Racial Bias in the Perception of Asian Americans' Pain: Considering Potential Causes, Mechanisms, and Consequences

Brandon Wai Ng

Darien, Illinois

Bachelor of Arts, Honors, Northwestern University, 2011

Master of Arts, University of Virginia, 2013

A Dissertation presented to the Graduate Faculty

of the University of Virginia in Candidacy for the Degree of

Doctor of Philosophy

Department of Psychology

University of Virginia

May, 2017

Acknowledgements

This dissertation represents the combined effort of so many individuals that have shaped me as a scientist, scholar, and human being. First and foremost, I would like to express my gratitude to my incredible dissertation committee at UVA: Sophie Trawalter, Jamie Morris, Shige Oishi, and Joanna Williams. Thank you all so much for your thoughtful feedback on the work I care about so deeply.

To my dissertation research advisor, Sophie Trawalter, and my faculty research advisors in the psychology department, Jamie Morris, Shige Oishi, and Jerry Clore, thank you all so much for your time, dedication, and energy over the past six years of my life. Thank you all for teaching me the ins and outs of the research process, and in doing so, teaching me so much about myself. For the rest of my life, I will forever be proud to say that I was a member of your labs, and that I was one of your graduate students. The amount of influence each of you has had on my development—intellectual, professional, and personal—is truly incapable of being defined. It is genuinely an honor to have been a part of each of your academic legacies, and I only hope to make you all proud wherever life takes me. To Sophie, thank you so much for your unwavering support and your detailed, thoughtful feedback. It is truly remarkable when I think back to the day when I first came to you with the research question that has now become my dissertation. Thank you for being such a wonderful mentor to me.

To Jamie and Shige, my primary and secondary research advisors, thank you for being such an integral part of my research from day one, all of your guidance and words of wisdom, and for all of the fun-filled lab meetings (that are too often pressed for space due to the sheer number of students wanting to be a part of such wonderful labs). To Jerry, thank you for being

one of the kindest and most supportive advisors I could ever ask for, and thank you for all of the laughs during our research meetings that always seemed to pass by way too quickly.

I would also like to thank the Presidential Fellowship in Data Science and UVA's Data Science Institute for the support of my research, and the array of collaborators with whom I have been privileged to work: Adi Shaked, Yu Huang, Jerry Clore, Shige Oishi, and Laura Barnes. I am also incredibly grateful to Eileen Chou and Julia Schnyer for all of their generosity and kindness. To Joan Chiao and Wendi Gardner, my undergraduate advisors at Northwestern University, thank you for inspiring me to embark on this journey and for showing me how fascinating, challenging, and fun research can be. To Lisa Hechtman, my graduate student mentor, thank you for your encouragement over the years, especially when I decided to attend UVA—your alma mater, and soon to be mine as well.

The work in this dissertation would not have been possible without my dedicated team of research assistants: Ryan Pugh, Grace Gronvold, Alexandra Mitchell, Mookie Goodson, and Minjoo Kang, who gave so much of their time and energy to ensure the success of my research. Mentoring wonderful undergraduates has been one of the most rewarding parts of my graduate career. Thank you for bringing such enthusiasm, optimism, and happiness to all of my lab meetings (even when we met on weekends or evenings). And thank you to my amazing research team during my National Science Foundation East Asia and Pacific Summer Institute (EAPSI) fellowship in Singapore for one of the most thrilling and worthwhile experiences of my life—especially to my mentor, Bobby Cheon, and Irene Melani.

And finally, an immense thank you to my family and graduate school friends. To my parents, Henry Ng and Karen Ng; to my siblings, Justin Ng and Rachel Ng; and to my wonderful friends that I have made in graduate school, especially Adi Shaked, Yu Huang, Philip Yen,

Lindsay Palmer, and Liya Yu: I truly would not have been able to make it to this point without you. It is an honor to be a part of your lives, and thank you for being such an important part of mine. Words cannot express how indebted I am to each and every one of you for your kindness, love, and support-- for celebrating with me in my moments of success and providing a listening ear and guiding feedback when I needed it the most. Thank you for everything.

Abstract

Immense healthcare disparities exist between Whites and racial minority group members in the United States, but almost no work has focused on disparities between Whites and Asian Americans. Existing research provides some evidence for disparities between Asians and Whites in diagnosis and treatment with regard to mental and physical health, but the work that has explored Asian-White disparities has primarily focused on patient-related factors, and has not explored the role racial bias may play. My dissertation aims to address this gap in the literature by investigating racial bias in the perception of Asian Americans' pain. Studies 1 and 2 demonstrate that White Americans assume that Asians feel less pain and face greater adversity than do Whites. I reason this is because, in the absence of prior information, Whites assume that Asians are "perpetual foreigners," and thus lower status, which leads to underestimating their pain. Study 3 demonstrates a reversal of the bias; I reason this is because, given the provided information, Whites in this study assumed the Asian targets were "model minorities" rather than "perpetual foreigners"; they assumed the Asian targets had high status, leading them to overestimate their pain. In Study 4, I directly test this hypothesis by examining whether information relating to target status and/or hardship moderates the Asian-White racial bias in pain perception—namely, whether information consistent with the perpetual foreigner stereotype leads to perceptions that Asians feel less pain relative to Whites, and whether information consistent with the model minority stereotype leads to perceptions that Asians feel more pain relative to Whites. Taken together, my dissertation documents a novel racial bias in pain perception toward Asian Americans—one that is intricately tied to the divergent, albeit coexisting, stereotypes surrounding Asians in the United States. I conclude by discussing the implications of this bias for large-scale disparities in healthcare between Asians and Whites.

Keywords: pain, racial bias, Asian, model minority, perpetual foreigner, health disparities

Racial Bias in the Perception of Asian Americans' Pain: Considering Potential Causes, Mechanisms, and Consequences

Overview of Historical and Contemporary Racial Bias against Asian Americans

Asian Americans have had a long and complicated history in the United States—a history that is often untold and little known (Daniels, 1997). Although Asian Americans are commonly presented as a success story in contemporary America, racial bias and discrimination against Asians has been pervasive from the very beginning of Asians' presence in the United States.

Chinese immigration to the United States began in the early nineteenth century, and immigrant Chinese laborers were instrumental in the construction of the American Transcontinental Railroad. In spite of this, eventually Asians' presence led to American anxiety about foreigners stealing domestic jobs and the more extreme fear of the United States being completely overtaken by Asians: the so-called "Yellow Peril." Congress responded by issuing numerous discriminatory policies to limit the influx of Asian immigration, the most notable being the Chinese Exclusion Act of 1882. The Chinese Exclusion Act not only banned Chinese laborers from entering the United States, but also prevented them from obtaining American citizenship. To date, it is the only piece of American immigration legislation that has banned immigration from a specific ethnic group, and it remained in effect for over 60 years, until it was eventually repealed in the midst of World War II, in 1943 (Leong & Okazaki, 2009; Takaki, 1989).

During World War II, with the United States fighting against Japan, Japanese Americans became the new targets of racial hatred and outright discrimination. Although many Japanese Americans were born and raised in the United States, the American government feared that Japanese Americans, as a function of having Japanese ancestry, were working as spies. As a

result, the government, in the absence of legal evidence, deprived Japanese Americans of their constitutional rights and protections, and forcibly relocated them to internment camps, stripping them of their homes, jobs, and property in the process (Leong & Okazaki, 2009; Takaki, 1989).

In contemporary America, Asian Americans continue to confront racial stereotyping and prejudice. Asian Americans are viewed primarily through two lenses, through two distinct stereotypes: as model minorities and as perpetual foreigners, both of which have been detailed in prior literature (e.g., see Sue, Lin, Bucceri, Nadal, & Torino, 2007). The model minority stereotype is the assumption that Asian Americans are **privileged and high-status**, because of their competence and motivation to succeed (Wong & Halgin, 2006). Indeed, previous work has shown that people hold predominantly positive stereotypes of Asian Americans: that is, they are generally perceived as intelligent, capable, and successful (Czopp, Kay, & Cheryan, 2015; Fiske, Cuddy, & Glick, 2007; Maddux, Galinsky, Cuddy, & Polifroni, 2008; Wong, Lai, Nagasawa, & Lin, 1998). It is important to note, however, that despite the seemingly positive nature of the model minority stereotype and other beliefs about Asians, Asian Americans do not construe such associations as such and actually find them over-generalizing, offensive, and distressing (Siy & Cheryan, 2014; Sue et al., 2007; Wu, 2003).

