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Do Contact and Empathy Mitigate Bias Against Gay and Lesbian People Among Heterosexual Medical Students? A Report from Medical Student CHANGES

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Abstract

Purpose—A recent Institute of Medicine report concluded that lesbian and gay individuals face discrimination from health care providers and called for research on provider attitudes. Medical school is a critical juncture for improving future providers' treatment of sexual minorities. This study examined both explicit and implicit biases against lesbian women and gay men among medical students, focusing on two predictors of such bias, contact and empathy.

Method—This study included the 4,441 heterosexual first-year medical students who participated in the baseline survey of the Medical Student Cognitive Habits and Growth Evaluation Study (CHANGES), which employed a stratified random sample of 49 U.S. medical schools in fall 2010. The researchers measured explicit attitudes toward gay and lesbian people using feeling thermometer self-assessments, implicit attitudes using the Implicit Association Test (IAT), amount and favorability of contact using self-report items, and empathy using subscales of the Interpersonal Reactivity Index.

Results—Nearly half (45.79%; 956/2,088) of respondents with complete data on both bias measures expressed at least some explicit bias and most (81.51%; 1,702/2,088) exhibited at least some implicit bias against gay and lesbian individuals. Both amount and favorability of contact predicted positive implicit and explicit attitudes. Both cognitive and emotional empathy predicted positive explicit attitudes, but not implicit attitudes.

Conclusions—The prevalence of negative attitudes presents an important challenge for medical education, highlighting the need for more research on possible causes of bias. Findings on contact and empathy point to possible curriculum-based interventions aimed at ensuring high-quality care for sexual minorities.

A recent Institute of Medicine (IOM) report noted that gay and lesbian individuals “face discrimination in the health care system that can lead to an outright denial of care or to the delivery of inadequate care.”^{1(p62)} Biases among health care providers may help explain a number of observed health disparities faced by these sexual minority groups, such as possible higher risks for cancer, HIV/AIDS, and eating disorders as well as less use of preventive health services.^{1,2} As a result, the IOM report called for more research on provider attitudes toward gay and lesbian individuals as a next step toward addressing unequal treatment. Given that medical schools represent a critical context in which lay people become providers, understanding the attitudes of heterosexual students entering the medical profession is an important aspect of building a medical school curriculum that can effectively address biases and help ensure future physicians will provide high quality care for sexual minorities.

In this study, we aimed to assess the amount of bias against gay and lesbian people (i.e., less favorable attitudes toward gay and lesbian people relative to heterosexual people) among heterosexual first-year medical students and to investigate factors that may predict such bias. We examined both explicit and implicit attitudes. *Explicit* attitudes are consciously

controlled and are traditionally assessed using self-report measures such as feeling thermometers.^{3,4} *Implicit* attitudes are automatic responses that often occur outside conscious awareness^{5,6} and are commonly measured using response-latency tasks such as the Implicit Association Test (IAT).⁷ Implicit attitudes help explain behavioral outcomes that cannot be predicted from explicit attitudes alone.⁶ For example, implicit racial bias has been shown to predict provider decisions and demeanor that result in lower quality of care for black patients.^{8–12} Explicit attitudes are susceptible to social desirability concerns, so they often appear more favorable than implicit attitudes.^{5,13}

Explicit negative attitudes toward homosexuality have declined (but have not disappeared) in recent years,¹⁴ particularly among well-educated individuals.¹⁵ However, even when explicit bias becomes socially unacceptable, implicit bias tends to remain prevalent.^{16–18} We therefore predicted that implicit bias against gay and lesbian individuals would be pervasive among heterosexual first-year medical students, even those who avoid expressing explicit bias.

We focused on two characteristics that may predict bias among medical students—prior contact with sexual minorities (contact) and self-reported empathic tendencies (empathy).^{19,20} One of the most robust predictors of lower levels of bias is previous experience with members of the group in question.²¹ Both greater frequency of contact (quantity or amount) and more positive contact (quality or favorability) predict more positive intergroup attitudes.^{22,23} Even brief contact can mitigate bias against sexual minorities.^{19,22} In one study at a single medical school, encouraging direct contact by bringing gay and lesbian speakers into the classroom resulted in reduced levels of explicit anti-homosexual attitudes.²⁴ Research with other groups also suggests that intergroup contact can mitigate implicit biases.²⁵ In line with past work, we hypothesized that both amount and favorability of prior contact would be associated with lower levels of explicit and implicit bias.

Empathy is a second consistent predictor of positive attitudes toward a range of groups.²⁶ There are two types of empathy—cognitive and emotional.^{27,28} *Cognitive* empathy involves trying to think about things from another's perspective (perspective-taking); *emotional* empathy reflects having compassionate and sympathetic feelings (empathic concern).²⁹ Both cognitive and emotional empathy can be measured as traits or states and relate to positive intergroup attitudes in general.^{26,30,31} More specifically, there is correlational evidence from college student samples that both cognitive and emotional empathy predict positive attitudes toward gay and lesbian targets.²⁰ Therefore, we hypothesized that higher scores on trait measures of perspective-taking and empathic concern would predict lower levels of bias, both explicit and implicit, in heterosexual first-year medical students.

