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Implicit Racial Bias and Perceptions: The Effect of Physicians' Race on the Perceived Effectiveness of Physicians' Communication

Abstract

A survey was designed and data were collected using Amazon Mechanical Turk, a crowdsourcing service that allows users to hire remotely-located crowdworkers to answer survey questions and perform other tasks. Survey respondents believed they were judging the effectiveness of two physician statements; however, this was a deception—the true purpose was to study the effects, if any, that *seemingly* incidental background images had on respondents' judgments. Specifically, the images shown were of two physicians who closely resembled each other with respect to pose, setting, and dress but differed by race: one white and one Black. Each image was presented with one of two physician statements and subjects were more likely to judge the first statement as more effective than the second whenever the former was presented alongside the image of the white physician and the latter alongside the Black physician (compared to when the images were reversed). These findings suggest that implicit racial bias may affect perceptions about the effectiveness of physician communication, with white physicians perceived as being more effective communicators than Black physicians. These findings will contribute to existing research on intergroup perception in a medical setting (Major, Mendes, and Dovidio 2013, 515-516).

Introduction

The purpose of this study was to examine the effect of physicians' race on the perceived effectiveness of physicians' communications in order to measure the effect (if any) of implicit racial bias on respondents' judgments. A survey instrument was developed for this purpose in which respondents were initially misled into thinking they were answering questions about physician/patient communication. Respondents were shown two hypothetical physician statements, each paired with one of two seemingly incidental background images of

physicians. These depicted physicians closely resembled each other with respect to pose, setting, and dress

2

but differed by race: one white and one Black. This design allowed the association between perceptions about the relative effectiveness of the two statements and the race of the depicted physicians to be investigated.

Implicit (unconscious) bias is prejudice in “behavior and/or judgment that results from subtle cognitive processes and occurs at a level below a person’s conscious awareness, without intentional or conscious control” (Choate 2017). Implicit bias is a pre-reflective process formed over the course of an individual’s lifetime, resulting from exposure to direct and indirect messages, which plays a role in daily life and decision-making. Testing implicit associates, an indirect measure of social cognition, has been used as an alternative to survey-type measures of explicitly reported race attitudes and stereotypes which have garnered criticism in the past three decades (Kubota 2012, 942). The notion that implicit racial biases do, in fact, occur below a person's conscious awareness without intentional or conscious control, has been borne out through studies using fMRI to examine responses within part of the brain, notably the amygdala, hippocampus, temporal lobe, and medial frontal cortex.

This type of bias has been characterized as a “blindspot” by Mahzarin Banaji and Anthony G. Greenwald, two leading scholars in the field of implicit bias (Banaji and Greenwald 2012, 32-52). While individuals may be blind to these biases and how they affect their decisions and actions, the repercussions of these biases are often readily apparent, consequential, and far-reaching. A report published by Jo Handelsman and Natasha Sakraney (White House Office of Science and Technology Policy under the Obama administration) described implicit biases as destructive citing several examples: “Experiments show that people are more likely to hire a male candidate for a science position, rate the athletic ability of a person higher if they believe the person is African-American rather than white, and rate the verbal skills of a person higher if they think the writer is a woman rather than a man” (Handelsman and Sakraney 2012, 2-3). Implicit bias may even affect interpersonal interactions in medical settings especially in cases of racially discordant interactions. Following a study on the role that physician explicit and implicit biases play in shaping physician and patient reactions in racially discordant medical

interactions, Louis Penner and his colleagues concluded that, “relative to racially concordant medical interactions, racially discordant interactions are characterized by less patient trust, less positive

3

affect, fewer attempts at relationship building , and less joint decision-making” (Penner et al. 2009, 436).

The notion that implicit racial biases do, in fact, occur below a person's awareness without intentional or conscious control, has been borne out through studies using fMRI to examine subjects' brain activity (Kubota 2012, 944-948). To identify and study these *implicit* biases, indirect measures of social cognition are recommended over survey-type measures of explicitly reported race attitudes and stereotypes, which have garnered criticism in the past three decades (Kubota 2012, 942). The present study follows this recommendation by collecting data related to participants' conscious attitudes about the effectiveness of physician statements and analyzing whether these attitudes are affected by the race of the physician presented alongside each statement.

Understanding the ways humans perceive and evaluate race and how these processes relate to social behaviors, including physician/patient communication, have consequential effects both for the perceiver and for the perceived. While the effects of implicit bias among health care professionals has been investigated (Hall et al. 2015), the present study seeks to measure implicit biases among *patients*. Patients who perceive their physician as an ineffective communicator may have reduced trust in—and even less adherence to—care instructions (Asan, Yu, Crotty. 2021).