Asian Americans are also stereotyped as perpetual foreigners. The perpetual foreigner stereotype is the assumption that Asian Americans are aliens in America-- that their homeland is not the United States, but rather their country of origin in Asia. Simply stated, Asian Americans are denied their American identity (Cheryan & Monin, 2005; Guendelman, Cheryan, & Monin, 2011; Wang, Minervino, & Cheryan, 2013): they are assumed to be foreigners, regardless of their actual American cultural knowledge or the amount of time that they have lived in the United States. In fact, one study found that even when they were explicitly labeled as American,

Asian targets were still viewed as significantly more foreign than Black, Hispanic, and White Americans (Cheryan & Monin, 2005). Only Whites are privileged enough to be viewed as Americans by default (Devos & Banaji, 2005). To the extent that Asians are associated with being the "Other," and thus perpetually out-of-touch with western culture, language, and customs, the perpetual foreigner stereotype also confers ascriptions of **assimilation difficulty, hardship, and low status**.

Although seemingly harmless, perhaps even complimentary, these stereotypes can, and do, lead to negative racial attitudes and discrimination against Asian Americans. For instance, Butz and Yogeeswaran (2011) found that because Asian Americans are automatically assumed to be foreign and Asian countries (China, Japan) are viewed as economic threats, priming non-Asian participants with macroeconomic threat increased prejudice toward Asian Americans. This increase in negative racial attitudes was not general across all racial minority groups (e.g., Black Americans), but was specific to Asian Americans. In a second line of work, Yogeeswaran and Dasgupta (2010) showed that relative to White faces, Asian faces were more implicitly associated with foreignness, and that the strength of the Asian-Foreign association predicted subsequent hiring discrimination against Asians for an American national security job. The racial bias was explained by perceived loyalty: because participants viewed Asians to be more foreign, they perceived their loyalty to the United States as more tenuous, which thus led them to select *against* Asian targets in hiring decisions.

Discrimination against Asians in the Healthcare Domain

In the present work, I examine how these pervasive stereotypes and related beliefs about Asian Americans may impact racial bias and discrimination in another domain: health and healthcare. Specifically, I investigate how these stereotypes may shape racial bias in the

perception of Asian Americans' pain, and how this racial bias in pain may in turn affect subsequent health-related outcomes.

This work is of timely importance. Existing research on stereotyping, prejudice, and discrimination against Asian Americans in healthcare is relatively scarce. The majority of studies that have investigated racial health disparities between White Americans and racial minorities have not recruited Asian American participants at all (see Ezenwa, Amerigo, Ward, & Serlin, 2006, for review). And for the work that has investigated health disparities (of any kind) between Whites and Asians, the focus has rarely been on racial bias, but instead on other factors.

Health Disparities between Whites and Asians, and Their Proposed Causes

Research suggests that Asians overall, relative to Whites, are significantly less likely to seek mental health treatment when experiencing psychological problems, and even when they do, they terminate treatment prematurely at much higher rates (Abe-Kim et al., 2007; see Leong & Lau, 2001, for review). More strikingly, prior work has demonstrated that Asians are also less likely to receive pain medications. For example, Pletcher, Kertesz, Kohn, and Gonzales (2008) examined the rates at which members of different minority groups (White, Black, Hispanic, and Asian, which they combined with participants who identified as "Other") received opioid analgesics in US emergency departments for various types of painful health conditions. Relative to Whites, participants in the "Asian/Other" category were significantly *less* likely to receive opioid analgesics, and these differences held, and became starker, with increasing levels of pain severity. The racial disparity in pain treatment remained true after other patient factors were statistically controlled for as well (Pletcher et al., 2008). Relatedly, Rust and colleagues (2004) examined the rate at which Medicaid recipients in Georgia received epidural analgesics to alleviate pain during labor. Results showed that Asian women were 69% less likely to receive an

epidural analgesic relative to White women. While the rate of epidural use was 59.6% for White patients, the rate dropped to 48.2% for Asian patients (Rust et al., 2004; Ezenwa et al., 2006).

In evaluating the reasons for these disparities, however, researchers mostly focus on patient-related factors; namely, the emphasis in Asian cultures on preserving face and honor to the family, the stigma that is placed on mental illness in Asian American communities, and communication difficulties due to language barriers or a cultural mismatch between Asian patients and White providers (Abe-Kim et al., 2007; Leong & Lau, 2001). Researchers seldom focus on provider-related factors, and almost never on providers' racial bias per se. As far as we can tell, the only literature on healthcare disparities that mentions the potential role of *racial bias* toward Asian Americans—prejudicial beliefs or attitudes among healthcare providers-- is literature on cancer prevalence and mortality rates (Ibaraki, Hall, & Sabin, 2014). Cancer disparities exist between Asian Americans and other racial groups (Murphy, Xu, & Kochanek, 2012, as cited in Ibaraki et al., 2014), and previous research has shown that this is primarily due to Asian Americans not being diagnosed with cancer until later stages (Ibaraki et al., 2014; Smigal et al., 2006). These disparities in prevalence, diagnoses, and mortality rate seem to stem from differences in the rates of physician recommendation for preventative cancer screening. Indeed, physicians are less likely to recommend Asian Americans to pursue preventative cancer screenings, and as a result, the rate at which Asian Americans actually receive cancer screenings is lower than other racial groups, including other racial minorities in some cases (see Ibaraki et al., 2014, for review).

Ibaraki et al. argue that perhaps one reason why doctors may be less likely to encourage Asian Americans to receive preventative cancer screening is because of the model minority myth. Because Asian Americans are stereotyped as being successful, diligent, and responsible,

they may also be associated with exercising good judgment over health decisions, thus obviating the need for cancer screening even when their symptoms warrant it. Indeed, preliminary data suggests that Asian Americans are perceived as being healthier and less likely to suffer from adverse health conditions, relative to other ethnic groups (Ibaraki et al., 2014). In this way, racial bias in the form of seemingly harmless, or even positive, stereotypes toward Asian Americans may contribute to adverse health disparities for Asian Americans at the macroscopic level.

The Present Work

In the present work, I focus on the potential role of racial bias in the perception of Asians' and Asian Americans' pain experience. Although there has been no work to our knowledge examining racial pain biases against Asians, existing literature provides initial evidence for racial biases against some racial minority group members. For example, Trawalter, Hoffman, and Waytz (2012) randomly assigned participants to view either a Black target or White target, and asked participants to estimate how much pain the target would experience in different physical pain scenarios. Demonstrating causal evidence for the racial bias, participants consistently underestimated the pain of the Black target, relative to the White target. However, Trawalter and colleagues (2012) found that the racial bias in pain perception was not explained by race *per se*, but rather was rooted in assumptions about hardship and status that race made salient. Indeed, framing the Black target as high status eliminated the racial bias (Trawalter et al., 2012, Study 6), and in another experiment (Trawalter et al., 2012, Study 5), the effect of the target's race (Black versus White) on participants' pain ratings was not significant once perceptions of the targets' status were statistically controlled for. In sum, people systematically underestimate Blacks' pain, due to a priori assumptions that Blacks have lower status and/or

have faced greater amounts of hardship than Whites have (Hoffman & Trawalter, 2016; Trawalter et al., 2012).

The existing work thus gives rise to two intriguing, and hitherto untested, possibilities for how people may perceive Asians' and Asian Americans' pain. On the one hand, to the extent that the perpetual foreigner stereotype confers Asians with low status, people may assume that Asians too feel less pain than Whites. On the other hand, to the extent that people assume that Asians are a model minority, and thus perceive them to be especially high-status and privileged, this may lead people to assume that Asians feel more pain than do Whites. I take an experimental approach to test these two predictions, specifically documenting the contexts under which people underestimate and overestimate Asians' pain and exploring the potential ramifications this may have for health and healthcare. As such, the proposed dissertation stands poised to contribute to our understanding of racial bias toward Asians and Asian Americans and, by implication, large-scale health disparities between Asians and Whites.

