

BroadcastMed | Grand Rounds: Medical School Factors Associated with Change in Implicit Racial Bias Between 1st and 4th Year Among 3,547 Medical Students

GLORIA PETERSON: I'd like to welcome everyone from all of our Mayo campuses to the CCATS Grand Rounds. I'm Dr. Gloria Peterson. I'm a genetic epidemiologist scientist in the division of epidemiology and the Department of Health Sciences research and along with Dr. David Warner, who many of you go through CCATS, we co-direct the office of health disparities research.

And I will be doing the introduction of Dr. Michelle van Ryn, but I wanted to take a few minutes to tell you a little bit about what the office of health disparities research is. You need to think of it as a resource for researchers across all of Mayo Clinic. It is a relatively new office. It's been in existence for several years. And I'm going to give you an overview of it, so that you know that it's available as a resource to you.

Our mission is to support meaningful research programs to identify, develop, and deploy strategies to eliminate health disparities and that our research, subjects, and patients reflect the diverse communities that form the mosaic of our nation. We had envisioned ourselves as a single front door and resource for researchers across the Mayo campuses. We know that the office of community engaged research has been recently reorganized and we're actively collaborating and partnering with the OCER-- or I think I saw OENR or something like that. So I don't know where-- OENR, that's what it was, office of engage research or something like that.

And we're working very closely together. And between the community engage research group and the office of health disparities research, we're there for you. The office of health disparities research has a lot of different activities and functions. One of the key ones is to identify and help deliver specific resources such as community partners, grant assistance service, file bank survey, research center, and other needs for researchers to conduct health disparities research. We actually will have an analytic office that will help you to identify statistics about the Mayo patients and communities that we serve.

And we really, really seek to foster collaborations between researchers by networking and building a community of researchers at Mayo. This office is a very actually high level office. It reports directly to the executive dean for research, Dr. Greg Gores, and so we do have funding from the research committee to keep our activities going and to help you. We have made major commitments through our resources and activities to the Mayo Clinic Cancer Center and to CCATS.

Because of our high level reporting structure to the executive dean for research, we actually are very much engaged and the face of research and health disparities research at the institutional level. So the office of diversity and inclusion led by Sharon Hayes, who I know you have heard from, has set out a roadmap for addressing diversity inclusion at Mayo Clinic and have set a whole series of priorities that are shown on the left side. From developing diverse leaders and creating a culture of inclusion and increasing staff and learner diversity but as well, they want to promote and lead health equity.

And one of the arenas in which we are working with this office of diversity and inclusion is through research and developing the means and the data to identify and eliminate health disparities and to make Mayo Clinic a national leader in the science of promotion of health equity. We promote and coordinate efforts to identify and work to eliminate health disparities across research practice and education. And one of our mechanisms is to award pilot projects. I'll talk about that in a minute.

We believe-- it's taken us many years to get to this point, but we have a critical mass and we'd love to add your portrait to this and have a large mass of investigators working in health disparities research. But at all three campuses we have a presence. We have active activities going on. We're working in each of the three cities that we work in or the three communities. Very active and with a number of different initiatives. And so it would be really great if you would step into our office and into our website and learn more about it and see how you can potentially develop projects or work with the communities across all three campuses that we serve.

I just want to briefly mention the thing that probably is most important to those in the audience and that is that this office actually is a source of funding for research. We award pilot projects annually. To date, we've awarded 20. And the project should be aimed at identifying, reducing, and eliminating health disparities. We're particularly interested in funding junior investigators who can partner with senior health disparities researchers. We're also interested in finding experienced investigators who want to add a health disparities dimension to their research. So this is really open to all. The awards are annual, one year only and up to \$35,000.

The other piece of funding that we do make available is travel scholarship. Every year the NIH sponsors a two week health disparities course. It's kind of like boot camp for health disparities research. You have to apply to get in. But if you get in to this course, get admitted to this course because it has limited enrollment, we will pay the full stipend and travel expenses for you to go. So we will support your scholarship. It is competitive though, just letting you know.