Method

This study was approved by the institutional review boards of the Mayo Clinic and the University of Minnesota.

Sample

This study uses baseline data collected as part of the Medical Student Cognitive Habits and Growth Evaluation Study (CHANGES), a national longitudinal study of medical students who matriculated in fall 2010 at U.S. medical schools accredited by the Liaison Committee on Medical Education. CHANGES is designed to examine changes in medical students' well-being, experiences, and attitudes between their first year (baseline) and their last year (data not yet available) of medical school.

In the first stage of our sampling design, we stratified medical schools by geographic region (6 regions) and public/private status. Because there were no private schools in the Northwest region, there were 11 strata. Schools were sampled from each stratum in roughly the same proportion (43%) using a proportional to (first-year class) size sampling methodology,³² resulting in our targeted sample of 50 schools. One military school was excluded because it had highly unique features, including acceptance policies, curriculum structure, timing, and student characteristics.

In the second stage of sampling, we sent recruitment materials via e-mail or postal mail to the 5,823 first-year students at these 49 medical schools whose e-mail address or mailing address we were able to obtain from the Association of American Medical Colleges (collected via an item about CHANGES added to the Matriculating Student Questionnaire in 2010), snowball sampling, and a list we purchased from a vendor (for details, see Supplemental Digital Figure 1 at [LWW INSERT LINK]). The students who volunteered to participate completed an online questionnaire during their first semester of medical school (between October 2010 and January 2011). All 4,732 respondents (81% response rate; 55% of the 8,594 first-year students enrolled at the 49 sampled schools) gave informed consent and received a \$50.00 incentive. This response rate is comparable to those of other published studies of medical students.³³

As part of the larger CHANGES survey, respondents indicated their age, gender, race/ethnicity, and sexual orientation. For this report, we excluded respondents who marked "bisexual," "homosexual," or "other" for their sexual orientation, as well as those who chose not to respond to that question, leaving only the 4,441 respondents (94%) who marked "heterosexual."

We categorized respondents who identified with multiple racial/ethnic groups into just one of those groups, in the following order: black, Hispanic/Latino, South Asian, East Asian, and white. In conducting the main analysis, we excluded respondents who did not reply to this question as well as respondents from racial/ethnic groups beyond the five listed because there were too few of them to support generalizable conclusions.

Measures

Explicit attitudes toward gay men and lesbian women—We measured explicit attitudes using a validated feeling thermometer technique for assessing social attitudes, in which respondents indicated their feelings toward certain groups of people by moving a slider.^{3,4} Numbers along the side of the thermometer ranged from 0 ("very cold or unfavorable") to 100 ("very warm or favorable"). To help guide responses, the thermometer

was marked in increments of 10, but responses were recorded to an integer degree of precision. Respondents completed separate thermometer measures for “gay men,” for “lesbians,” and for several groups pertinent to other goals of the larger study, including racial groups (e.g., “Caucasians”).

The separate feeling thermometer ratings for lesbians and for gay men were highly correlated, $r(4324) = .92, P < .0001$. Therefore, for our main dependent measure, we averaged these ratings to create a composite feeling thermometer score for gay and lesbian targets. For the purpose of prevalence estimates only, explicit bias was defined by a composite score for gay and lesbian targets that was lower than the rating for Caucasian targets.

Implicit attitudes toward gay men and lesbian women—We measured implicit attitudes using the IAT, a validated measure of automatic, unconscious attitudes that can be adapted to measure attitudes toward many different groups.⁷ The sexual orientation IAT in this study, which was identical to the Sexuality IAT from Project Implicit, compared the amounts of time required to categorize images associated with heterosexuality and homosexuality (e.g., line drawings of couples) at the same time as positive and negative words (e.g., joy, hurt).³⁴ About half of the respondents in our sample ($n = 2,141$) were randomly assigned to complete this IAT; the rest were assigned to a different IAT and were excluded from our analysis procedures involving implicit bias in this report. (We retained all heterosexual respondents with complete data for analysis procedures involving our explicit attitude measure.)

We computed IAT D-scores, representing differences in valenced associations with heterosexual and homosexual targets, as suggested by Greenwald et al.³⁵ Positive scores indicate positive implicit evaluations and negative scores indicate negative implicit evaluations of gay and lesbian people relative to heterosexual people. We chose this scoring system, even though it is the opposite of the traditional scoring system (in which larger positive scores indicate *more* bias), to facilitate comparison to the explicit attitude measure (the composite thermometer score).

Contact—We measured amount of contact by asking participants to indicate how much interaction they had with “gay, lesbian, or bisexual individuals” prior to medical school, using a four-point response scale ranging from “none” (1) to “substantial” (4). We measured favorability of contact by asking participants to indicate how favorable their interactions with sexual minorities had been prior to medical school, using a four-point response scale ranging from “very unfavorable” (1) to “very favorable” (4).³⁶

Empathy—We assessed individual differences in empathy using two subscales of the Interpersonal Reactivity Index (IRI), each consisting of seven statements with 7-point response scales ranging from “strongly disagree” (1) to “strongly agree” (7).^{27, 37} These subscales were empathic concern ($\alpha = .83$) and perspective-taking ($\alpha = .79$). Empathic concern included items such as “I am often quite touched by things that I see happen.” Perspective-taking included items such as “Before criticizing somebody, I try to imagine

how I would feel if I were in their place.” (For the items included in the two scales, see Supplemental Digital Appendix 1 at [LWW INSERT LINK].)