Method

Participants

Data were collected using Amazon Mechanical Turk, a crowdsourcing service that allows users to hire remotely-located crowdworkers (Turkers) to perform discrete on-demand tasks including responding to surveys. Table 1 reports the (self-reported) demographic information for the dataset used in the analysis:

4

Table 1.
Data description, self-report demographic information.

Gender ^a	Race ^b	Age						Total
		18-24	25-34	35-44	45-54	55-64	65+	
Female	Asian	1	1	1	0	0	0	3
	Black or African American	1	4	4	1	1	0	11
	Latino or Hispanic	0	1	0	1	0	0	2
	Mixed race	0	1	2	2	0	0	5
	Native American or Alaska Native	0	1	0	1	0	0	2
	Native Hawaiian or Pacific Islander	0	0	0	0	0	0	0
	White	5	37	27	19	5	1	94
	Other	0	0	0	0	0	0	0
Male	Asian	2	7	1	1	0	0	11
	Black or African American	0	4	1	1	0	1	7
	Latino or Hispanic	0	1	1	0	0	0	2
	Mixed race	0	8	0	3	0	0	11
	Native American or Alaska Native	0	11	1	2	0	0	14
	Native Hawaiian or Pacific Islander	0	0	0	0	0	0	0
	White	8	56	48	14	6	1	133
	Other	0	0	0	0	0	0	0
	Total	17	132	86	45	12	3	295

^a No respondents self-identified as *Non-binary / third gender*.

^b Sixteen respondents selected multiple race categories. These were added to the *Mixed race* category.

It can be seen that of the 295 included respondents, the largest 3 groups were: (a) males, age 25-34 (56); (b) males, age 35-44 (48); and females, age 25-34 (37). These self-reported demographic data resemble the characteristics of crowdsourced data reported elsewhere (Pew Research Center. 2016).

A small-scale pilot study of six participants indicated that the approximate time needed to complete the survey instrument was 100 seconds and, as has been advocated elsewhere (Ahler, Roush, Sood 2020), the amount of compensation was based on a \$15.00 minimum wage. As described in more detail in the next section, study participants were (temporarily) deceived about the purpose of the study and so it was important that no individual Turker participate more than once. Ostensibly, Turkers can be prevented from doing this administratively; however, some workers circumvent this prohibition through the use of multiple accounts (Ahler, Roush, Sood 2020). For this reason, only the earliest respondent associated with a given IP address was included.

Instrument

A survey instrument was created specifically for this study. At the conclusion of the survey, the true purpose of the study is revealed, and participants are given the opportunity to opt out (although none chose to); however, because the purpose of the study was to investigate *implicit* bias, it was necessary to initially deceive participants about the study purpose. For this reason, the survey begins with a *false* description of the study. This description is presented alongside a photograph of a physician meeting with a patient in a clinical setting. This image was shown to help participants acclimate to the inclusion of physician images as incidental features of the survey. The study was described to respondents as follows:

You are being invited to participate in a research study titled *Physician/Patient Communication Effectiveness*.

Why are we doing this research study?

The purpose of this research is to study the elements of spoken English that affect communication between physicians and patients in a clinical setting.

Who can participate in this research study?

Residents of the United States who are fluent in spoken English and have not previously taken one of our Physician/Patient Communication Effectiveness surveys.

What will I be asked to do?

If you agree to take part in this study, you will be asked to provide demographic information about yourself, answer a question about communication with your current doctor, and rate the clarity of two physician statements.

What risks does participation in this study pose to respondents?

We believe there are minimal risks associated with this research study.

To proceed with the study, respondents must acknowledge that they have read this description, are 18 years of age or older, and agree to participate. Subjects who agree then are asked to answer three demographic questions about their gender, age, and race:

Which of the following genders do you most identify with?

Male

Female

Non-binary/ Third gender

Prefer not to say

Which of the following best describes your age?

18-24

25-34

35-44

45-54

55-64

65 and over

Which of the following best describes you? Select all that apply.

Asian

Black or African American

Latino or Hispanic

Native American or Alaska Native

Native Hawaiian or Pacific Islander

White

Mixed Race

Other

After this, participants are shown what *appears* to be the first survey question, which asks about their preferences regarding receiving information and instructions from their physician:

In what form do you prefer to receive information and instructions from your doctor? In writing

Verbally

Both

No Preference

Once again, an image of a physician (in this case, working on a laptop in a medical office) is also shown. In fact, this question was unimportant to the study purpose; instead, it was intended only to further orient participants to the (apparent) nature of the survey and further acclimate them to the presence of seemingly innocuous images of physicians.