Our other big priority was to really make Mayo Clinic visible both externally. And so this is actually our external website that anyone in the universe can come in to this blog spot and look basically at what is a copy of what we see internally without some of the other things that the Mayo policy doesn't let us share. But you can see that we really are promoting our research across all three campuses.

The internal one is very easily accessible to you. You go to the Mayo home web page and then click on research. And then office of health disparities has its own click. And you'll find all of these activities. So that was the office of health disparities in a small nutshell, and I don't want to take much more of your time but to introduce our speaker for today, Dr. Michelle van Ryn. She is a professor of Health Services Research here at Mayo Clinic senior associate consultant. And she's in the division of health care policy and research in the department of health sciences research.

She received her Bachelor of Science degree in liberal studies from Regents College in New York. And her Master of Public Health degree and her PhD from the University of Michigan. Her PhD is in social psychology and health. And she did post doctoral training or post-graduate training and psychosocial factors mental health and illness at the University of Michigan. She's been actually quite active in a number of different venues, and today she's going to talk about her longitudinal study on unconscious bias in medical students. It's a fascinating study. I've heard her give this talk a couple of times before, but this is an update for me to hear about the latest data that she has been able to collect and some very, very important insights for us. So welcome, Michelle.

MICHELLE VAN RYN: Good afternoon. Thank you very much, Dr. Petersen. And thank you to the office of health disparities research, which was instrumental in bringing me in my research program here two years ago. So I will be talking about the impact of medical school experiences on changes in student implicit racial bias or unconscious racial bias. I'm hoping that you haven't heard this one before, but we'll see. Yeah, I think so. So no disclosures, nobody's making any money or getting any benefit.

What I'm hoping that you'll take away today is some information about what kinds of training in related fields that medical students are getting around the country. Get a little bit of a sense of how in this sample, medical school training, climate, and interracial contact is associated with changes and implicit racial bias. And we'll talk about some next steps. I'm also going to be providing some background on why we should care about this dependent variable. Some of you may have heard this before.

So many of you, if not most of you, may know that there is really massive evidence of unequal treatment. Most of the research focuses on black, white differences in care. But there is also evidence for other groups such as Native Americans, Hispanics, there's mixed evidence for Asian disadvantage, and there are other stigmatized groups that are being documented is having some variation or disparities in care that are inappropriate and need addressing.

This talk is focusing on race and is specifically talking about black or African-American race. And then mostly versus white race. And the reason for that is that it's been the disparities in care have been the most heavily studied and the most extensively documented. And it's a social category in this culture in our country that seems to be associated with a whole host of unpleasant circumstances and disadvantages from a social environment and institutions.

So racial disparities are mediated through, but they persist independently of health insurance, of site of care, and clinical appropriateness. So one of the reasons that I put this slide up is that when we were first studying this in the 1990s, and there is a piling up of evidence showing that race mattered in terms of quality of care in a host of domains, the argument was or the assumption was that it really wasn't anything about race. It was actually socioeconomic status or insurance. And that race itself didn't independently contribute.

And one of the problems was people were just adjusting for race. They just see that like adjusted for race, as if it didn't matter, and then over time, the evidence piled up so dramatically that the conclusions were that race does matter, and it matters independently. Such that high socioeconomic status, private health insurance, high performing health plans, receipt of care at high performing facilities, while beneficial don't consistently had the same impact on quality of care for black patients as they do for white patients. And I know about 5 or 10 years ago, I wrote an editorial trying to give my ideas about some insight about why the advantage of having Medicare plus private insurance might be benefiting white but not black Americans and certain health care facilities.