Overview of Studies

The present dissertation primarily investigates the perception of Asian Americans' pain from the perspective of majority group members, and as such, Studies 1-3 explored the racial bias in pain perception and lay stereotypes about Asian Americans predominantly from the perspective of mostly White Americans (assuming, as in prior work, that White Americans would be most likely to demonstrate the bias; Leong & Schneller, 1997). In Study 4, where I manipulated target information specifically, a more diverse sample was recruited to bolster generalizability. I hypothesized that stereotypes and perceptions of Asian Americans, as a minority group in the United States, constituted a cultural phenomenon, so for all studies, I limit analyses to participants born in the United States. In Studies 1 and 2, I show that Whites assume

that Asians feel less pain than do Whites. And in Study 3, I show that Whites sometimes also assume that Asian Americans feel more pain than do Whites. I argue that in Studies 1 and 2, the perpetual foreigner stereotype was particularly salient to participants. This imbued the Asian targets with ascriptions of hardship and low status, thus leading participants to underestimate Asian Americans' pain relative to Whites'. However, in Study 3, I posit that the model minority stereotype was most accessible. Thus, participants assumed that Asians were privileged and high-status, and assumed they would feel more pain relative to Whites.

To explain these divergent results, Study 4 employed a moderation approach, in which I used a crossed design to manipulate hardship and status information explicitly. In this way, the Low-Status/ High-Hardship Asian target was intended to bring forth the perpetual foreigner stereotype, whereas the High-Status/ High-Hardship Asian target was intended to bring forth the model minority stereotype. Supporting the results of Studies 1 and 2, participants underestimated the pain of low-status Asian targets relative to White targets, but did not do so for high-status Asian targets. Moreover, participants' evaluations of a control Asian target (no demographic information) most resembled the Low-Status/ High-Hardship target, lending credence to the notion that in the absence of prior information, Asian Americans are construed as perpetual foreigners. Taken together, the studies in this dissertation document a novel racial bias toward Asians' and Asian Americans' pain experience that has the potential to shape important health-related and policy-related decisions.

Study 1

In Study 1, I conducted an initial test of racial bias in perceptions of Asians' vs. Whites' pain. I presented participants with pairs of White and Asian targets, and asked them to choose

which target would experience more pain in various pain scenarios. In this first study, I provided participants with minimal information about each target—just name, gender, and race information. This study, then, provides a first test of the bias as it might function in the real world, when people have minimal information.

Method

Participants. Participants were 60 predominantly White American undergraduates at the University of Virginia, who participated in partial fulfillment of their psychology course requirements (29 women and 31 men, 1 multi-racial).

Procedure. After participants provided informed consent and reported their age and gender, they were told that they were completing a study on social perception and how people formed impressions of others. Participants were then provided with photos of two gender-matched targets, one Asian target and one White target (taken from the Montreal Set of Facial Displays of Emotion; Beaupré, Cheung, & Hess, 2000). Three different sets of pairings were used for each gender to control for the effect of any one pairing of photos. I imbued the targets with generic names, consistent with Waytz, Hoffman, and Trawalter (2014). If participants were male, they saw "John," an Asian male, and "Jeff," a White male. Conversely, if participants were female, they saw "Jessica," an Asian female, and "Janet," a White female. To understand the general nature of the bias, participants were given minimal demographic information (only the gender and race of the targets). Participants were asked to imagine meeting both of the targets and to report any impressions they had of them. This was simply to prompt participants to attend to the targets. Then, participants were told to imagine both of the targets in fourteen different pain scenarios (seven physical pain scenarios followed by seven social pain scenarios; Cronbach's alpha = .72), which ranged from benign injuries (e.g., burning their hand touching a

hot dish, not being picked for a group assignment) to more severe injuries (e.g., dislocating their shoulders playing sports, getting bullied by a colleague at work). For each scenario, participants were asked to decide which of the targets would experience more pain.

Participants were then asked to make seven adversity judgments: to choose which target experienced more privilege, adversity, luck, hardship, obstacles, wealth, and suffering (Cronbach's alpha = .77). Participants then filled out some demographic questions and were debriefed. For all studies in the dissertation, only the results for the primary dependent variables of interest are reported; the interested reader may refer to the supplemental materials for information on other measures.

Results

Primary Results: Perceptions of Pain. I created composite scores for all primary measures of interest: pain and adversity.[1] Consistent with Waytz et al. (2014), for the pain items, I counted the number of scenarios for which the participants chose the Asian target to experience more pain (which ranged from a low of 0 to a high of 14) to create a composite pain score. Scores lower than 7 indicate that participants felt the Asian target would experience less pain relative to the White target, whereas scores higher than 7 indicate the opposite. I then conducted a one-sample *t*-test, comparing the sample mean against the neutral midpoint of 7. For the pain items, scores below 7 indicated that participants perceived the Asian target to feel *less* pain than the White target. Participants ascribed significantly less pain to the Asian targets, relative to the White targets ($M = 6.23$, $SE = 0.42$), $t(54) = -1.83$, $p = .072$, $d = 0.25$. Readers may refer to the supplementary materials for additional analyses.

[1] I excluded participants that did not answer all fourteen scenarios for the pain items or all seven adversity items for each respective dependent measure; thus, degrees of freedom for the dependent measures differ. For correlational analyses, participants were only included if they answered all scenarios for both measures.

Secondary Results. To assess perceptions of the targets' adversity, I counted the number of scenarios for which participants chose the Asian target to be more privileged (appropriate items were reverse-scored and scores ranged from a low of 0 to a high of 7). Scores below 3.5 indicated that participants perceived the Asian target to be more privileged (higher-status) than the White target. Consistent with predictions, participants assumed that the Asian target experienced marginally greater amounts of adversity and hardship than the White target (M = 2.96, SE = 0.29), $t(55) = -1.86$, $p = .068$, $d = 0.25$. However, perceptions of the targets' adversity did not correlate with perceptions of their pain: $r\ (49) = -.02$, $p = .881$.

Discussion

The results of Study 1 provide initial evidence that, given minimal information, Whites assume a priori that Asians feel less pain than do Whites. They also assume that Asians face greater hardship than do Whites. However, perceptions of hardship were not related to perceptions of pain. I used a forced-choice paradigm to prevent socially desirable responding (i.e., reporting that all targets are the same—they all feel the same amount of pain) but this all-or-nothing aspect may have made it difficult to capture such a relationship between hardship and pain. In Study 2, I thus replicate and extend Study 1 by using a different paradigm—one that uses a continuous measure for both hardship and pain.

Study 2

In Study 2, I sought to replicate Study 1 using a different paradigm. Instead of measuring bias using a purely forced choice paradigm, I used a continuous measure. This continuous measure should allow for a more sensitive test of measured mechanisms. In replication of Study 1, I hypothesized that participants would assume the Asian target would feel less pain than the White target. Study 2 was also a within-subjects design.

Method

Participants. Participants were 68 predominantly White American undergraduate students born in the United States (51 women and 17 men, 1 multi-racial) at the University of Virginia who participated in partial fulfillment of their course requirements or as volunteers.

Procedure. The stimuli and general procedure for Study 2 were virtually identical to Study 1. After providing informed consent, participants reported their age and gender. They were then told that the purpose of the study was to understand how people form impressions of others, and were provided with two gender-matched targets (one Asian and one White). I again used three different pairings to control for the effect of any one pairing. They were again provided with the name ("John" and "Jeff" for male participants, "Jessica" and "Janet" for female participants), gender, and race of each target, and were asked to imagine what it would be like to meet them.

Participants were then provided with fourteen pain scenarios (seven physical pain and seven social pain; Cronbach's alpha = .74) and were asked to judge which target would feel more pain on a *continuous* 6-point Likert scale with no midpoint (1 = Asian target would experience a lot more pain than the White target; 6= White target would experience a lot more pain than the Asian target). Of note, this measure retained the "forced choice" aspect in that participants had to choose between the Asian or White target, but participants were also allowed to vary the extremity of their choice, which allowed the dependent measures to be measured as continuous variables. They subsequently completed the seven adversity scenarios (Cronbach's alpha = .88) from Study 1. Finally, participants completed other measures assessing their perceptions of the target (to assess similarity and identification), some demographic questions, and were then debriefed.

Results

Primary Results: Perceptions of Pain and Adversity. I coded participants' pain and adversity ratings as continuous variables. Participants' judgments for each of the fourteen pain scenarios were averaged to form composite scores. Lower scores indicated that participants perceived the Asian target to feel a lot more pain relative to the White target, whereas higher scores indicated the opposite. I then conducted a one-sample *t*-test comparing the sample mean to the neutral midpoint of 3.5 (scores could range from 1-6). Consistent with predictions, participants again perceived the Asian target to feel significantly *less* pain relative to the White target (M = 3.74, SE = 0.06): $t(67) = 3.82$, $p < .0005$, $d = 0.45$.