The remaining two questions were related to the study's true purpose. These questions were both the same, "*How effective is this doctor's communication?*", but each was accompanied by a different statement: the first question by *statement A*,

I sent an order for Ventolin with three refills. I recommend you come to the office to discuss your asthma so we can do a peak flow test to make sure your asthma is well controlled prior to your next refill.

and, the second by *statement B*:

Since you have a bacterial infection, I will prescribe an antibiotic. If your symptoms haven't improved after three days, or if you have questions, please call the office and we'll talk about your next steps.

These statements were printed over different background images: one of a white physician and one of a Black physician (as will be described below, which image accompanied which statement was chosen at random for each respondent).

Although seemingly as innocuous as the earlier images, these two photographs were selected for specific reasons: both feature physicians of a similar age in a three-quarter stance; wearing a light-coloured shirt, blue tie, and white lab coat with a stethoscope draped around their neck; smiling with teeth showing; and holding a binder or clipboard with their hands clasped around their waist.

Upon completion of these two questions about communication effectiveness, participants are brought to a debrief screen where the true purpose of the study was revealed:

Thank you for your participation in our study! Your participation is greatly appreciated.

Purpose of the study: earlier in our consent form we informed you that the purpose of this study was to investigate the elements of spoken English that affect communication between physicians and patients in a clinical setting. In actuality, our study is about the elements of visual imagery that subconsciously affect beliefs about communication effectiveness.

Unfortunately, in order to properly research this topic, we could not provide you with all of these details prior to your participation. This ensures that your reactions in this study were spontaneous and not influenced by prior knowledge about the purpose of the study. If we had told you the actual purposes of our study, the effect (if any) of the background images would have no longer been subconscious. We regret the deception, but we hope you understand the reason for it.

At this point, participants are given the opportunity to either acknowledge that they understand and do *not* wish to opt out or to opt out. All participants choose to remain in the study.

Procedure

Subjects were randomly assigned to one of two conditions. In condition 1, statement A was presented alongside the image of a white physician and statement B was presented alongside the image of a Black physician; in condition 2, the images were swapped such that statement A was presented alongside the image of a Black physician and statement B alongside the image of a white physician. As described above, subjects then were asked to judge the effectiveness of each statement A and B and this was accomplished using a 4-point Likert-type scale: Not effective at all, Slightly effective, Moderately effective, and Extremely effective.

While respondents were asked to rate statement effectiveness, the actual effectiveness of the specific statements was not of interest in this study. Instead, the interest here was in whether perceived differences in effectiveness between statements was affected by the race of the physician pictured alongside each statement. For this reason, the 4-category response data were only used to classify respondents into one of two groups: (a) respondents who judged statement A to be more effective than statement B and (b) respondents who did not.

It follows that every respondent could be described by two attributes: the condition to which they were randomly assigned and the group to which they were members based on their perceptions about differences in statement effectiveness. Since any respondent in either condition can be a member of either group, this leads to four possible contingencies: Group 1 / Condition 1, Group 2 / Condition 1, Group 1 / Condition 2, Group 2 / Condition 2. In this way, the data can be summarized by a 2×2 contingency table (sometimes called a cross tabulation).

If the distribution of the group classification variable (based on respondents' perceived differences in statement effectiveness) is associated with condition (based on the race of the physician presented alongside each statement), this would be evidence that implicit racial bias affected respondents' judgments about statement effectiveness. In contrast, if the group variable's distribution is about the same across condition, this would not be evidence of an association between condition and group. These two outcomes can be expressed more formally as a null and alternative hypothesis:

H₀: Condition and group are independent (when statements are presented alongside images of physicians, whether the depicted physician is Black or white does not affect respondents' judgments about statement A being more effective than statement B; null hypothesis)

H₁: Condition and group are dependent with the proportion of condition 1 respondents judging statement A to be more effective than statement B exceeding expectation (respondents are more likely to judge statement A to be more effective than statement B when statement A is presented with an image of a white doctor and statement B is presented with an image of a Black doctor; alternative hypothesis)

One way to test the independence between categorical variables (like group and condition) is to use a chi-squared test (sometimes called Pearson's chi-squared test). In brief, the test statistic for the chi-squared test is a measure of the difference between the observations as summarized in the contingency table and the contingency table that would be expected were the categorical variables independent. If the variables truly are independent, this test statistic follows a chi-squared distribution (with one degree of freedom in the case of a 2×2 contingency table). It follows that if the probability of the observed test statistic—or a more extreme test statistic—is

sufficiently improbable (for the purpose of this study,), the null hypothesis of independence between variables would be rejected and the alternative hypothesis of dependence (in this case, dependence following the structure described above) would be accepted.