So the evidence accumulated so much that Congress mandated the Institute of Medicine, which is part of the National Academy of Sciences to look at this evidence. This is a long time ago now. And they concluded that yes indeed, there's something going on here to worry about, and they also looked at the evidence associated with the degree to which providers might be contributing to racial disparities in care. And they back then said that it looked like there might be three prostheses, prejudice or bias, beliefs or stereotypes, and greater clinical uncertainty. And although in the actual full report, they do distinguish between implicit or unconscious and explicit in their public recommendations not as much, which I think caused quite a lot of reactants and backlash.

So since then there has been a growing body of research and media attention to the role of unconscious or implicit racial bias in providers in contributing to inappropriate variation in care or disparities in care, including a lot of attention from the legal community. So about a year ago I went to Case Western. They say they have the best health law program in the country. I don't have any reason to-- I looked it up, but I don't have any reason to not believe them. But one of the things that was going on there, which was fascinating to me, was trying to figure out how to create a standard of negligence. Meaning that given that everyone knows this is going on, if health systems aren't responding to it could, this be a part of a sort of lawsuits and claims? I don't know I don't think that's super close, honestly, I think there's a lot of issues but it was something it was fascinating.

And here's some of this background that some of you may have, but I think it's really important to understanding what we're talking about and what's probably going on here. So one of the biggest questions is how do you reconcile this disconnect? Because most providers genuinely want to provide the very best care for all their patients and explicitly, like most well educated groups in the United States, are pretty consciously unbiased. Are pretty egalitarian and non-bigoted conscious beliefs. And these are genuine beliefs. I'm not at all claiming they're not so what explains this?

So the understanding of what is happening here is best rooted in an understanding of the way we think. So pretty much all of the scientific fields that study cognition, mental processing, information processing, and there is quite a lot of them, have converged in the hypothesis that we have at least two parallel processing system. The controlled one. The one we're aware of. The one that's effortful. The one that helps us decide right now if you're going to focus on me, you're going to focus on what you have to do next. Right Versus your automatic system, which you might suddenly find you're thinking of something completely different. that's your Automatic system. OK? Your explicit system. It's effortful. Takes effort to focus.

The automatic processing system. So for those of you who have read some of the popular books like Kahneman's book, *Thinking Fast and Slow*, cause a system 1 thinking. It's unconscious. It's reflective. It requires no effort. It's extremely fast, and it is hard wired to store information and recall it in association with repeated experiences. So that sounds a little jargony. So I'll get into that in a minute. And these two systems actually involve different cortical mechanisms.

So to get at what this system one is, when you walked into this room, if those of you who just came here last week and saw the Fleming lecture, I'm sorry. Because I think I might have done this example. When you walked into this room, most of you although some of you may have come from a different culture and this might be the first time you've been in this auditorium, did not have to put any mental effort into knowing what to do. Right? And if you think about it, if you didn't have this automatic system you might be trying to figure out what do you do with a chair, which way do you sit, how do I face it, do we talk to each other? Right now, your automatic understanding schema or script of what you do in a lecture, is guiding your behavior with no conscious effort. Right? So you're at least pretending to pay attention and probably are fascinated, I'm sure.

But you're not chatting, right? Getting things out, not doing crafts. So this is our effort. If you had to actually walk in here and figure it out consciously, you'd collapse. So this is true for how we act. It's true for things like how we interact with objects with food with everything. So it's really adaptive, and it's extremely helpful to us. It's very well-developed in the social world, because we're a social species. Sometimes people say, well what about hermits? Or I'm not. I'm individual. Like it or not, our well-being rises and falls based on our relationship with others and where we are in our social systems. We are a very social species, social independent species, interdependent species. So we have extremely well developed structures for the social world.

So one of the things that we do to make sense of our social world and to make it less complex for us, is that we try to figure out our unconscious system is storing information about groups or categories of people. Categories that are relevant in our culture. Right? So we categorize people by skin tone. We don't really categorize people by eye color. Right? When you see someone of a certain eye color, you're not automatically activating a bunch of stuff, because eye color isn't relevant in our culture. So there's cultural decisions about what's important.