Analysis

First, we estimated the prevalence of explicit bias and implicit bias by examining means and frequencies. Second, we assessed the predictors of explicit and implicit attitudes separately by constructing linear regression models, adjusting for the complex sampling probabilities and including respondent demographics (age, gender, and race) as covariates. In both models, the main predictors of interest were amount of contact with sexual minorities, favorability of contact, the interactive effect between amount and favorability of contact, empathic concern, and perspective-taking.

In the explicit attitudes model, our dependent measure was the composite feeling thermometer score. We also examined alternative regression models both with and without the demographic covariates, with the composite feeling thermometer score and the individual feeling thermometer ratings for gay men and for lesbian women (separately) as response variables. In all six models, the terms of interest involving contact and empathy had identical signs and outcomes of hypothesis tests as well as similar effect sizes, so only the results for the composite measure with demographic covariates are reported below. Feeling thermometer ratings were available for 4,326 respondents; we excluded 183 cases with missing data on any predictor (including demographic predictors), leaving 4,143 respondents.

In the implicit attitudes model, our dependent measure was the IAT D-score, which was available for 2,141 respondents. We excluded 97 cases with missing data on any predictor (including demographic predictors), leaving 2,044 respondents.

In all regression models, we computed unstandardized coefficients (b) with all continuous variables (except the response variable) centered at the mean and all categorical variables dummy coded. Unstandardized coefficients represent the number of units by which the outcome variable (measured on a continuous scale) is expected to change for each unit increase in the predictor variable. We computed standardized coefficients (β) with all variables, including dummy codes and the response variable, centered and rescaled such that means were 0 and variances were 1. Standardized coefficients represent the number of standard deviations by which the outcome variable is expected to change for each standard deviation increase in the predictor variable.

All analysis procedures were carried out using R version 2.15.0 (R Foundation for Statistical Computing, <http://www.r-project.org/>), using the “survey” package version 3.29–4 to account for the complex sampling design in regression models.

Results

Of the 4,441 heterosexual first-year medical students in our sample, 2,206 (49.67%) were male and 2,765 (62.26%) were white. They ranged in age from 19 years to 49 years (mean = 24, standard deviation [SD] = 3). Our sample’s demographic characteristics (see Table 1)

were similar to those of all students who matriculated at U.S. medical schools in 2010. For example, the AAMC reported that among 18,665 matriculants in 2010, 9,909 (53.1%) were male and 10,655 (57.1%) were white.³⁸

Explicit and implicit biases against gay and lesbian individuals

Feeling thermometer ratings of lesbian women (mean = 76.87, SD = 23.38) and gay men (mean = 77.22, SD = 23.71) were similar. Because of the length of the CHANGES survey and concerns about respondent fatigue, we did not include a measure of explicit attitudes toward heterosexual targets. To evaluate explicit attitudes toward gay and lesbian targets relative to a nonstigmatized majority group, we compared these ratings to those given for Caucasian targets (mean = 85.33, SD = 18.12). Ratings for lesbian women, $P < .0001$, Cohen's $d = 0.45$, 95% confidence interval (CI) = 7.90 to 9.03, ratings for gay men, $P < .0001$, $d = 0.42$, 95% CI = 7.56 to 8.72, and the composite scores, $P < .0001$, $d = 0.45$, 95% CI = 7.73 to 8.83, were all significantly lower than ratings for Caucasian targets. To estimate the prevalence of explicit bias, we counted those respondents who gave a lower feeling thermometer rating to lesbian and gay targets (composite score) than to Caucasian targets. Nearly half (45.79%; 956/2,088) of respondents with complete data on both measures of bias expressed at least some explicit bias against gay and lesbian individuals.

Our measure of implicit bias was the IAT D-score, for which negative scores indicate bias against gay and lesbian targets. The mean level of implicit bias in our sample of heterosexual medical students (mean = -0.44, SD = 0.47) was slightly more pronounced than the mean level in Project Implicit's sample (convenience sample of general population, not restricted to heterosexual participants, $N = 269,683$; mean = -0.35, SD = 0.47 [sign of mean inverted to be congruent with our scoring system]³⁴), $P < .0001$, $d = 0.19$, 95% CI = -0.46 to -0.42. Most (81.51%; 1,702/2,088) respondents with complete data on both measures of bias exhibited at least some implicit bias against gay and lesbian individuals (i.e., IAT D-scores < 0). Even among respondents who avoided expressing any explicit bias, about three-quarters (74.29%; 841/1,132) showed implicit bias (see Chart 1).

Consistent with previous research,^{6,39} IAT D-scores were only modestly related to explicit attitudes in a simple linear regression model accounting for the sampling design, $\beta = .20$, $b = 9.92$, standard error (SE) = 1.26, $P < .0001$.