Pearson’s chi-squared test is a form of proof by contradiction: the proposition of dependence is first assumed to be false and then, if a contradiction arises (in this case, a test statistic that would be highly unlikely under the null hypothesis of independence), this is interpreted as evidence that the proposition is true. In other words, if the null hypothesis is rejected, this is evidence that respondents are more likely to judge statement A to be more effective than statement B when a white doctor is depicted alongside statement A and a black doctor alongside statement B. (Note, however, that if the null hypothesis is not rejected, this would not prove the null hypothesis—it would mean only that it failed to be rejected.)

Results

Table 2 shows the contingency table for the data collected in this study.

*Table 2.
Observed contingency table.*

	<i>Condition 1^c</i>	<i>Condition 2^d</i>
<i>Group 1^a</i>	123	88
<i>Group 2^b</i>	39	45

^a *Group 1: respondents who judged statement A to be more effective than statement B.*

^b *Group 2: respondents who did not judge statement A to be more effective than statement B.*

^c *Condition 1: statement A presented with white physician and statement B with Black physician.*

^d *Condition 2: statement A presented with Black physician and statement B with white physician.*

A chi-square test of independence was performed to assess the relationship between group (based on whether respondents judged statement A to be more effective than statement B represented by the rows in Table 2) and condition (based on whether respondents were shown a white doctor with statement A and a Black doctor with statement B or the reverse represented by the columns in Table 2). There was a significant relationship between these two variables,

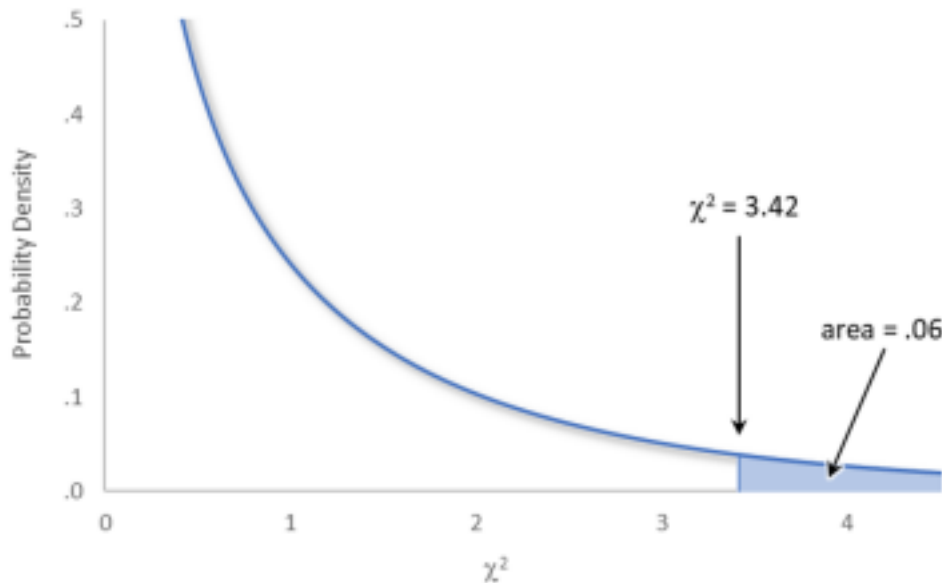
11

$$\chi^2 = 3.42 \quad \phi = .032$$

, χ^2 . Effect size, as measured by ϕ , was .11, which is associated with a $\phi = .1$ small effect.²

Figure 1 shows the probability density function for the chi-squared distribution along with the reported chi-squared test statistic. It can be seen that when the null hypothesis of independence is true, the probability of observing this—or a more extreme—test statistic is $\diamond = .032$.

Figure 1.
The probability density function for the chi-squared distribution with one degree of freedom.



Note: Also shown is the test statistic for the contingency table, Table 2, $\chi^2_{df=1} = 3.42$. The shaded region to the right of the test statistic shows that when the null hypothesis of independence is true, the probability of this—or a more extreme—test statistic is $p = .065$. However, this is based on a two-tailed test (unstructured dependence). The one-tailed probability, which is the probability of interest in this study, corresponds to half this area or $p = .032$.

¹ The two-tailed p value for a chi-squared test with one degree of freedom and a chi-squared value of 3.42 is $p = .065$. However, recall that here, the interest is in a specific dependency structure and so a one-tailed test could be used. Thus, $p_{one-tailed} = p_{two-tailed} / 2 = .065 / 2 = .032$.