We automatically store a lot of information. Some of it is something called stereotypes, which is beliefs about a group, which is automatically very rapidly applied when we come across someone that we've categorized. Now, a complexity to that is you can meet someone and you may categorize them based on any one of many groups. So for example, there are studies showing when people interact with black physicians, they may be activating physician expectations or they may be activating black stereotypes. And that depends on whether their ego has been threatened. So it's a little bit motivated.

Some of this is very simple. It's very quick. It's like an effective flash. So you can do studies of people, and you can expose them to images. And you will be able to pick up very rapidly on both cortisol and physiologic reactions. So we have this, and we may not be aware of this. But it's very fast, and then those emotions affect what we do. The other thing to bear in mind is had come up with explanations that are very egalitarian. So for example, I might be interacting with a low income colleague, and be assuming because of my egalitarian social frame, that they're not going to be as capable of doing things that I want them to do because their social circumstances won't allow them. Right? This is stereotyping with an egalitarian justification.

So having an egalitarian frame of mind doesn't necessarily let us off the hook. The question is how do you figure out what's actually happening with any given individual? So unconscious bias, unconscious attitudes, have been overwhelmingly shown to predict behavior. And when they're inconsistent, not always by the way, they're not always inconsistent consistent with our conscious beliefs. But in the case of race, they often are, especially for people who are in the health care system who are wanting to provide good care. So when they're inconsistent. So when we have have stored negative attitudes or beliefs or reactions that are inconsistent, we're a lot more likely to be affected by or hijacked by these implicit biases when our cognitive resources are low. When we're tired. When we're stressed. When we're anxious. And this makes sense because it serves the need for cognitive efficiency. This system keeps us going when all of our other resources are gone. This is why we can usually make it home in our cars, no matter how tired we are, because we have an automatic set of things that are happening to guide us on where we go. Although, if you're trying to go someplace different, you might find yourself at home. Right? Because you're not able to exert this sort of mental processing.

Explicit forms of prejudice and stereotyping have decreased but implicit forms of bias and stereotyping is still pervasive in our country. Even among people with genuine egalitarian beliefs. So the studies show that around 80% of white Americans, and this is white Americans in any group including physicians and therapists and social psychologist, nurses, everybody, show significant implicit preference for whites over blacks. So are much more likely to associate the concept of black with negative terms. And the concept of white with positive terms.

All right, not the same as conscious. Activated automatically, not aware of it, often not aware that it's affecting how we're perceiving others, our emotions, and our behavior. Very quick. And then the last point, and for those of you who study medical decision making some of this is going to be quite familiar to you, especially if you look at error. We've got a lot of hardware cognitive things going on that help us confirm what we already believe. So we do a lot to notice, not consciously, recall, and interpret incoming information in ways that are consistent with what we already believe.

So before I get into the medical school response, I'll give you a personal example. So some of this is unconscious. So we will notice things about others that fit our prior expectation of them. So one of the things that can be happening, let's say with nursing students of color for example, or residents of color, is that what has been noticed about them is when they're making mistakes or when they're not confident. Because that fits the expectation. Whereas perhaps, for their white counterparts, that's not been noticed as much. Right? So this is the one-- and it's not conscious, but it's one of the ways that we serve perpetuate problems and discriminatory outcomes, because we're noticing negative things from groups of people that we're primed to notice.

So the other thing we do is it's a standard of evidence issue, which is why there's probably 1,100 to 1,200 studies of this, and there are still more studies coming. So I read a study recently that said that parental engagement in school activities has no impact. Big, big study. Right? Not my field. So it was she looking at the relationship between a whole bunch of variables in how engaged parents were and said, there's no benefit. I spent-- this is before I was paying attention so much time trying to discredit that study. I was like, this is not right. I looked at the methods really carefully. I found all kinds of flaws. Now, and a little later I was thinking about that. And I was thinking, if the study had had the conclusion that I already think it's true, right? I probably would have not even looked at that.