Predicting explicit attitudes toward gay and lesbian individuals

Table 2 summarizes the results of the complete regression model evaluating contact and empathy as predictors of explicit attitudes (feeling thermometer ratings of gay and lesbian targets).

As we hypothesized, in the same model and in the absence of an interactive effect, both amount of contact, $\beta = .09$, $b = 2.49$, SE = 0.50, $P < .0001$, and favorability of contact, $\beta = .40$, $b = 14.58$, SE = 0.75, $P < .0001$, independently predicted positive attitudes. In addition, the interaction between favorability and amount of contact significantly predicted explicit attitudes, $\beta = -.09$, $b = -3.91$, SE = 0.72, $P < .0001$. This interaction suggests that the effect of amount of contact depended on how favorable respondents perceived the contact to be.

To illustrate this dependency, we re-estimated the linear effect of amount of contact with favorability of contact centered at 1 SD below the mean (representing relatively unfavorable contact) and 1 SD above the mean (representing relatively favorable contact).⁴⁰ Among respondents who rated their contact with sexual minorities as relatively unfavorable, increasing amounts of contact strongly predicted positive attitudes, $b = 5.04$, $SE = 0.76$, $P < .0001$. In contrast, among participants who rated their contact as relatively favorable, amount of contact was unrelated to explicit attitudes, $b = 0.06$, $SE = 0.59$, $P = .92$. Thus, amount of contact was a strong predictor of positive attitudes when contact was unfavorable, but became increasingly less important as the favorability of contact increased.

Our second set of key predictors, included in the same regression model, pertained to the two types of empathy—perspective-taking (cognitive empathy) and empathic concern (emotional empathy). As predicted, higher levels of perspective-taking predicted more positive attitudes, $\beta = .06$, $b = 1.51$, $SE = 0.35$, $P = .0001$. Higher levels of empathic concern also predicted more positive attitudes, $\beta = .10$, $b = 2.56$, $SE = 0.41$, $P < .0001$.

Predicting implicit attitudes toward gay and lesbian individuals

Table 3 summarizes the results of the complete regression model evaluating contact and empathy as predictors of implicit attitudes.

Our first set of key predictors pertained to contact. As expected, both amount of contact, $\beta = .17$, $b = 0.09$, $SE = 0.01$, $P < .0001$, and favorability of contact, $\beta = .11$, $b = 0.08$, $SE = 0.02$, $P = .0002$, strongly predicted positive implicit attitudes. Adding the interaction between amount and favorability to the model did not explain additional variance, $\beta = .01$, $b = 0.01$, $SE = 0.02$, $P = .60$.

Our second set of key predictors, included in the same regression model, pertained to empathy. Neither perspective-taking, $\beta = .06$, $b = 0.03$, $SE = 0.02$, $P = .06$, nor empathic concern, $\beta = -.04$, $b = -0.02$, $SE = 0.01$, $P = .16$, significantly predicted implicit attitudes over and above the effects of contact.

Discussion

Previous work has documented disparities in care and discrimination against gay men and lesbian women in the health care system¹; this study examined part of the basis for these disparities by documenting implicit and explicit biases against lesbian and gay individuals among future medical providers. The prevalence of negative attitudes presents an important challenge for medical education, highlighting the need for more research on how to address possible causes of bias. We identified two specific predictors of negative attitudes that could facilitate the development of curriculum-based interventions aimed at ensuring high quality care for sexual minorities.

Consistent with intergroup contact theory,²² we found that more frequent and more positive intergroup contact predicted more positive attitudes toward gay men and lesbian women. Although our correlational results should be interpreted cautiously, they hint at four possible medical education interventions—and potential avenues for experimental or longitudinal

research to test the interventions' causal efficacy. First, instructors could include gay men and lesbian women on speaker panels^{24,41} to provide students with a small number of high-quality positive contact experiences, which our results suggest can be related to explicit or overt biases (when contact experiences were highly favorable, the amount of contact ceased to be an important predictor of explicit attitudes). Second, because prior experimental research has shown that appropriately constructed imagined contact can have positive outcomes,⁴² instructors could include patient sexual orientation information in clinical scenarios as part of case-based medical training. Third, medical schools could increase heterosexual students' contact with gay and lesbian peers by implementing programs to recruit more sexual minority students.⁴³ Interventions designed to increase the number of lesbian and gay students may be especially promising, because prior experimental research has shown that equal-status contact is particularly effective for reducing intergroup bias.^{21,22,25} Fourth, administrators and faculty could encourage the development of an identity-affirming environment to help mitigate lesbian and gay students' feelings that they "don't fit in." Some theorists have suggested that such an intervention could increase the proportion of sexual minority students who are open about their sexual orientation and reduce the likelihood that they will drop out.⁴⁴

In this study, greater cognitive empathy (perspective-taking) and emotional empathy (empathic concern) were associated with more positive explicit attitudes toward lesbian and gay targets, but neither type of empathy significantly predicted implicit attitudes. These results are consistent with past work showing that contact is a more important predictor of implicit attitudes than dispositional variables like empathy,²⁵ but our data do suggest that empathy helps explain overt biases. Empathy has been shown to decline gradually as students progress through medical school,³⁷ and this decline has been identified as a source of general problems with patient care.^{45,46} Our study reveals that low levels of empathy relate to explicit bias against gay and lesbian people even as early as the first year of medical training, suggesting that the decline in empathy observed over time could have more serious implications for gay and lesbian patients as students progress through medical school and, potentially, into medical practice. Although we cannot draw causal conclusions from our correlational data, our results suggest that taking steps to prevent empathy decline could help mitigate overt bias against sexual minorities. There is promising work^{47,48} suggesting that interventions can be designed to increase long-term empathy, but more direct evidence of their efficacy is needed.