² Phi (ϕ) is a measure of the association between two variables (a correlation coefficient). By convention, ϕ around .10 are associated with small effects.

Discussion

Reflect on Hypothesis

(Alternative) Hypothesis: *Condition and group are dependent with the proportion of condition*

I respondents judging statement A to be more effective than statement B exceeding expectation (respondents are more likely to judge statement A to be more effective than statement B when statement A is presented with an image of a white doctor and statement B is presented with an image of a Black doctor.

In this study, participants believed they were judging the effectiveness of two physician statements; however, this was a deception—the true purpose was to study the effects, if any, that seemingly incidental background images had on respondents’ judgments. Specifically, the images shown were of two physicians who closely resembled each other with respect to pose, setting, and dress but who differed by race: one white and one Black. Each image was presented with one of two physician statements and subjects were more likely to judge the first statement as more effective than the second whenever the former was presented alongside an image of a white physician and the latter alongside a Black physician (compared to when the images were reversed). These findings suggest that statements presented alongside images of Black physicians are perceived as being less effective than statements presented with images of white physicians.

Error Analysis

Amazon Mechanical Turk is a fast and inexpensive way to recruit survey or experiment participants; however, concerns about response quality exist. Insincere responses from survey satisficers, responses generated by “non-respondents” (bots), and falsely reported demographic data may result in attenuation of observed effect. The response quality to surveys is nearly impossible to observe because the solicitation of beliefs, attitudes, and opinions typically lack an objectively correct answer. HIT (Human Intelligence Task) completion rate is the the only signal of worker quality. Because requesters have to ability to batch approve Turker’s responses, completion rate is not necessarily an accurate signifier of quality.

Due to the anonymity of soliciting responses from remotely-located crowdworkers, Turkers’ demographic information and the location from which they are taking the survey cannot

13

be directly observed. As a result of this opacity, turkers located outside of the United States, might complete HITs limited to Americans and/or might also create multiple accounts in order

to complete the same HIT repeatedly, even when they are explicitly prohibited from completing each HIT more than once (Ahler et al.). In the case of the present survey, respondents were deceived to believe they were judging the effectiveness of two physician statements; however, the true purpose, which was revealed to respondents in a debrief at the end of the survey, was to study the effects, if any, that *seemingly* incidental background images had on respondents' judgments. It was important that no individual Turker participate more than once. Responses from duplicated IP addresses were removed, thus reducing the power of the data.

Future Research

Testing the effect of physicians' race on the perceived effectiveness of physicians' communications in order to measure the effect (if any) of implicit racial bias on respondents' judgments sheds light on a small aspect of the racially prejudiced conditions that are pervasive even in race-blind institutions such as medical schools and hospitals in the United States. If we were to look objectively at our systems, institutions, laws, and policies, they are constructed in a way that produces racial inequality and will continue to do so without some sort of proactive intervention. According to the research conducted by the Pew Research Center, "The Black population of the United States is growing. In 2019, there were 46.8 million people who self-identified as Black, making up roughly 14% of the country's population. This marks a 29% increase since 2000 when there were roughly 36.2 million Black Americans" (Tamir, Budiman, Noe-Bustamante, Mora. 2021). In contrast, the Association of American Medical Colleges (AAMC) reported in 2018 that 5% of all active physicians in the United States were Black or African American (Association of American Medical Colleges 2019) and in 2019, the AAMC reported that 3.6% of US medical school faculty were Black or African American (Guevara, Wade, and Aysola 2021). Thus, Black or African American physicians and medical school faculty are underrepresented in medicine (URM).

Of all active physicians in the US, 17.1% identified as Asian, 5.8% identified as Hispanic, .3% identified as American Indian or Alaska native. This research may be extended to understand the effects of implicit bias on the perceptions of physicians from other racial and ethnic groups that are URM as well as female physicians who, despite comprising 48% of the

general US population in 2018 (Statista 2022), made up only 35% of active

physicians (Association of American Medical Colleges 2019).

As previously discussed, implicit bias is the unconscious collection of stereotypes and attitudes that are developed toward certain groups of people as a result of experience, media exposure, cultural conditioning, and environment. Due to the subjective nature of bias formation, further study of the perceptions of respondents on the basis race, ethnicity, age, or gender will contribute to the understanding of how biases compare across demographic subgroups. This type of data collection and analysis will necessitate a larger sample size and mitigation of barriers to subgroup participation in survey administration in order to improve the quality and completeness of demographic subgroup data.

15

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16

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