 49 ont participé : 22 dans le groupe non soumis à l'intervention et 27 dans le groupe soumis à l'intervention. Les scores globaux ont été de 29 et de 29,4, et de 26,2 et 25,8 dans les groupes non soumis à l'intervention et soumis à l'intervention ($p = 0,85$), respectivement, pour leurs réponses au sondage liées à un piètre rendement perçu lors des cours cliniques ou au bloc opératoire. Dans l'ensemble, les réponses typiques de la menace du stéréotype ont été plus marquées en ce qui concerne un piètre rendement perçu lors des cours cliniques qu'au bloc opératoire ($p = 0,001$).

Conclusion : Les résidents ont une faible estime d'eux-mêmes après un piètre rendement perçu, particulièrement lors des cours cliniques. Une simple séance d'orientation conçue pour réduire la menace du stéréotype n'a pas réussi à l'atténuer dans l'ensemble. Il faudra approfondir la recherche pour envisager une intervention à plus long terme comme stratégie envisageable pour réduire la perception d'un piètre rendement lors des cours cliniques et au bloc opératoire.

Surgical residents come from diverse backgrounds, posing many challenges, including the need for creating an effective learning environment. While new models of residency training are emerging, the individual needs of residents must always be considered. If individual needs are not addressed, learners may not take full advantage of their learning opportunities or even fail in their pursuit.

There are many possible explanations for why some students don't learn or perform well in the training environment, including a phenomenon called stereotype threat.¹ Stereotype threat is defined as the predicament felt by people in situations, whether positive or negative learning experiences, where they could conform to negative stereotypes associated with their own group membership.² Stereotype threat can potentially affect members of any group about whom a negative stereotype exists. The threat is cued by the mere recognition that a negative group stereotype could apply to oneself in a given situation.² Well-studied examples of stereotype threat include African Americans performing worse on tasks described as assessing intelligence,³ whites performing worse on tasks described as assessing natural athletic ability⁴ and women performing worse on math-related tasks.⁵ For those who have surmounted obstacles to enter the domain (for example, African Americans in higher learning and women in math studies), stereotype threat can be particularly self-threatening.²

Stereotype threat adversely affects performance by 3 distinct yet interrelated mechanisms: a physiologic stress response that directly impairs mental processing, a tendency to more actively monitor performance and efforts to suppress negative thoughts and emotions in the service of self-regulation.⁶ These mechanisms combine to reduce performance on cognitive and social tasks.⁷ Moreover, when the stereotype threat is chronic, "disidentification,"² an adaptation that undermines sustained motivation, can occur, leading to withdrawal from learning opportunities. For surgical residents this withdrawal might manifest as being less willing to participate in the operating room (OR) and teaching rounds and/or reduced motivation to address perceived knowledge or technical gaps. Stresses from poor performance in turn may lead to burnout and psychiatric morbidity.⁸

In a demanding and stressful program, like that faced by orthopedic surgery residents, the activation of stereotype threat could potentially jeopardize students' performance and affect their aspirations. The longstanding underrepresentation of women and minorities in orthopedic residency programs⁹ may set the stage for stereotype threat. Simple interventions, such as sharing of negative learning experiences, have been shown in other situations to reduce stereotype threat.² The purpose of this study was to evaluate a simple orientation to reduce stereotype threat in an orthopedic surgery residency program. In particular, the study evaluates whether an orientation provided junior residents with enhanced positive attitudes toward learning.

METHODS

Participants

The study participants were recruited from the 5-year orthopedic surgery residency program at the University of Toronto from 2003 to 2007. In September of 2003 all of the postgraduate year 1 (PGY1) residents had 2 opportunities to attend a 2-hour orientation session and were thus classified as the intervention group. Residents who were in PGY2–5 in the first year of the initiative were placed into the nonintervention group. From 2004 to 2007, as PGY1 residents entered the residency program the number in the intervention group increased with a concomitant drop in the nonintervention group as residents moved up in PGY level.