Past research has suggested that perspective-taking is one of the most important processes by which contact facilitates positive intergroup attitudes,⁴⁹ and efforts to increase perspective-taking and empathic concern over the long term have been suggested as a way to help providers reduce unintentional racial bias.⁴¹ However, other work has suggested that merely striving to adopt the perspective of a target group member can lead to greater anxiety and social distancing from the target group in situations where stereotypes are highly salient.⁵⁰ Therefore, interventions designed to increase empathy should be careful not to focus exclusively on perspective-taking.

The primary limitation of this study is its correlational nature. For example, we cannot determine whether positive attitudes cause positive contact experiences, or vice versa. An

ongoing longitudinal assessment of this group of students will help us ascertain whether changes in contact or empathy precede changes in attitudes. Additionally, we have reported statistical effects that explain only a small proportion of the variance in attitudes toward gay men and lesbian women. Such small effect sizes are typical in research examining intergroup attitudes.^{19,22,51} Although no single set of related variables can fully explain these multifaceted social phenomena, computer simulations suggest that even very small differences in biases can contribute to substantial structural inequalities.⁵²

A further limitation is that this study did not directly measure discriminatory behavior. Future research should examine the relationship between biases harbored by students and treatment of gay and lesbian patients, as has been done in work on racial biases.¹¹ Finally, our sample may have included some sexual minority students, if any respondents marked “heterosexual” due to concerns about stigma or confidentiality.

Pervasive bias against gay and lesbian people presents a serious problem that medical education must address to mitigate health inequalities. Steps to increase positive intergroup contact experiences and to promote empathy represent promising educational and research possibilities.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. Institute of Medicine. The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding. Washington, DC: The National Academies Press; 2011. http://www.nap.edu/catalog.php?record_id=13128 [Accessed November 14, 2014]
2. Buchmueller T, Carpenter C. Disparities in health insurance coverage, access, and outcomes for individuals in same-sex versus different-sex relationships, 2000-2007. *American Journal of Public Health.* 2010; 100:489-495. [PubMed: 20075319]
3. Alwin D. Feeling thermometers versus 7-point scales: Which are better? *Sociological Methods and Research.* 1997; 25:318-340.
4. Kinder DR, Drake KW. Myrdal's prediction. *Political Psychology.* 2009; 30:539-568.
5. Dovidio, JF.; Gaertner, SL. Aversive racism. In: Zanna, MP., editor. *Advances in Experimental Social Psychology.* Vol. Vol. 36. San Diego, CA: Elsevier Academic Press; 2004. p. 1-52.
6. Greenwald AG, Poehlman TA, Uhlmann EL, Banaji MR. Understanding using the Implicit Association Test: III. Meta-analysis of predictive validity. *Journal of Personality and Social Psychology.* 2009; 97:17-41. [PubMed: 19586237]