So some of what happens in our field, and it's getting a lot more attention in a way that's very interesting, is that for what gets published, what gets funded, and policy are consistent much more with what we believe. And things that are inconsistent are held to a much higher standard of evidence. So if any of you are having some trouble getting something published and can't figure out why studies that are much worse aren't getting published, you may be studying something or coming up with conclusions that are really inconsistent with the beliefs of the reviewers. There's several studies now in various forums looking at this process and NIH reviews to try to see how implicit assumptions are affecting reviews.

So OK. So there's all this evidence medical schools care a lot. And they're doing a lot. There's a new accreditation standard for medical schools that pretty new, not that new I guess a few years now, that's associated with meeting the need for training in these areas. There's no evaluation. There isn't very much consistency. Medical schools change. Right? What we do from year to year. So the degree to which anything that anyone is doing is affecting implicit racial bias is unknown.

The other thing is most of the efforts that we make in our organizations will [INAUDIBLE] formal training but doesn't really look at climate or norms. Even though it's a lot of recognition that matter, but it's a lot harder to look at. So we really don't know much about that either. So no one has known much at all about what happens in medical schools and whether it makes a difference in implicit racial bias. So we kind of set out to try to find that out as best we could, given the fact that there's a \$500,000 direct cap on NIH grants. And what we did in this study is we sought to look, this is one of our aims, at the independent and combined impact of formal training, climate and norms, and interracial contact on changes in implicit racial bias among a large sample of medical students.

This is the team. There's a lot of people from Mayo here. I do want to acknowledge Dr. Phelan, who is here. He is a co-author on this particular talk. And Dr. Hardeman and the study coordinators also who often get missed. And this is a multi collaborative program. And we also have a lot of funding from supplements to increase diversity in the health related workforce. So we have really good talent through that process.

So this is the sample. So what we were going for-- we drew a stratified weighted random sample of medical schools. And the strata included region and public private. What we were going for is when we selected these medical schools, we originally selected 50, but one of them was a military school. And was just so different that we ended up dropping them. Half their students weren't even there in any given year. So we had 49. We wanted to get everybody in the first year class and follow them forward.

The beginning of medical school you can't ascertain email addresses. The AAMC has them. But of course, they're not just going to hand them out. We did work with them. They did help us some. If people want more detail on how we got the email addresses and contact information for the 5,823 that we did, I can tell you offline. It's kind of tedious.

So we had of these, there is almost 3,2700 that we couldn't get any contact information, so we could not invite. Of those we invited, 4,732 or 81%, responded at baseline to an online questionnaire that took them about an hour and included implicit association tests, which I'll describe in a minute. Of these we followed them forward, and the analyses I'm presenting here, looks at the dependent variable, which is IAT score at year 4 when they're graduating. this was last spring. Versus what happened with their IAT score when they came in. And there's a little bit of an exodus going on here.

So anyway, we have 81% of those we invited, which is 55% of the first year class. At follow up now, we had 84% of baseline respondents. Some of them weren't eligible because they had slowed their practice down. And some of them were still in year one, year two. They had taken dual degrees. They had taken time off. So the analyzes we focus on here is that 3,756.

We're a little worried. How are people different? Right? Than medical students overall? Right? We have 55% of the first year class. But is our ability to ascertain contact information systematically associated with our independent or dependent variables of interest? And I can't tell you that we actually know that, because it's almost impossible to tell. But what we did do is we compared them on relevant demographic factors from all matriculates and from some other samples and found that the proportion of women, proportion of black, was similar. And what you'll see is that our study has about 70% rounding up white. The matriculation questionnaire that the AAMC does every year also does. But in fact, of the first year students there is only 65% white. So we have a slight over representation of white students.