Intervention

The orientation session was provided to PGY1 residents by the senior author (J.G.W.) in September and January of each year. Thus, in first year, residents in PGY1 received the intervention and those in PGY2–5 did not receive the intervention. In second year, residents in PGY1 and PGY2 formed the intervention group and those in PGY3–5 formed the nonintervention group. By the fifth year, the PGY1 residents received the intervention and all residents in PGY1 through PGY5 formed the intervention group. The session was not didactic but highly interactive based on individual experience to promote the key concepts.¹⁰ During the meeting, the senior author emphasized the high expectations of the orthopedic surgery training program and the high probability of residents' success. The senior author described common feedback from past residents as well as his own experiences of being at rounds and in the OR. The session included an open discussion of the residents' recent experiences in the OR and rounds and their responses to those experiences. While some of those experiences may have been negative, many simply emphasized a gap in knowledge or experience. The specific focus was how residents may have felt after their perceived poor performance: incapable, stupid or harassed, with a wish to avoid future exposure. The orientation ended with a discussion of 2 simple potential strategies to respond to perceived poor performance during learning experiences in teaching rounds and the OR: talking with peers (to understand similarity of experiences and share responses to those experiences) and encouragement to form study groups early in residency whereby group members can learn together, share experiences and support each other.

Outcomes

Between 2003 and 2007, all residents were asked to complete a questionnaire focusing on elements of stereotype threat.¹¹ The anonymous questionnaire comprised 2 sections inquiring

about experience in teaching rounds and in the OR, with the same 7 questions in each section. For each statement in the questionnaire, (e.g., your performance made you feel you were not going to succeed at orthopedics), the resident was asked to indicate their agreement using a scale of 1 (strongly disagree) to 7 (strongly agree). Where appropriate, the scores were revised (i.e., your performance made you want to go and read about the topic) so that higher scores indicated a more negative response to the perceived poor performance. Thus the scores ranged from 7 to 49, and the maximum score of 49 represented the most negative experience.

In 2009, an email was sent to all residents asking them to comment on the following questions:

- 1) Do you remember attending a meeting/orientation session in the first year of your residency program?
- 2) Did you feel that this meeting was valuable? If yes, why?
- 3) Do you remember the content of the meeting? If yes, what?
- 4) Do you have any suggestions that would improve that orientation meeting?

Statistical analysis

We compared the total questionnaire scores for teaching rounds and the OR as well as each question in the survey between the intervention and nonintervention groups. For residents who responded more than once (i.e., in subsequent years), we used the average of their responses (i.e., questionnaire score at time 1, time 2 and time 3). Paired *t* tests were performed to determine whether the nonintervention group differed from the intervention group in their scores. For each question, a score from 1 to 7 indicated the

level of the negative emotion associated with the perceived poor performance; the higher the score, the greater the level of negative emotion. As noted, for question 7 we inverted the score so that strongly agree was scored as 1 and strongly disagree was scored as 7. Again, for each resident we took the average of their responses for the analyses.

We also used the summary intervention and nonintervention group scores to determine if the level of emotion typical of stereotype threat experienced at rounds differed from that experienced in the OR.

RESULTS

Eighty-four orthopedic surgery residents were invited to participate in this research. Forty-nine (58%) of them responded to the survey at least once: 22 from the nonintervention group and 27 from the intervention group.

Comparison analysis

Paired *t* tests revealed no significant differences between the groups regarding their overall total scores on both teaching rounds ($p = 0.85$) and OR ($p = 0.84$) surveys. When each question was analyzed individually, no significant differences were found between the intervention and nonintervention groups (Table 1).

Collapsed group analysis

We found a significant difference ($p = 0.001$) in total questionnaire scores between responses to rounds versus responses to the OR, with the experience of rounds eliciting higher overall threat scores (Table 2).

Scores of 4.0 and below indicate a lack of agreement with statements about emotions typical of stereotype threat, and scores above 4.0 indicate high agreement. After a perceived poor performance, on average residents were more likely to want to go and read about the topic, to feel ashamed/embarrassed and to feel less capable than other residents at their stage, but they were less likely to feel unsuccessful or angry, to want to avoid the situation or to hate their jobs. The statement that received the strongest

Table 1. Comparison analysis between nonintervention and intervention groups

Category	Group; mean score		<i>p</i> value
	Nonintervention	Intervention	
Rounds			
Total score	28.2	28.6	0.85
No success	3.3	3.5	0.79
Angry	3.3	3.4	0.80
Not capable	4.5	4.2	0.54
Ashamed	4.6	4.9	0.59
Avoid	3.6	4.1	0.34
Read	0.7	0.8	0.70
Hate job	3.1	2.9	0.74
Operating room			
Total score	25.6	25.1	0.84
No success	3.3	3.8	0.35
Angry	2.8	3.2	0.36
Not capable	4.0	3.9	0.79
Ashamed	4.5	4.4	0.86
Avoid	2.9	2.1	0.13
Read	1.3	1.2	0.89
Hate job	2.7	2.4	0.43

Table 2. Collapsed group analysis

Category	Group; mean score		<i>p</i> value
	Rounds	Operating room	
Total score	28.4	25.4	0.001
No success	3.4	3.6	0.27
Angry	3.4	3.0	0.10
Not capable	4.3	3.9	0.038
Ashamed	4.7	4.5	0.045
Avoid	3.9	2.5	0.001
Read	0.8	1.3	0.006
Hate job	3.0	2.5	0.008

level of endorsement from the residents was “Your performance made you want to go and read about the topic,” with a mean score of 0.8/7 and 1.3/7 for rounds and the OR, respectively, indicating high agreement.