7. Greenwald A, McGhee D, Schwartz J. Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*. 1998; 74:1464–1480. [PubMed: 9654756]
8. Green AR, Carney DR, Pallin DJ, et al. The presence of implicit bias in physicians and its predictions of thrombolysis decisions for black and white patients. *Journal of General Internal Medicine*. 2007; 22:1231–1238. [PubMed: 17594129]
9. Moskowitz GB, Stone J, Childs A. Implicit stereotyping and medical decisions: Unconscious stereotype activation in practitioners' thoughts about African Americans. *American Journal of Public Health*. 2012; 102:996–1001. [PubMed: 22420815]
10. Sabin JA, Greenwald AG. The influence of implicit bias on treatment recommendations for 4 common pediatric conditions: Pain, urinary tract infection, attention deficit hyperactivity disorder, and asthma. *American Journal of Public Health*. 2012; 102:988–995. [PubMed: 22420817]
11. Cooper LA, Roter DL, Carson KA, et al. The associations of clinicians' implicit attitudes about race with medical visit communication and patient ratings of interpersonal care. *American Journal of Public Health*. 2012; 102:979–987. [PubMed: 22420787]
12. Penner LA, Dovidio JF, West TW, et al. Aversive racism and medical interactions with black patients: A field study. *Journal of Experimental Social Psychology*. 2010; 46:436–440. [PubMed: 20228874]
13. Devine, PG. Beyond the isolated social perceiver: Why inhibit stereotypes?. In: Wyer, RS., editor. *Stereotype Activation and Inhibition*. Mahwah, NJ: Lawrence Erlbaum Associates Publishers; 1998. p. 69-81.
14. Pew Research Center. *The Global Divide on Homosexuality*. Washington, DC: Pew Charitable Trusts; 2013 Jun. <http://www.pewglobal.org/files/2013/06/Pew-Global-Attitudes-Homosexuality-Report-FINAL-JUNE-4-2013.pdf> [Accessed November 14, 2014]
15. Pew Research Center. *The American-Western European Values Gap*. Washington, DC: Pew Charitable Trusts; 2011 Nov. <http://www.pewglobal.org/files/2011/11/Pew-Global-Attitudes-Values-Report-FINAL-November-17-2011-10AM-EST1.pdf> [Accessed November 14, 2014]
16. Dovidio JF. On the nature of contemporary prejudice: The third wave. *Journal of Social Issues*. 2001; 57:829–849.
17. Dovidio JF, Gaertner SL. Aversive racism and selection decisions: 1989 and 1999. *Psychological Science*. 2000; 11:315–319. [PubMed: 11273391]
18. Nosek BA, Banaji M, Greenwald AG. Harvesting implicit group attitudes and beliefs from a demonstration web site. *Group Dynamics: Theory, Research, and Practice*. 2002; 6:101–115.
19. Herek GM, Capitanio JP. "Some of my best friends": Intergroup contact, concealable stigma, and heterosexuals' attitudes toward gay men and lesbians. *Personality and Social Psychology Bulletin*. 1996; 22:412–424.
20. Johnson M, Brems C, Alford-Keating P. Personality correlates of homophobia. *Journal of Homosexuality*. 1997; 34:57–69. [PubMed: 9378949]
21. Pettigrew TF, Tropp LR. A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology*. 2006; 90:751–783. [PubMed: 16737372]
22. Pettigrew T, Tropp L, Wagner U, Christ O. Recent advances in intergroup contact theory. *International Journal of Intercultural Relations*. 2011; 35:271–280.
23. Tausch, N.; Hewstone, M. Intergroup contact. In: Dovidio, JF.; Hewstone, M.; Glick, P.; Esses, VM., editors. *The SAGE Handbook of Prejudice, Stereotyping, and Discrimination*. London, UK: Sage Publications; 2010. p. 544-560.
24. Kelley L, Chou C, Dibble S, Robertson P. A critical intervention in lesbian, gay, bisexual, and transgender health: Knowledge and attitude outcomes among second-year medical students. *Teaching and Learning in Medicine*. 2008; 20:248–253. [PubMed: 18615300]
25. Turner RN, Hewstone M, Voci A. Reducing explicit and implicit outgroup prejudice via direct and extended contact: The mediating role of self-disclosure and intergroup anxiety. *Journal of Personality and Social Psychology*. 2007; 93:369–388. [PubMed: 17723054]
26. McFarland S. Authoritarianism, social dominance, and other roots of generalized prejudice. *Political Psychology*. 2010; 31:453–477.

27. Davis MH. A multidimensional approach to individual differences in empathy. *Journal Supplement Abstract Service (JSAS) Catalog of Selected Documents in Psychology*. 1980; 10:85.
28. Davis MH. Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*. 1983; 44:113–126.
29. Batson C, Fultz J, Schoenrade PA. Distress and empathy: Two qualitatively distinct vicarious emotions with different motivational consequences. *Journal of Personality*. 1987; 55:19–39. [PubMed: 3572705]
30. Todd A, Bodenhausen G, Richeson J, Galinsky A. Perspective taking combats automatic expressions of racial bias. *Journal of Personality and Social Psychology*. 2011; 100:1027–1042. [PubMed: 21381852]
31. Batson CD, Polycarpou MP, Harmon-Jones E, et al. Empathy and attitudes: Can feeling for a member of a stigmatized group improve feelings toward the group? *Journal of Personality and Social Psychology*. 1997; 72:105–118. [PubMed: 9008376]
32. Sarndal, C.; Swensson, B.; Wretman, J. *Model Assisted Survey Sampling*. New York, NY: Springer-Verlag; 1992.
33. Dyrbye LN, Thomas MR, Harper W, et al. The learning environment and medical student burnout: A multicentre study. *Medical Education*. 2009; 43:274–282. [PubMed: 19250355]
34. Nosek B, Smyth F, Banaji M, et al. Pervasiveness and correlates of implicit attitudes and stereotypes. *European Review of Social Psychology*. 2007; 18:36–88.
35. Greenwald AG, Nosek BA, Banaji MR. Understanding using the Implicit Association Test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology*. 2003; 85:197–216. [PubMed: 12916565]
36. Voci A, Hewstone M. Intergroup contact and prejudice toward immigrants in Italy: The mediational role of anxiety and the moderational role of group salience. *Group Processes & Intergroup Relations*. 2003; 6:37–52.
37. Neumann M, Edelhäuser F, Tauschel D, et al. Empathy decline and its reasons: A systematic review of studies with medical students and residents. *Academic Medicine*. 2011; 86:996–1009. [PubMed: 21670661]
38. Association of American Medical Colleges. Table 9: Matriculants to U.S. Medical Schools by Race, Selected Combinations within Hispanic or Latino Ethnicity, and Sex, 2008–2011. Applicants and matriculants data. <https://www.aamc.org/data/facts/applicantmatriculant> [No longer available.] [Accessed March 1, 2014]
39. Hofmann W, Gawronski B, Gschwender T, Huy L, Schmitt M. A meta-analysis on the correlation between the Implicit Association Test and explicit self-report measures. *Personality and Social Psychology Bulletin*. 2005; 31:1369–1385. [PubMed: 16143669]
40. Aiken, LS.; West, SG. *Multiple Regression: Testing and Interpreting Interactions*. Newbury Park, CA: Sage Publications; 1991.
41. Burgess D, van Ryn M, Dovidio J, Saha S. Reducing racial bias among health care providers: Lessons from social-cognitive psychology. *Journal of General Internal Medicine*. 2007; 22:882–887. [PubMed: 17503111]
42. Turner R, Crisp R, Lambert E. Imagining intergroup contact can improve intergroup attitudes. *Group Processes & Intergroup Relations*. 2007; 10:427–441.
43. Niu NN, Syed ZA, Krupat E, Crutcher BN, Pelletier SR, Shields HM. The impact of cross-cultural interactions on medical students' preparedness to care for diverse patients. *Academic Medicine*. 2012; 87:1530–1534. [PubMed: 23018328]
44. Przedworski JM, Dovidio JF, Hardeman RR, et al. A comparison of the mental health and well-being of sexual minority and heterosexual first-year medical students: A report from Medical Student CHANGES. *Academic Medicine*. 2015; 90 XXX-XXX.
45. Hojat M, Mangione S, Nasca TJ, et al. An empirical study of decline in empathy in medical school. *Medical Education*. 2004; 38:934–941. [PubMed: 15327674]
46. Hojat M, Mangione S, Nasca TJ, Gonnella JS, Magee M. Empathy scores in medical school and ratings of empathic behavior in residency training 3 years later. *The Journal of Social Psychology*. 2005; 145:663–672. [PubMed: 16334513]