As I replicated the racial bias in pain perception, I next examined perceived adversity. I averaged the adversity items (appropriate items were reverse-scored), and scores again ranged from 1 to 6 (participants with missing data had the remaining answered items averaged together). Lower-scores (below the neutral midpoint of 3.5) indicated that participants perceived the Asian target as having a much better life than the White target, whereas higher-scores indicated that participants perceived the White target as having a much better life than the Asian target. As predicted, participants perceived the Asian target to have lived a harder life and overcome more adversity than the White target (M = 3.82, SE = 0.09), t (67) = 3.58, p = .001, d = 0.43. However, once again, pain ratings did not correlate with adversity, $r(66) = .17$, $p = .172$.

Secondary Results. For consistency across studies, the key variables of interest—the pain items and adversity—were also coded as forced choice variables, as in Study 1. The number of scenarios for which the participant chose the Asian target over the White target was summed, and then compared to the neutral midpoint of 7 (indicating no racial bias). Consistent with Study

1, participants assumed that the Asian target would experience *less* pain than the White target, $t(67) = -4.17$, $p < .0005$ ($M = 5.59$, $SE = 0.35$), $d = 0.51$. There was no significant difference from the neutral midpoint for adversity when coded as forced choice, although the pattern was consistent with Study 1 (Asian targets perceived to have greater adversity; $M = 3.08$, $SE = 0.31$), $t(63) = -1.35$, $p = .182$, $d = 0.17$.[2] Thus, the overall pattern of results held when coded as continuous measures or as forced choice. However, again, coded as forced choice, there was no correlation between adversity and pain, $r(62) = .05$, $p = .704$.

Discussion

Study 2 conceptually replicated and extended the results of Study 1. In the absence of prior information, White American participants assumed a priori that the Asian target would feel less pain than the White target. Participants, once again, ascribed significantly greater amounts of adversity and hardship, and thus lower status, to the Asian targets but adversity and hardship were not correlated with pain perceptions. One possibility is that there was simply not enough variance in participants' perceptions of hardship. The variance may have been especially limited, since Studies 1 and 2 employed forced-choice paradigms. Of note, however, in both studies, participants ascribed less pain to Asian targets, and higher amounts of perceived adversity and hardship—in line with the perpetual foreigner stereotype. In completed Study 3, I thus attempted to manipulate the salience of the perpetual foreigner stereotype to see whether that might shift perceptions of pain.

Study 3

In Study 3, I conceptually replicated and extended Studies 1 and 2. Instead of using a within-subjects design (Studies 1 and 2), I used a between-subjects design in which participants

[2] Of note, when coded as forced choice, 4 participants were excluded for not completing all of the adversity scenarios, as mentioned above. All of the excluded participants, however, judged the Asian target to feel more adversity. I suspect that results would have been more robust if those 4 participants were included.

were randomly assigned to rate the pain of an Asian or White target. In addition, I attempted to manipulate the salience of the perpetual foreigner stereotype. Participants were randomly assigned to rate a target that was either a White American, White foreigner, Asian American, or Asian foreigner. I predicted that White participants in the Asian-foreign target condition would give the lowest pain ratings and participants in the White-American target condition would give the highest pain ratings. I predicted that participants in the other two conditions (Asian-American and White-foreign would fall in the middle).

Method

Participants. Participants were 253 White American undergraduate students at UVA who participated in partial fulfillment of their course requirements. Of those, 241 were US-born (96 women, 145 men, 4 multi-racial).

Procedure. After providing informed consent, participants self-reported how much pain they would feel in eighteen different physical pain scenarios, consistent with Trawalter et al. (2012). They subsequently provided self-ratings for eighteen different social pain scenarios, followed by ratings of their own adversity along with other measures. Participants were then randomly assigned to view either a gender-matched White American, White foreign (Russian), Asian American, or Asian foreign target (Japanese), and were asked to rate how much pain they would feel in 18 physical pain scenarios and 18 social pain scenarios (Cronbach's alpha = .94), in addition to how much adversity they felt the target (Cronbach's alpha = .71) had faced and how foreign the target was. To ensure consistency across targets, similar and culturally appropriate names were used ("Sam/Samantha" [White American and Asian American male and female targets], "Sergei/ Stesha" [White foreign male and female target, respectively] and "Satoru/ Shizuru" [Asian foreign male and female target, respectively]. Consistent with prior

work (Trawalter et al., 2012), I created composite scores for the primary dependent variables of interest: pain items (physical pain and social pain were averaged to form a composite pain score) and adversity (see Appendix C for measures and descriptions of the targets).

Results

Manipulation Check: Perceptions of Foreignness. First, I examined whether participants perceived the foreign targets as more foreign than the American targets. Recall that the manipulation was meant to elicit the perpetual foreigner stereotype for participants in the Asian target/foreign condition (relative to the White target conditions and the Asian target/American condition). I conducted an ANCOVA on participants' perceptions of the targets' foreignness, controlling for gender and participants' self-reports of their own foreignness (as in Trawalter et al., 2012). There was a significant main effect of target race: $F(1, 235) = 34.17$, $p < .0005$ and a main effect of target foreignness: $F(1, 235) = 241.63$, $p < .0005$. There was also a significant target race by target foreignness interaction: $F(1, 235) = 16.02$, $p < .0005$. Separate ANCOVAs revealed that framing the White target as American attenuated ascriptions of foreignness ($M = 1.57$, $SE = 0.10$) relative to the White foreign target ($M = 3.70$, $SE = 0.10$), , $F(1, 112) = 239.20$, $p < .0005$. However, although framing the Asian target as American slightly reduced the perceived foreignness of the Asian American target ($M = 2.66$, $SE = 0.12$) versus the foreign Asian target ($M = 3.93$, $SE = 0.12$), the difference was much smaller, $F(1, 120) = 55.73$, $p < .0005$. In other words, framing the Asian American target as being explicitly born and raised in the United States was not sufficient to eliminate the perpetual foreigner stereotype entirely: Asian Americans were still viewed as foreign. The manipulation was thus not successful at shifting participants' perceptions of Asian targets' foreignness.

Perceptions of Pain. Participants' pain ratings for the scenarios were averaged. To examine perceptions of pain, we conducted a 2 (Target Race: Asian, White) by 2 (Target Foreignness: American, Foreign) between-subjects ANCOVA, controlling for gender and self-reported pain. There was a significant main effect of target race, F (1, 235) = 15.72, $p < .0005$, such that participants assumed that Asian targets as a whole would feel *more pain* (M = 2.52, SE = 0.03) than White targets as a whole (M = 2.37, SE = 0.03), d = 0.51. There was no significant main effect of foreignness, F(1, 235) = 0.00, p = .954, and no significant interaction between target race and foreignness, F(1, 235) = 2.43, p = .120. See Figure 1.

Perceptions of Adversity. I next explored participants' perceptions of the targets' adversity and hardship. Consistent with model minority stereotypes (and inconsistent with perpetual foreigner stereotypes), there was a significant main effect of target race, such that people perceived Asian targets overall as having a *more privileged* life (M = 2.85, SE = 0.04), relative to White targets (M = 2.72, SE = 0.04), F (1, 235) = 4.40, p = .037. There was also a main effect of target foreignness, such that participants perceived American targets overall (M = 2.92, SE = 0.04) as having a more privileged life than foreign targets overall (M = 2.65, SE = 0.04), F(1, 235) = 21.66, $p < .0005$. Of note, there was a significant interaction between target race and foreignness, F (1, 235) = 4.26, p = .040. Although participants assumed that White foreigners struggled with more adversity relative to White Americans, they assumed that Asian *Americans* and Asian foreigners were equally high in terms life hardship. The means were as follows: White American (M = 2.92, SE = 0.06) and Asian American (M = 2.93, SE = 0.06) targets were ascribed the greatest amount of privilege and status, followed by Asian foreigners (M = 2.77, SE = 0.06), and White foreigners (M = 2.52, SE = 0.06). And of note, the partial correlation between pain and adversity, controlling for gender and self-ratings for appropriate

measures, indeed showed a significant correlation between pain and adversity, r (235) = 0.29, p < .0005, such that higher amounts of perceived target privilege (and thus, less adversity) were significantly associated with higher assessments of pain (see Figure 2).