Response to follow-up email

Seventeen (35%) of the residents in the intervention group responded to the email at the end of our study. Most of them (13 of 17) remembered attending the meeting, 11 of 17 accurately recalled the content of the meeting, and 12 of 17 felt it was valuable to their training. Only 1 resident who attended the meeting did not feel it was valuable. Of those who felt the meeting was valuable, the common sentiments were that “it confirmed that certain feelings of ineptitude that one will experience during residency are common and experienced by the majority;” that it “encouraged us to continue sharing experiences with each other;” and that “it is more important to learn from [the inevitable adverse experiences] than to convince yourself that you suck.” A recurrent suggestion from the residents was the desire to receive follow-up sessions throughout their training.

DISCUSSION

This research demonstrated that residents have more adverse learning attitudes in response to their experience at rounds than the OR. A simple 2-hour orientation did not enhance their positive learning attitudes. While perceived poor performance made them feel incapable and ashamed, it also led to the perceived need to read more.

Training culture is thought to include, in addition to the formal curriculum, an informal and hidden curriculum.¹⁰ The formal curriculum is the structured learning opportunities provided during a surgical residency. The informal curriculum is the nonstructured, opportunistic, personal interaction between teacher and learner. The informal curriculum is particularly relevant in surgery, as the process by which the wisdom of clinical practice is imparted and a trainee’s knowledge and skills become situated in the context of daily work. This informal curriculum, while imperative to surgical training, allows the transmission of behaviours, beliefs and attitudes — the so-called “hidden curriculum.”¹¹ The hidden curriculum is a function of the implicit values held by the institutions as a whole and of the individual surgical educators and allied health professionals working in the trainee’s learning environment.

While arising even in response to a perceived gap in knowledge or experience in positive learning experiences, the risk of stereotype threat may be worsened in negative learning experiences. Gofton and Regehr¹¹ warn that the messages of the hidden curriculum are likely central in the perpetuation of particularly negative stereotypes. For example, a potential stereotype is that orthopedic surgeons

must have substantial physical strength to perform their duties.¹² Women may be less encouraged by attending surgeons through this informal curriculum owing to fewer opportunities to perform procedures, to be the first assistant in the operating suite and to be involved in the running of a surgical service.¹³ Other evidence suggests that some women are deterred from surgery by impressions regarding the lifestyle of orthopedic surgeons (e.g., no time for family, personal life), and a lack of available role models (i.e., few female mentors).¹² Logel and colleagues¹⁴ reported that in domains in which women are negatively stereotyped, interacting with a sexist man can further trigger social identity threat, thereby undermining women’s performance. Perceived sex discrimination and sexual harassment while on surgery rotations have been suggested to contribute to the lower rate of selection of orthopedic surgery by female medical students.^{12,15} Owing to the consistent under-representation of certain minorities, stereotypes entrenched and perpetuated by the hidden curriculum as well as more blatant triggers, the daily culture of surgical residency provides ample opportunity for stereotype threat and disidentification. While much of the focus has been on women, the literature would support that any stereotype to which individuals self-identify places them at risk for stereotype threat.² The impact of stereotype threat on learning could be substantial and raises the need for potential mitigating strategies.

Strategies that emphasize blurring group differences have been shown to reduce stereotype threat. Rosenthal and Crisp¹⁶ reported that having women focus on overlapping characteristics between sexes (a blurring intergroup bias intervention) before completing a test allowed them to answer more math questions correctly. Cohen and colleagues¹⁷ demonstrated that a brief in-class writing “self-affirmation” assignment reinforcing individual self-worth through reflecting on positive group memberships improved the grades of African American students and reduced the racial achievement gap by 40%.¹⁷ According to these authors, a small reduction in psychological threat can set off a recursive cycle where a slight improvement in subsequent performance can lessen performance-inhibiting threat, thereby leading to sustained or improved performance over time. Teaching about stereotype threat (i.e., specifically informing individuals that their test anxiety may be due to stereotype threats) also has the potential to improve women’s performance on math tests.¹⁸ Another possible strategy is the power of optimistic teachers who convince students of their potential by providing successful performance challenges, thereby reinforcing the ability of students to succeed and in turn reducing the belief that success is tied only to innate abilities.² Finally, simply informing participants that membership in specific subgroups has no effect on task ability can eliminate stereotype threat in testing the leadership aspirations of women.^{18–20}