47. Batt-Rawden SA, Chisolm MS, Anton B, Flickinger TE. Teaching empathy to medical students: An updated, systematic review. *Academic Medicine*. 2013; 88:1171–1177. [PubMed: 23807099]
48. Riess H, Kelley JM, Bailey RW, Dunn EJ, Phillips M. Empathy training for resident physicians: A randomized controlled trial of a neuroscience-informed curriculum. *Journal of General Internal Medicine*. 2012; 27:1280–1286. [PubMed: 22549298]
49. Pettigrew T, Tropp L. How does intergroup contact reduce prejudice? Meta-analytic tests of three mediators. *European Journal of Social Psychology*. 2008; 38:922–934.
50. Vorauer JD, Sasaki SJ. Helpful only in the abstract? Ironic effects of empathy in intergroup interaction. *Psychological Science*. 2009; 20:191–197. [PubMed: 19170943]
51. Herek GM. Gender gaps in public opinion about lesbians and gay men. *Public Opinion Quarterly*. 2002; 66:40–66.
52. Martell RF, Lane DM, Emrich C. Male-female differences: A computer simulation. *American Psychologist*. 1996; 51:157–158.

References cited in chart and tables only

53. Crandall, CS.; Stangor, C. Conformity and prejudice. In: Dovidio, JF.; Glick, P.; Rudman, LA., editors. *On the Nature of Prejudice: Fifty Years After Allport*. Malden, MA: Blackwell Publishing; 2005. p. 295-309.
54. Lewis GB. Black-white differences in attitudes toward homosexuality and gay rights. *Public Opinion Quarterly*. 2003; 67:59–78.

Table 1

Demographic Characteristics of First-Year Medical Students Who Self-Identified as Heterosexual (n = 4,441) in the Medical Student CHANGES Baseline Survey, 2010^a

Characteristic	No. (%)
Gender	
Female	2,235 (50.33)
Male	2,206 (49.67)
Race/ethnicity	
Black	279 (6.28)
South Asian	460 (10.36)
East Asian	609 (13.71)
Hispanic/Latino	250 (5.63)
White	2,765 (62.26)
Other/unknown ^b	78 (1.76)

Abbreviation: CHANGES indicates Cognitive Habits and Growth Evaluation Study.

^a Students were sampled from 49 medical schools across the United States in fall 2010 (see Figure 1). Both gender and race/ethnicity were self-identified.

^b These participants were excluded from the primary analysis procedures, which adjusted for race/ethnicity.