Students are about 24. Ranged from 19 to 49, which is amazing to me the 19 part. Tended to be pretty affluent. So we had very, very small percentage of students who matriculated whose parental income was less than \$40,000. About 1/3 total less than \$100,000 and then you can see that there were-- oh, actually. We actually had a chunk that were over \$500,000, and they're bunched in there, I'm sorry about that, they're bunched in there with the highest category. 16% were born outside the USA. And we have a distribution of students in terms of political conservatism that is pretty much of a normal distribution, they're pretty evenly distributed. A little bit towards the liberal.

This is our model. But do not fear, because I'm not going to go for all of it. So what we measured was driven by research individual factors and behavioral factors that prevent people from behaving in racially biased ways, reduce the likelihood people will be biased, or help people avoid being hijacked by unconscious biases. But for this presentation, what I'm going to be focusing on is these variables, which is the medical school factors that I mentioned earlier and how they affected change in implicit racial attitudes between baseline and follow up.

You see separate sample validation. We collected school information from an independent sample of students who were in their fourth year when our students were in the third year and then compared. And had pretty good validation for the climate variables, which I'll describe in a minute. How many people already know what the implicit association test is? Raise your hands.

OK so we have a pretty-- this is new to a lot of people. OK. So about 15 years ago the social psychologist and cognitive psychologists developed some measures that they felt were pretty reliably assessing unconscious attitudes. These measures involve reaction time associations. I am not going to spend a lot of time on that now, because we don't have that kind of time. But when I first started looking at this, I was skeptical because I was like, eh. What's happened though, is there's an incredible amount that maybe 200 studies with samples of thousands of people, showing an association between implicit attitudes measured by the implicit association test and a variety of outcomes, including behaviors and judgments, decisions, voting, interpersonal style, nonverbal behavior, physiologic response to members of out groups.

So how do you interpret the IAT? So the IAT ranges from negative two to positive two. You'll see it there. It is usually categorized, in our study we kept it continuous, but it's usually categorized in this way so that people who are in this category, in the six of moderate or seven, have been pretty heavily shown to behave in ways that are different than people who are not. In our sample at baseline that with 64% of our students. So a little bit lower.

This shows movement. Again, in the multivariate modeling I'm going to show you it's a continuous variable. It's a change score. But this is sort of helpful for getting a sense of do people move in and out of these categories. So the first two columns are the students who were either just mildly biased or pro-black on that category. Right? So that they were showing a lot of negative racial bias towards blacks. What you see is about 46% of them by the end of their career had moved in to moderate to severe bias. When you look at a group that had the moderate to strong bias, that's the second two here, what you'll see is that most of them stayed there. But about 32% moved into unbiased. So we had some movement going on.

We asked them-- I'm going to just do a side thing about the difference between school level and individual level analysis. I'm going to show you a little bit about the school level. It's an incredible amount of variance within schools. So it's very difficult to characterize schools, because students in any given school have a lot of different experiences. So we ask them about the training they got. We also promised that we would analyze the school experiences versus focus on individual schools. And our goal is not to harm medical schools. Our goal is to help schools. So these analyzes adjust for school inter school correlation. That's what we've done.

This is just the distribution who took what. 53% said they took a seminar on minority health. 77% had some kind of workshop. Almost 2/3 said that they had gotten some kind of information on racial bias or stereotyping. A quarter actually did an IAT. This is this measure I just described. And when you look at the hours of training, we were really interested in finding out how much training they got in some of these things that we think of as soft skills. But these soft skills have been shown to prevent implicit bias from affecting behavior, such as cognitive empathy, partnership building.

So we looked to see how many hours they reported of exposure. So the first column there is the mean, but the second is the median. And in this one I think in some ways the median is more relevant. There's about half of the students said that they got less than 20 hours and half more than 20 hours in seeing things from patients perspectives and cognitive empathy. So things around that. About 12 in partnership building. So the median for racial disparities in health care, half the students got less than 10 hours. Half more. Similar with cultural customs. And then this measure of the potential effect of unintended racial bias on the carrier provider-- we didn't think anybody was getting any content on that actually when we did the study, but not true. There is some content that students are getting on this.