Discussion

In Study 3, I attempted to manipulate the perceived foreignness of Asian targets to test whether "perpetual foreigners" are perceived as feeling less pain and "model minorities" are perceived to feel more pain than do Whites. The manipulation, however, did not shift participants' perceptions of the targets' foreignness. Still, participants exhibited a racial bias in pain perception. Contrary to the results of Studies 1 and 2, where White American participants ascribed less pain to Asian targets than White targets, Study 3 participants perceived Asian targets overall to feel *more* pain than White targets, and perceived Asian targets to be more privileged as well. Finally, ascriptions of pain were significantly associated with ascriptions of status and hardship, such that higher amounts of perceived privilege (lower amounts of hardship) were associated with higher assessments of pain.

Interim Summary of Studies 1-3

At first blush, the conflicting findings between Studies 1 and 2, and Study 3 are puzzling. I think the reason for the different racial bias observed in Study 3 versus Studies 1 and 2, was perhaps due to the differing salience of the two primary stereotypes of Asians in the United States—as perpetual foreigners (Studies 1 and 2) or as model minorities (Study 3). If and when Whites call to mind the perpetual foreigner stereotype, they assume Asians feel less pain; if and when they call to mind the model minority stereotype, they assume Asians feel more pain.

In this way, I would argue that because participants only saw the face of the Asian target and received no other information (aside from a generic name), participants in Studies 1 and 2

construed the Asian targets as *perpetual foreigners*, and thus associated them with hardship and low status, which led to underestimating their pain. However, because the Asian targets in Study 3 were American (or Japanese nationals, which the participants interpreted to be privileged), participants construed the Asian targets as *model minorities*, which brought forth associations of high status and privilege, leading them to overestimate Asians' pain. Thus, in Study 4, I employed a moderation approach, explicitly manipulating information in line with the predominant stereotype through which the Asian targets were construed, to test this hypothesized explanation underlying the divergent results in Studies 1 to 3. In addition, because hardship, in addition to status (although very much related to hardship) are both related to the model minority stereotype (Wong & Halgin, 2006) and have been posited in prior research to influence perceptions of others' pain (Hoffman & Trawalter, 2016; Trawalter et al., 2012), I manipulated both of these constructs in a crossed design to determine which more significantly predicted the racial bias in pain perception. I piloted these vignettes extensively to ensure the validity of the manipulation, as detailed below.

Pilot to Study 4

Method

Participants. Participants were 88 self-identified predominantly White American UVA undergraduates (39 women, 49 men, 1 multi-racial) that participated in partial fulfillment of their course requirements.

Procedure. Participants were randomly assigned in a between-subjects design to view a single gender-matched Asian target in one of four conditions: (1) High-Status/ High-Hardship, (2) Low-Status/ High-Hardship, (3) High-Status/ Low-Hardship; (4) Low-Status/ Low-Hardship (see Appendix D for the biographies). In this way, the High-Status/ High-Hardship condition

was specifically intended to bring to mind the model minority stereotype, and the Low-Status/ High-Hardship condition was specifically intended to bring to mind the perpetual foreigner stereotype. However, I implemented a crossed design with all four combinations of hardship and status to examine fully the impact of perceived hardship and status on Whites' perceptions of Asian Americans' pain. For instance, Asian targets in the High-Status/ High-Hardship condition were also described as having a difficult upbringing, but the adversity was attributed to their parents' high expectations and pressure to succeed in school and extra-curricular activities (high status). By contrast, Asian targets in the Low-Status/ High-Hardship condition were framed as having a tough upbringing as a result of having to help out in their family's restaurant and learning English as a second language (low status). And whereas these tasks were framed as arduous in the high-hardship conditions, they were framed as much less burdensome in the low-hardship conditions.

Participants were then asked to answer several adversity questions about the target on a 5-point Likert scale (the seven adversity items from Studies 1 and 2; e.g., *How much adversity do you think Jessica has overcome?,* 1 = No adversity at all to 5 = Extreme adversity). As several of the seven items track status as well as hardship, I used the four items explicitly about hardship (hardship, adversity, suffering, and obstacles) as our primary measure of hardship. To track status more specifically, participants were then presented with the MacArthur Status Ladder (Adler, Epel, Castellazzo, & Ickovics, 2000) and were asked to assess where the target would rank on the ladder in terms of status (1 = Low, 10 = High). Following this question, participants were asked to make an explicit judgment about the target's status in American society (1= Very Low-Status, 6 = Very High-Status).

Results. Overall, the manipulations were successful. I first turn to status. On the ladder question, high-status targets were perceived to be higher on the ladder (M = 7.10, SE = 0.17), relative to low-status targets (M = 4.70, SE = 0.25), $t(77.85) = 7.92$, $p < .0005$. The same held true for the explicit status question, in which high-status targets were again perceived to be higher-status (M = 4.95, SE = 0.17) relative to lower-status targets (M = 3.13, SE = 0.15), $t(82.86) = 7.84$, $p < .0005$. However, as intended, there was no difference between status conditions in terms of hardship, $t(86) = -1.00$, $p = .321$. In terms of hardship, the high-hardship condition was perceived to experience more hardship (M = 3.61, SE = 0.09) relative to the low-hardship condition (M = 2.57, SE = 0.09), $t(86) = 7.97$, $p < .0005$. However, as intended, the difference in perceived status between the hardship conditions was much smaller. On the ladder question, high-hardship targets were perceived to be of lower status (M = 5.34, SE = 0.29) than low-hardship targets (M = 6.30, SE = 0.26), $t(84.48) = -2.44$, $p = .017$, but the effect was not large. And on the explicit status question, there was not a strong difference in perceived status between the high-hardship (M = 3.73, SE = 0.21) and low-hardship (M = 4.23, SE = 0.21) conditions, $t(86) = -1.68$, $p = .097$. In short, the manipulations were successful at manipulating participants' perceptions of the target person's hardship and status.

Study 4

Method

Participants. Participants were 447 UVA undergraduates and community members that participated in exchange for a small gift (e.g., candy) or for partial fulfillment of their psychology course requirements. Participants were excluded from analysis if they were not born in the US (or did not answer that question; n = 36) or did not answer all of the pain items, as the

forced choice composite served as the primary dependent measure (n = 8), leaving a final sample of 403 participants (223 women and 180 men, 286 self-identified White).

Procedure. The general procedure was consistent with Studies 1 and 2. After providing informed consent, participants were randomly assigned to view a pairing of two gender-matched targets (an Asian target and a White target, with name, race, and gender information provided). Importantly, to administer the experimental manipulation, the Asian targets were accompanied by a short biography that conveyed key information about their hardship and status. As such, participants were randomly assigned in a between-subjects design to one of five Asian target conditions: (1) High-Status/ High-Hardship, (2) Low-Status/ High-Hardship, (3) High-Status/ Low-Hardship; (4) Low-Status/ Low-Hardship; or (5) No Information/ Control, which was identical to Studies 1 and 2. Of note, to avoid introducing additional noise, the White target that accompanied the Asian target in all five conditions was not provided with a short biography.

Consistent with Study 2, participants were then asked to make relative pain judgments about the targets using a 6-point Likert scale for fourteen pain scenarios (Cronbach's alpha = 0.71), and seven adversity questions (Cronbach's alpha = 0.89). Because hardship and status were specifically manipulated in Study 4, the adversity and status items served as manipulation checks.

Results

Manipulation Check: Hardship and Status. I counted the number of adversity scenarios for which participants chose the Asian target to experience more adversity, and conducted a 2 (Status: High, Low) by 2 (Hardship: High, Low) between-subjects ANOVA. Appropriate items were reverse-scored, and higher-scores indicate that the Asian target was perceived to be more privileged (less adversity than the White target). As predicted, there was a

significant main effect of status, such that the high-status conditions (M = 3.83, SE = 0.16) were perceived to be better off than the low-status conditions (M = 1.90, SE = 0.16), $F(1, 316) = 70.92$, $p < .0005$. There was also a main effect of hardship, such that the high-hardship conditions were perceived to be worse off (M = 2.00, SE = 0.16), relative to the low-hardship conditions (M = 3.74, SE = 0.16), $F(1, 316) = 57.91$, $p < .0005$. Again, replicating the results of Studies 1 and 2, Asian targets in the control condition (no information provided) were perceived to be worse off, relative to the neutral midpoint (M = 2.29, SE = 0.25), $t(81) = -4.89$, $p < .0005$.