Table 2

Predicting Explicit Attitudes Toward Gay and Lesbian Individuals Among Heterosexual First-Year Medical Students^a

Term	Standardized coefficient (β)	Unstandardized coefficient (<i>b</i>)	Standard error of <i>b</i>	<i>P</i> value
Intercept	.02	80.93	0.67	< .0001
Demographic covariates^b				
Male (vs. female)	-.11	-4.94	0.57	< .0001
Black (vs. white)	-.04	-3.36	1.19	.008
South Asian (vs. white)	-.03	-2.29	1.07	.04
East Asian (vs. white)	-.05	-3.25	0.99	.002
Hispanic/Latino (vs. white)	-.01	-0.56	1.42	.70
Age (years)	.01	0.06	0.12	.63
Contact				
Amount	.09	2.55	0.50	< .0001
Favorability	.39	13.98	0.74	< .0001
Amount x favorability	-.09	-3.91	0.72	< .0001
Empathy				
Perspective-taking	.06	1.51	0.35	.0001
Empathic concern	.10	2.56	0.41	< .0001

^a This model is based on data from the 4,143 heterosexual first-year medical students with complete data on all predictor variables in the Medical Student Cognitive Habits and Growth Evaluation Study (CHANGES) baseline survey in fall 2010. The dependent variable was a feeling thermometer composite score of positive feelings toward gay men and lesbian women. Lower scores on this measure indicate greater bias against gay and lesbian individuals.

^b Covariates were included in the model to show that the effects of empathy and contact on attitudes could not be explained by demographic differences in empathy and contact. Although demographic differences in attitudes fall outside of the theoretical scope of this report, the findings that women display more positive attitudes than men and that white people display more positive attitudes than black people are consistent with some past results from non-medical samples.^{51,54}

Table 3

Predicting Implicit Attitudes Toward Gay and Lesbian Individuals Among Heterosexual First-Year Medical Students^a

Term	Standardized coefficient (β)	Unstandardized coefficient (<i>b</i>)	Standard error of <i>b</i>	<i>P</i> value
Intercept	-.02	-0.41	0.02	< .0001
Demographic covariates^b				
Male (vs. female)	-.12	-0.11	0.02	< .0001
Black (vs. white)	-.02	-0.05	0.04	.25
South Asian (vs. white)	.03	0.05	0.03	.16
East Asian (vs. white)	.01	0.02	0.04	.62
Hispanic/Latino (vs. white)	.05	0.09	0.04	.04
Age in years	-.01	0.00	0.00	.73
Contact				
Amount	.17	0.09	0.01	< .0001
Favorability	.11	0.08	0.02	.0002
Empathy				
Perspective-taking	.06	0.03	0.02	.06
Empathic concern	-.04	-0.02	0.01	.16

^aThis model is based on data from the 2,044 heterosexual first-year medical students with complete data on all predictor variables from among the half of respondents assigned to complete the sexual orientation Implicit Association Test (IAT) as part of the Medical Student Cognitive Habits and Growth Evaluation Study (CHANGES) baseline survey in fall 2010. The dependent variable was an IAT D-score, for which lower scores indicate more bias against gay men and lesbian women.

^bCovariates were included in the model to show that the effects of empathy and contact on attitudes could not be explained by demographic differences in empathy and contact. Although demographic differences in attitudes fall outside of the theoretical scope of this report, the finding that women display more positive attitudes than men is consistent with some past results from non-medical samples.^{51,54}

Chart 1

Prevalence of Explicit and Implicit Bias Against Gay and Lesbian Individuals Among Heterosexual First-Year Medical Students, Medical Student CHANGES Baseline Survey, 2010^a

	No implicit bias	Implicit bias	Total
No explicit bias	13.94% (n = 291)	40.28% (n = 841)	54.21% (n = 1,132)
Explicit bias	4.55% (n = 95) ^b	41.24% (n = 861)	45.79% (n = 956) ^c
Total	18.49% (n = 386)	81.51% (n = 1,702) ^d	100% (n = 2,088)

^a Respondents to the Medical Student Cognitive Habits and Growth Evaluation Study (CHANGES) baseline survey in fall 2010 included 4,441 heterosexual first-year medical students from 49 medical schools across the United States. Half of the survey respondents were randomly assigned to complete a sexual orientation Implicit Association Test (IAT). Implicit bias was defined by negative IAT D-scores. Explicit bias was defined by lower composite feeling thermometer ratings for lesbian and gay targets than for “Caucasian” targets. This chart reports results for the 2,088 respondents with complete data on both measures of bias (excluding those who were not assigned to the sexual orientation IAT and those who chose not to respond to the three relevant explicit attitude items). Note that this chart is provided for illustrative purposes only; the variables included in the main analysis were retained in their numeric form rather than categorized as shown here.

^b Explicit bias in the absence of implicit bias is not generally predicted by current theories of bias, but it could potentially reflect normative influences for expressing sexual orientation biases in the respondent’s social environment.⁵³ Given the small number of respondents who exhibited this pattern, this result may be influenced by measurement error, particularly in the IAT, in which D-scores depend on reaction time data.

^c To give an indication of the magnitude of explicit bias on an individual level, the authors examined the number of respondents who rated gay and lesbian targets more than 10 points lower than “Caucasian” targets on the feeling thermometer, since the rating scale was marked in 10-point intervals. Of the respondents included in this table, 26.92% (562/2,088) had a differential greater than 10.

^d To give an indication of the magnitude of implicit bias on an individual level, the authors examined the number of respondents whose IAT D-scores were more extreme than -5 , viewed as a “medium” level of bias.^{7,35} Of the respondents included in this table, 49.04% (1,024/2,088) were beyond this threshold.