Emotion regulation matters, and I'm going to skip through this because I'm taking too much time on this. This is something because people are always interested in characterizing schools. So I just wanted to show this so you can get a sense of what's going on within schools. So looking at schools, we looked at the percent of students within each school who said they had taken for example, a seminar on minority health. And what you see is that the school that had the lowest percent was at 25%. So 25% of students in that school said they had done something around minority health. And when you look at that, that's possible. Because there's so much change over time, and there's so much variation in electives that it's really hard to know exactly what's going on by looking at a schools curricula.

And this is a huge challenge for us in studying what's going on in medical schools. There's not a uniform thing to say, we hope there would be, honestly, but there isn't. So what you see here is something similar, going down there that for almost all of these, there isn't a single school that doesn't have a chunk of students saying they did it. OK. All right, so I'm going to move on from schools.

In addition to looking at what kinds of exposures they reported, we also looked at how skilled they felt in a lot of things. And I'm not presenting all of them. But one of them was developing a positive relationship with racial minority patients and overcoming intended or unconscious racial bias. These loaded to the same underlying factor, and they were combined into one measure. We looked at role modeling. And again, we have multiple measures, and I'm only presenting the one that's most relevant here.

And what we ask them is if they had ever heard residents who are attending, so when they were in their clinical rotation, make negative comments about black patients. There's an important thing I want you to bear in mind. This isn't racist comments. This is negative comments of any kind about a black patient. So this negative role modeling. We looked at whether the school had what you would call or organizational people might call a learning or growth orientation, which is there kind of an acceptance that people are going to make mistakes and need to learn versus a more punitive orientation, where it's very scary to make a mistake. So this is the growth orientation. And there were two questions. Did you have an opportunity to learn, how to interact more effectively? And were you encouraged to learn from your mistakes?

We used a racial climate scale that's got two sub domains. It's been heavily validated and used a lot in academic settings. There are very few things that translate from health settings to medical schools. One is there tense racial climate? And you can see there it's things like they've witnessed racial insensitivity from faculty, students, and there's tension. And the other one is a sense of the overall organization value. So the medical school makes a genuine effort to recruit minority students and has respect and so on.

And then we looked at contact with black medical students, and we looked at how much interaction. And we looked at favorability of interaction. Each of these how much interaction and how favorable has been shown to independently affect interracial attitudes and then actually towards any other contact group. OK? We use hierarchical linear modeling with random effects to account for potential correlation of responses by school. Right? Because we have school clustering.

The first thing we did is we estimated separate models within each domain. So one of the questions is, if you're just going to talk about training reform, which of these things in the training experiences mattered? Right? What aspects of the climate? What aspects of content? And then we developed a model, which is all three. In each of the models we took the variables that had a bivariate relationship with change in implicit racial bias, adjusting for baseline bias and then school clustering.

So what you see in this model of all of those variables are the ones that had a bi variance, a kind of bivariate, because we did it just for a couple of things, relationship. And when you put them into a model together and use decomposition of effects, which is something that-- we had a statistician from Yale do this for us, because this is a little bit complicated for me at this point. Because some of these things are highly correlated. What actually came out as being important is whether or not they had completed an IAT as part of medical school training. And whether they had a high level of self-efficacy. The other kinds of training dropped out of the model. Some of that might be because the effect of these training was mediated through self-efficacy.

Of all the climate variables, it was negative role modeling and the growth learning orientation, whether it was a supportive learning orientation where people could make mistakes. Of the contact variables you'll see that there's was a bivariate relationship with contact with black medical students. But that when you actually look at these together, what's important is favorability of interaction with black faculty. Again, all predicting change and bias. A negative coefficient means a decrease in racial bias and positive means an increase. Probably could have said that sooner, huh?