Status was assessed using the SES-Ladder item and the explicit status question, as described above, which ranged from 1 (Asian target is significantly higher status than the White target) to 6 (White target is significantly higher status than the Asian target, 3.5 being the neutral midpoint). Again, lending credence to the efficacy of the manipulation, there was a significant main effect of status, such that the high-status Asian targets were perceived to be higher on the ladder (M = 2.61, SE = 0.08), whereas low-status Asian targets were perceived to be lower on the ladder (M = 3.89, SE = 0.08), $F(1, 315) = 116.76$, $p < .0005$. Interestingly, there was also a significant main effect of hardship, with high-hardship Asian targets perceived to be lower on the ladder (M = 3.46, SE = 0.08) relative to low-hardship Asian targets (M = 3.04, SE = 0.08), $F(1, 315) = 12.35$, $p = .001$. There was no significant interaction between hardship and status, $F(1, 315) = 0.02$, $p = .895$. For the explicit status question, again, as predicted, there was a main effect of status, with high-status targets being perceived as higher-status (M = 3.51, SE = 0.09) relative to the low-status targets (M = 4.26, SE = 0.09), $F(1, 316) = 34.42$, $p < .0005$. There was also a main effect of hardship, such that high-hardship targets were perceived to be lower in status (M = 4.02, SE = 0.09) compared to low-hardship targets (M = 3.74, SE = 0.09), $F(1, 316)$

= 4.90, p = .028. There was no interaction between hardship and status: $F(1, 316) = 2.21$, p = .138.

For the control condition (Asian targets with no information), there was no significant difference between the ladder and the neutral midpoint (M = 3.37, SE = 0.14): $t(81) = -0.99$, p = .327. However, when asked explicitly about status, participants perceived the control Asian target to be significantly lower status, relative to the White target (M = 4.00, SE = 0.12), $t(81)$ = 4.04, p = < .0005. Overall, the manipulations were successful at shifting participants' perceptions of target hardship and status (see Figures 3 and 4).

Primary Results: Perceptions of Pain. Consistent with Studies 1 and 2, I coded the pain scenarios as a forced choice as the primary dependent variable, and counted the number of scenarios (out of a maximum of fourteen, seven each for physical and social pain, respectively) for which participants assumed the Asian target would feel more pain than the White target. I then conducted a 2 (Hardship: High, Low) by 2 (Status: High, Low) ANOVA on participants' physical pain ratings. Results revealed a significant main effect of status, $F(1, 317) = 6.79$, p = .010. To decompose the main effect, I conducted a series of one-sample t-tests, comparing the overall number of pain items for which the participants chose the Asian target to experience more pain than the White target against the neutral midpoint of 7 (indicating no racial bias). Participants perceived low-status Asian targets overall to feel less pain relative to the neutral midpoint (M = 6.47, SE = 0.22), $t(156) = -2.43$, p = .016, d = 0.19, but this was not the case for high-status Asian targets (M = 7.29, SE = 0.23), $t(163) = 1.24$, p = .216, d = 0.10. There was no main effect of hardship, $F(1, 317) = 1.24$, p = .267. There was also no significant interaction between hardship and status, $F(1, 317) = 1.65$, p = .200.

I next turn to the control condition. Moreover, consistent with the rationale for Studies 1 and 2, in which we reasoned that in the absence of prior information about the Asian target, Whites perceived the Asian targets through the lens of the perpetual foreigner stereotype (leading them to underestimate their pain), participants in the control condition in Study 4 significantly underestimated the Asian targets' pain (M = 6.13, SE = 0.35), $t(81) = -2.45$, $p = .016$, $d = 0.27$. Indeed, the pattern of means showed that the control condition most closely resembled the Low-Status/ High-Hardship condition—the condition framed to align with the perpetual foreigner stereotype-- in terms of pain ratings, providing evidence for the perpetual foreigner stereotype as being the most salient default stereotype for Asian Americans in the absence of any additional information (see Figure 5).

Discussion

The results of Study 4 shed light on the divergent findings in Studies 1-3. Relative to a White target, participants in Study 4 significantly underestimated the pain of Asian targets but only when they were perceived to be low in status. This was particularly true for the Asian targets that were perceived to be low status and high in hardship. Participants did not show the racial bias, however for the Asian targets that were framed as being high in status. This is consistent with the explanation of the findings in Studies 1 and 2, in which White American participants, when asked to view an Asian target and White target with minimal information, significantly underestimated the pain of Asian targets relative to White targets, and also ascribed them greater amounts of adversity and hardship. I reasoned that the perpetual foreigner stereotype was particularly salient in this context, which carried with it ascriptions of low-status and/ or hardship, which resulted in an underestimation of Asian targets' pain. Indeed, in Study 4, although there was a main effect of status overall, it was indeed the Low-Status/ High-Hardship target—the condition designed to elicit the perpetual foreigner stereotype-- that resulted in the

most robust racial bias in pain perception. It is also important to note that the control condition in Study 4 was identical to Studies 1 and 2, in which no information was given about the Asian or White targets. Again, participants in this condition significantly underestimated the pain of the Asian target relative to the White target, and assumed by default that they experienced greater amounts of adversity (and were lower in status), compared to the White target as well. Moreover, the results of the control condition most closely resembled the results of the Low-Status/High-Hardship condition (which was designed to elicit the perpetual foreigner stereotype), supporting our explanation for the results of Studies 1 and 2.

That being said, Study 4 does not fully explain the divergent pattern of results, particularly Study 3, in which we found that White American participants significantly *overestimated* the pain of Asian targets, relative to White targets. We posited that this was caused by the model minority stereotype being particularly salient, due to the information participants were given about the Asian targets (that they were either born and raised in the USA, or were born and raised in Japan—an Asian country generally perceived as privileged). Although results were in the predicted direction, in Study 4 framing Asian targets as high-status did not result in a significant overestimation of their pain.

It is important to note, however, that the vignettes provided in Study 4 were much richer in detail than the vignettes provided in Study 3. Because status and hardship are so intricately linked, the vignettes employed in Study 4 to elicit high status (being pressured to succeed academically) also inevitably elicited moderate levels of hardship as well. Although we reduced the level of hardship for High-Status/ Low-Hardship targets, a minimal amount of perceived adversity was inevitable, especially considering the characteristics of the model minority stereotype. I suspect that this attenuated participants' perceptions of the high-status targets' pain,

resulting in the non-significant difference from the midpoint, as opposed to an overestimation of their pain.

General Discussion

Although health disparities between Asians and Whites have been documented, research elucidating the mechanisms underlying these disparities remains impoverished. Previous work has provided some evidence for particular disparities in the domain of mental health treatment, as well as in the prescription of pain medication. However, the majority of research that has examined Asian-White healthcare disparities at all has focused on patient-related factors (Asians' anxiety about stigma, losing face and honor, and difficulties communicating with their providers; Abe-Kim et al., 2007; Leong & Lau, 2001) and has not focused on the potential role of perceivers' racial bias. The present dissertation aimed to address this gap in the literature by examining racial bias in the perception of Asian Americans' pain as one potential source of these disparities.

Across four studies, I find novel evidence for racial bias in the perception of Asian Americans' pain. However, in contrast to prior research that has documented systematic pain disparities between Whites and racial minority group members in terms of directionality, the racial bias in pain perception seems to be more nuanced for Asian Americans. In Studies 1 and 2, I find that Whites, in the absence of substantial information, perceived Asian targets to feel less pain, and higher amounts of hardship and adversity, relative to White targets. In Study 3, I document a reversal of the bias, whereby Whites ascribed greater amounts of pain, and also higher amounts of privilege (lower amounts of adversity), to Asian targets relative to White targets. I reasoned that the perpetual foreigner stereotype was the most salient in the former two studies, whereas the model minority was most salient in the latter study, which conferred

opposing ascriptions of status and/or hardship. As such, I attempted to resolve these divergent findings by using a moderation approach in Study 4, whereby I provided participants with detailed information consistent with the perpetual foreigner or model minority stereotypes, respectively. I found that framing Asian targets with information along the lines of the perpetual foreigner stereotype significantly attenuated perceptions of their pain, but that this was not the case for Asian targets framed along the model minority stereotype (as high status). What is clear from the present studies, however, is that Asians by default are assumed to be lower in status relative to Whites, and that this results in the underestimation of their pain experience.

To our knowledge, these studies are the first to document a racial bias of any kind in the perception of Asian and Asian Americans' pain. However, although the findings of these studies are provocative, they do have limitations, which lay the groundwork for future research. Of note, the divergent pattern of findings between Studies 1 and 2 versus Study 3 still remain somewhat of a mystery. Although Study 4 provided some evidence that the ascriptions (status and hardship information) associated with the two stereotypes (perpetual foreigner versus model minority) indeed lead to divergent assessments of pain, more work is needed to establish more firmly the precise links between the two stereotypes and the two biases in pain perception. For example, a future study could randomly assign participants to one of three conditions (a model minority stereotype, perpetual foreigner stereotype, and control condition), and prime participants beforehand with images of Asian exemplars in accordance with those stereotypes, to see if that influences downstream assessments of a subsequent Asian target's pain.