The success of these simple interventions prompted the

development of an orientation session for junior residents. The orientation focused on the probable success of the residents. The orientation session also provided opportunities for the residents to focus on commonalities among their training experiences, including the experience of the senior surgeon. Finally, the session included an open discussion of the residents' recent positive and negative experiences in the OR and teaching rounds in an attempt to blur group differences and allow for self-affirming revelations. However, the findings of this study indicate that while our intervention from a senior staff member contained many of the elements of previously successful strategies, our brief intervention was not sufficient in reducing orthopedic residents' negative experiences at rounds and in the OR. Because most of our study participants remembered the orientation and felt that it was valuable to their training, it may be that enhancing the content of the intervention and/or increasing the frequency (which was also desired by our residents) of such sessions could have a greater impact with sustained effects. Most prior research on stereotype threat has focused on performance in exam conditions on a single occasion with almost no attention to performance over the long term. Thus, a key component of the future interventions will be the need to consider repeated long-term exposure.

Between the 2 components of the training program assessed, we found that significantly higher stereotype threat scores were elicited about rounds. A previously discussed model proposed by Schmader and colleagues²¹ identified pathways by which negative self-relevant stereotypes could impair working memory and increase physiologic stress responses that directly impair cognitive performance. The authors suggested these pathways could play a substantial role in real-world performance contexts, such as interviews or public speaking. Future investigation of stereotype threat in the orthopedic surgery training environment should pay particular attention to experiences during rounds. The results of our study, feelings of low self-worth but not feelings of anger toward the teacher, suggest that learners tend to internalize their perceived poor performance. Mentors and even the residents themselves must be cognizant of the messages they convey to each other, how these messages affect the training environment and the powerful psychological effects on learning.¹ In addition to focusing on residents' responses to learning experiences, educators should also be the focus of improved pedagogical techniques. "Grilling" residents during rounds may not be the most effective method of transmitting information and encouraging learning.

Limitations

Our study has several potential limitations. First, our stereotype threat questionnaire was not tested for reliability and validity. The questionnaire, however, had face validity because it assessed the important elements typical of stereotype threats.² Second, the stereotype threat questionnaire

was our only outcome measure for testing the effects of our intervention. Additional outcome measures would be objective measures of performance in rounds, in the OR or on standardized evaluations, such as the orthopedics in-training examination. Qualitative methods are also needed to gain greater insight into residents' learning experiences. Third, a before and after study is less rigorous than other designs. While no major changes occurred in the training program during the study period, factors other than stereotype threat may have been active and responsible for changes. However, we felt randomly assigning individuals at the same PGY level would likely lead to substantial contamination between the intervention and nonintervention groups, minimizing the ability to detect a difference. Fourth, our intervention was directed at the residents rather than the staff. However, changing the attitudes and behaviour of staff was considered less likely to be successful. Furthermore, even subtle cues — the "hidden" curriculum¹¹ or "the threat in the air"²⁰ — that are probably impossible to eliminate are likely to have a dramatic effect on resident performance. Finally, stereotype threat may occur even in response to positive learning experiences. Thus, reducing the impact of the hidden curriculum on residents seems more likely to be a successful strategy in reducing stereotype threat. We did not directly measure stereotype threat by subgroup because we were uncertain which threat might apply to which subgroup (e.g., sex, race, foreign-trained physicians). Furthermore, the strategies were directed toward mitigating the effect of perceived poor performance associated with learning, irrespective of the source of those emotions. Also, the intervention was directed at all residents and thus the small number of residents vulnerable to stereotype threat may be hidden in the larger group of residents. Finally, not all residents attended both sessions, possibly leading to dilution of the intervention. However, this strategy reflected the reality of most training programs in which residents attend educational opportunities intermittently based on clinical commitments and call schedules.

CONCLUSION

We found that residents experience low self-esteem following perceived poor performance, particularly at rounds. A simple orientation designed to reduce stereotype threat, however, was unsuccessful in reducing this threat overall. Future research will need to use other methods, such as qualitative research, to better understand residents' experiences and to consider longer-term intervention as a possible strategy to reduce negative experiences at teaching rounds and in the OR.

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Contributors: J.G. Wright designed the study. E. Gomez acquired the data. Both authors analyzed the data, wrote and reviewed the article and approved the final version for publication.

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