So this is when we try to compare and look at the decomposition of effects of all of these variables from the domain. So what we did is we took the significant variables from each of the three domains forward and looked at them in relationship to each other. And what you find is students who did have the IAT as part of their training, was associated with a decrease in racial bias. This is independent of baseline and adjusted for within school correlation. Self-efficacy is marginal. The role modeling remains significant in terms of increasing positive increasing racial bias. And having a favorable interaction with black faculty versus any of the others also is associated with a decrease in racial bias.

So what does this mean? Right? In some ways it kind of opens more questions than it answers, which often can happen with studies of this kind. But one of the things that we looked at a little closer is what does this mean that the students actually completed an IAT? And when you look a little closer, this is now speculation based on a really qualitative dive, and what it looks like is that when the schools incorporated, IATs, they had faculty who were pretty versed in this stuff. Right? So here for example, Mayo is not part of this-- I can never disclose, I can say Mayo isn't part of the 49 schools. But so at Mayo there are people here who can help interpret this social psych literature and make it quite relevant. And therefore, incorporate IATs in a meaningful and useful way.

So it looks like there may be something about the comfort level of faculty. So what we don't know is it really about the felt need that gets created when you assess your own bias? Could it be that? Or could it be that if you actually get that training, it's because you're with a faculty member who really gets it and understands how these processes play out?

So our recommendation for schools to cover both bases, is to use this in the curricula. But make sure that it's implemented by people who understand the complexity of these variables and can avoid a blaming approach. Right? We don't want people getting reaction and be like, I am not bias. Well, of course you're not bias. You don't want to be bias. These are unconscious processes through a series of exposures that you get your lifelong.

So this confidence thing, right, the confidence you can provide unbiased care. So again, this raises this question exactly-- we can look at some linkages between training. We can look at that as a dependent variable of its own. And we can come up with some conclusions about it, but we probably want to look a little closer. So again, we do a study that is the only study of its kind really looking at this. And in some ways it just it raises more questions. However, the recommendation we're making is to actually evaluate curricula for this outcome. Right? Self-efficacy and provide unbiased care. And then adjust curricula.

This issue about hearing negative comments, OK, this finding generalizes to all kinds of bias. And it's one of the most powerful and virulent effects on all kinds of negative outcomes on student well-being. So now, I'm telling you other findings from the study. Student well-being. All student well-being but certainly minority student well-being on changes in implicit bias towards other groups. So this negative role modeling this negative comment role modeling is really powerful. This occurs in the clinical setting.

So it's an interesting question for what to ask medical students to do. Because most places many medical schools have people going out to lots of different settings. So how closely can they work with these groups to try to assess the climate and change some of this negative role modeling.

And then this issue about favorable-- I always like do I actually even have to say it? Having favorable interactions with black physicians is very helpful for white students and other students. So obviously, we have a very strong value in our country on increasing the number of black physicians. We have trouble because the numbers are actually going down. The enrollment is going down in medical schools. So the pipeline programs are working and then people are leaving. So it's not the pipeline programs. It's the environments. So we really need to do more, not just to get more people into school, but to change the environment. So they're comfortable environments and supportive environments.

And what I would say, is if this piece-- these medical students who go out and part of their role is clinical training, if this was so powerful and changing implicit racial bias, which was really hard to move by the way. Our hypothesis was we weren't going to see change because it doesn't change much. Is that powerful-- what happens in residency? So we want to follow this group forward. And we have been-- we're not we're not having a lot of luck. We're just going to keep going back. So we have this cohort. They like us. We're following them. They continue to respond. We use extra money and got another measurement point. They're in residency right now. And we want to follow them and find out what's going on in their residencies and maybe actually test some interventions. So we have a few studies that have been proposed and have come back with a so-so score. And we just keep doing it.

The medical students study I just presented, we first proposed it in 2003, and we didn't get it funded till 2009. So just doing it. Right? All right. I'm going to end there. And I will tell you that I have a file that you can go to and it's basically an annotated bibliography. It's quite a large file. But often people ask for the citations but the depth of citations supporting this work is such that if you want it go ahead download the file. So and there's the link at the bottom.