Additionally, as an even more direct test of the link between the stereotypes and pain assessment, a future experiment could prime separate groups of participants with the stereotypes beforehand by providing participants with information about the two stereotypes and having

them elaborate on their associations. Alternatively, a correlational study could also tackle this question by asking participants to write down what first comes to mind when they think of Asian Americans (or what first comes to mind when viewing a random Asian target). A team of independent raters could then code the content of their responses, allowing me to see if participants more readily bringing to mind ascriptions related to the model minority (relative to the perpetual foreigner) subsequently demonstrate biases in pain assessment.

Future research should also examine the diversity of Asian subgroups in the United States. As different subgroups of Asian Americans have varied widely historically in terms of reasons for immigration-- and, thus, also in patterns of socioeconomic status (for instance, Chinese and Japanese Americans versus Cambodian and Laotian Americans; see Leong & Okazaki, 2009)--to the extent that the racial bias in pain is due to ascriptions of status and hardship, future research should explore whether the bias is exacerbated for certain subgroups. Addressing nuances in the perception of different ethnic subgroups was difficult to do in the present work, as the participants were primarily White participants from the University of Virginia (UVA) community—a context that provides very little exposure to the full spectrum of Asian subgroups in the United States. Moreover, given the demographics of UVA, it is likely that the small sample of undergraduates at UVA from demographically less privileged Asian ethnic subgroups (in the United States as a whole) hail from privileged backgrounds. Future research should be conducted in a more representative array of geographic regions, allowing for greater diversity in samples as well as participants, to obtain a better understanding of racial healthcare disparities affecting Asian Americans.

More broadly, the present work makes two key contributions to work on racial healthcare disparities. Firstly, it provides evidence that in cases where there are health disparities between

Asians and Whites, these disparities may be caused, at least in part, by physician bias. This is a marked addition to existing work on Asian-White disparities, particularly in the mental health domain, where prior research has focused primarily on the role of the patient (Abe-Kim et al., 2007; Leong & Lau, 2001). Secondly, my work shows that people may underestimate *and* overestimate Asians' pain. Although this makes intervention work difficult at a practical level, nevertheless, both the overestimation and underestimation of pain are problematic and inaccurate perceptions of another's actual experience. This could be extremely concerning in the healthcare domain. For instance, although the majority of research on pain disparities has focused on the public health concern of under-diagnosing—and thus undertreating—others' pain, prescribing too much medication may also present health concerns. More importantly, this also provides the intriguing possibility that in instances where it appears that there are no disparities between Asians and Whites, it may not be the case that Asians and Whites are indeed treated equally (that disparities are non-existent), but rather that Asians are treated in a bimodal way (with some being over-treated, and others being under-treated), obscuring disparities between the two groups.

I aim to test this in future work. For instance, through employing secondary data analyses, I could explore potential patterns of pain medication prescribed between Asians and Whites in geographic regions of the country where Asians are relatively low SES compared to the norm, and compare this to geographic regions where Asians are relatively high SES. And even within a particular region, I could also look at proxies that differentiate high-SES Asians from low-SES Asians (e.g., insurance status, welfare status, etc.) and explore how patterns of pain medication compare to Whites. This work would be primarily correlational in nature, but would provide a necessary first step to examining Asian-White health disparities in the real world, and potentially elucidate misleading obscurities in the existing literature.

Concluding Remarks

Taken together, the present dissertation documents a novel racial bias in the perception of Asian Americans' pain—a bias intricately intertwined with the conflicting, albeit simultaneously coexisting, stereotypes of the perpetual foreigner and the model minority, which leads to divergent assessments of pain. In either case, both the underestimation and overestimation of another's pain are inaccurate and may ultimately give rise to insidious health ramifications. As the majority of existing literature on racial health disparities has not recruited Asian American participants at all, the current empirical literature remains moot on disparities between Asians and Whites. As the Asian American population continues to grow in the United States, the present dissertation hopefully lays the groundwork for further work in Asian-White disparities, to ensure equitable treatment and health outcomes for all members of society.

References

Abe-Kim, J., Takeuchi, D. T., Hong, S., Zane, N., Sue, S., Spencer, M. S., ... & Alegría, M. (2007). Use of mental health-related services among immigrant and US-born Asian Americans: results from the National Latino and Asian American Study. *American Journal of Public Health*, *97*(1), 91-98.

Adler, N. E., Epel, E. S., Castellazzo, G., & Ickovics, J. R. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: Preliminary data in healthy, White women. *Health Psychology*, *19*(6), 586-592.

Beaupré, M. G., Cheung, N., & Hess, U. (2000). *The Montreal Set of Facial Displays of Emotion* [Slides]. (Available from Ursula Hess, Department of Psychology, University of Quebec at Montreal, P.O. Box 8888, Station "Centre-ville," Montreal, Quebec H3C 3P8.)

Butz, D. A., & Yogeeswaran, K. (2011). A new threat in the air: Macroeconomic threat increases prejudice against Asian Americans. *Journal of Experimental Social Psychology*, *47*(1), 22-27.

Cheryan, S., & Monin, B. (2005). Where are you really from?: Asian Americans and identity denial. *Journal of Personality and Social Psychology*,*89*(5), 717-730.

Czopp, A. M., Kay, A. C., & Cheryan, S. (2015). Positive stereotypes are pervasive and powerful. *Perspectives on Psychological Science*, *10*(4), 451-463.

Daniels, R. (1997). No lamps were lit for them: Angel Island and the historiography of Asian American immigration. *Journal of American Ethnic History*, 3-18.

Devos, T., & Banaji, M. R. (2005). American= White?. *Journal of Personality and Social Psychology*, *88*(3), 447-466.

Ezenwa, M. O., Ameringer, S., Ward, S. E., & Serlin, R. C. (2006). Racial and ethnic disparities in pain management in the United States. *Journal of Nursing Scholarship, 38*(3), 225-233.

Fiske, S. T., Cuddy, A. J., & Glick, P. (2007). Universal dimensions of social cognition: Warmth and competence. *Trends in Cognitive Sciences,11*(2), 77-83.

Guendelman, M. D., Cheryan, S., & Monin, B. (2011). Fitting in but getting fat identity threat and dietary choices among us immigrant groups. *Psychological Science*, *22*(7), 959-967.

Hoffman, K. M., & Trawalter, S. (2016). Assumptions about life hardship and pain perception. *Group Processes & Intergroup Relations*, *19*(4), 493-508.

Ibaraki, A. Y., Hall, G. C. N., & Sabin, J. A. (2014). Asian American cancer disparities: The potential effects of model minority health stereotypes. *Asian American Journal of Psychology*, *5*(1), 75-81.

Leong, F. T., & Lau, A. S. (2001). Barriers to providing effective mental health services to Asian Americans. *Mental Health Services Research*, *3*(4), 201-214.

Leong, F. T., & Okazaki, S. (2009). History of Asian American psychology. *Cultural Diversity and Ethnic Minority Psychology*, *15*(4), 352-362.

Leong, F. T., & Schneller, G. (1997). White Americans' attitudes toward Asian Americans in social situations: An empirical examination of potential stereotypes, bias, and prejudice. *Journal of Multicultural Counseling and Development*, *25*(1), 68-78.

Maddux, W. W., Galinsky, A. D., Cuddy, A. J., & Polifroni, M. (2008). When being a model minority is good... and bad: Realistic threat explains negativity toward Asian Americans. *Personality and Social Psychology Bulletin, 34*(1), 74-89.

Pletcher, M. J., Kertesz, S. G., Kohn, M. A., & Gonzales, R. (2008). Trends in opioid prescribing

by race/ethnicity for patients seeking care in US emergency departments. *JAMA*, *299*(1), 70-78.

Rust, G., Nembhard, W. N., Nichols, M., Omole, F., Minor, P., Barosso, G., & Mayberry, R. (2004). Racial and ethnic disparities in the provision of epidural analgesia to Georgia Medicaid beneficiaries during labor and delivery. *American Journal of Obstetrics and Gynecology, 191*(2), 456-462.

Siy, J. O., & Cheryan, S. (2013). When compliments fail to flatter: American individualism and responses to positive stereotypes. *Journal of Personality and Social Psychology, 104*(1), 87-102.

Smigal, C., Jemal, A., Ward, E., Cokkinides, V., Smith, R., Howe, H. L., & Thun, M. (2006). Trends in breast cancer by race and ethnicity: update 2006.*CA: A Cancer Journal for Clinicians*, *56*(3), 168-183.

Sue, D. W., Bucceri, J., Lin, A. I., Nadal, K. L., & Torino, G. C. (2007). Racial microaggressions and the Asian American experience. *Cultural Diversity and Ethnic Minority Psychology*, *13*(1), 72-81.

Takaki, R. (1989). Strangers from a distant shore: A history of Asian Americans. *Boston: Little, Brown and Company*.

Trawalter, S., Hoffman, K. M., & Waytz, A. (2012). Racial bias in perceptions of others' pain. PLoS ONE 7(11): e48546.

Wang, J., Minervino, C., & Cheryan, S. (2013). Generational differences in vulnerability to identity denial: The role of group identification. *Group Processes & Intergroup Relations*, *16*(5), 600-617.

Waytz, A., Hoffman, K. M., & Trawalter, S. (2014). A Superhumanization Bias in Whites' Perceptions of Blacks. *Social Psychological and Personality Science, 6*, 352-359.

Wong, F., & Halgin, R. (2006). The "model minority": Bane or blessing for Asian Americans?. *Journal of Multicultural Counseling and Development, 34*(1), 38-49.

Wong, P., Lai, C. F., Nagasawa, R., & Lin, T. (1998). Asian Americans as a model minority: Self-perceptions and perceptions by other racial groups. *Sociological Perspectives, 41*(1), 95-118.

Wu, F. H. (2003). *Yellow: Race in America beyond black and white*. Basic Books.

Yogeeswaran, K., & Dasgupta, N. (2010). Will the" real" American please stand up? The effect of implicit national prototypes on discriminatory behavior and judgments. *Personality and Social Psychology Bulletin*, 36(10), 1332-1345.

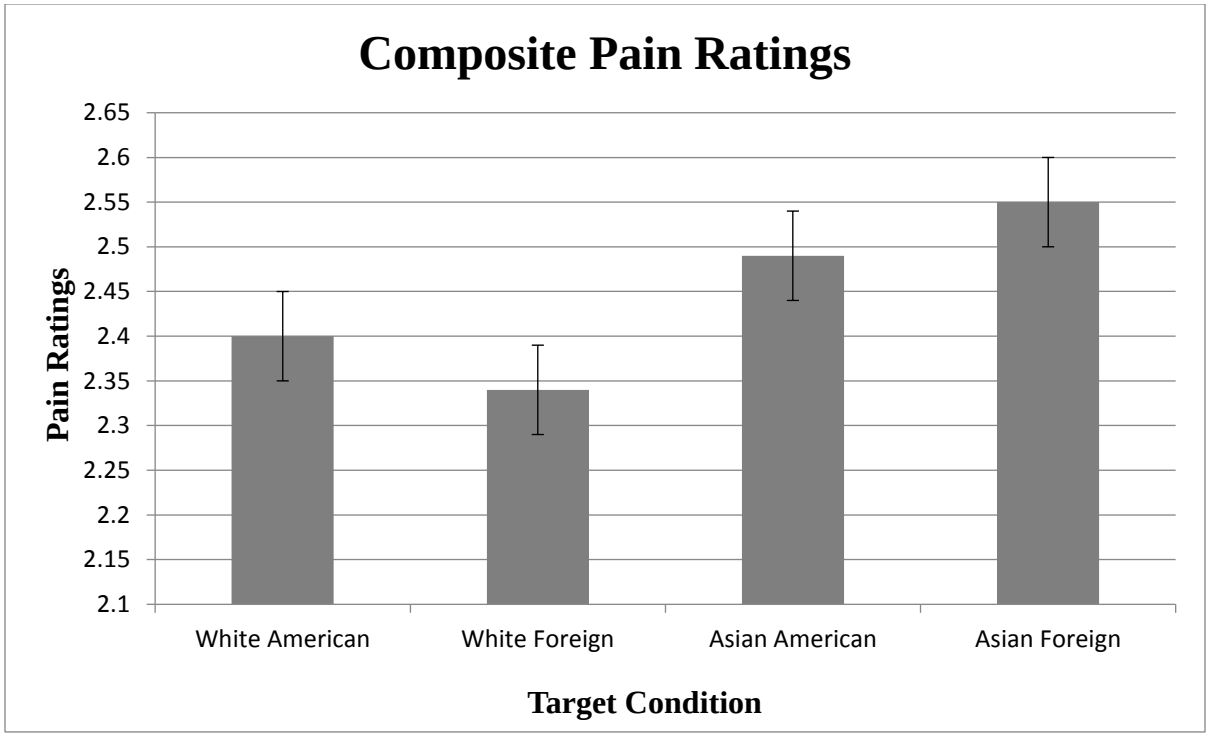

Figure 1. Composite pain ratings for each type of target in Study 3 (adjusted means and standard error generated from the ANCOVA, controlling for self-reported pain ratings and gender). Bars represent +/- 1 standard error. All means and standard errors values are rounded to two decimal places.

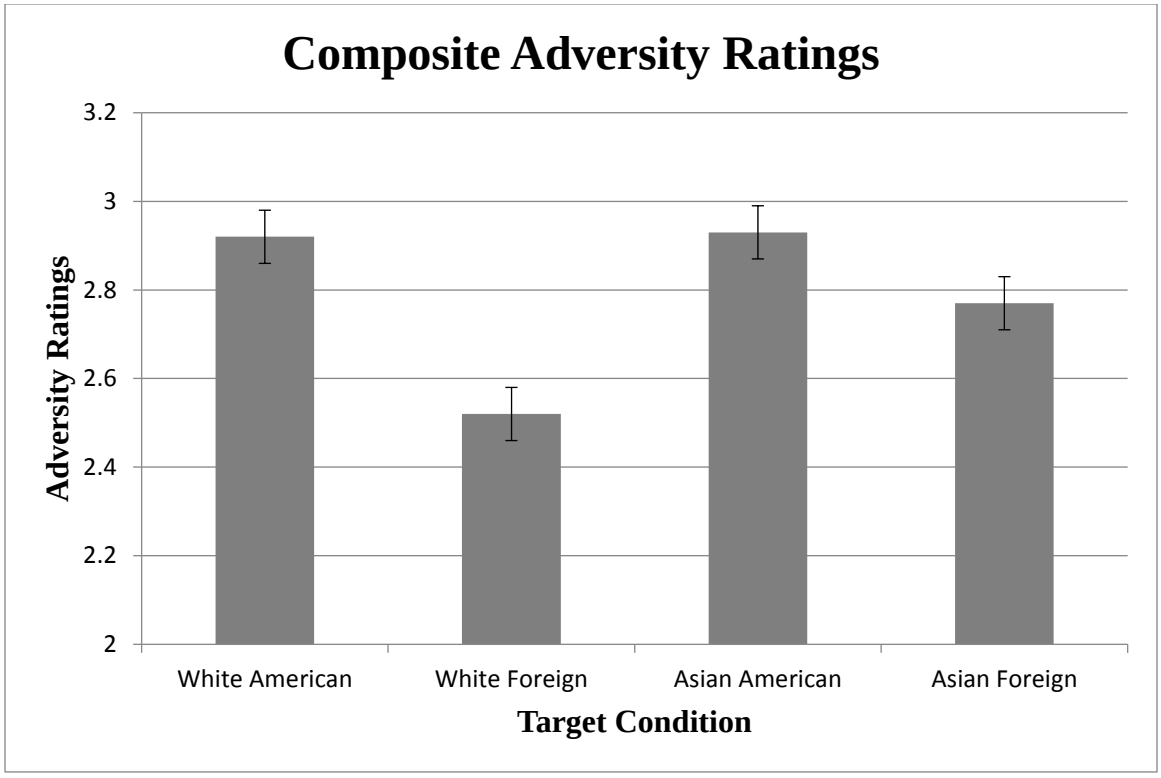

Figure 2. Composite adversity ratings for each type of target in Study 3 (adjusted means and standard error generated from the ANCOVA, controlling for self-reported adversity ratings and gender). Higher scores indicate a better life (more privilege). Bars represent +/- 1 standard error. All means and standard errors values are rounded to two decimal places.

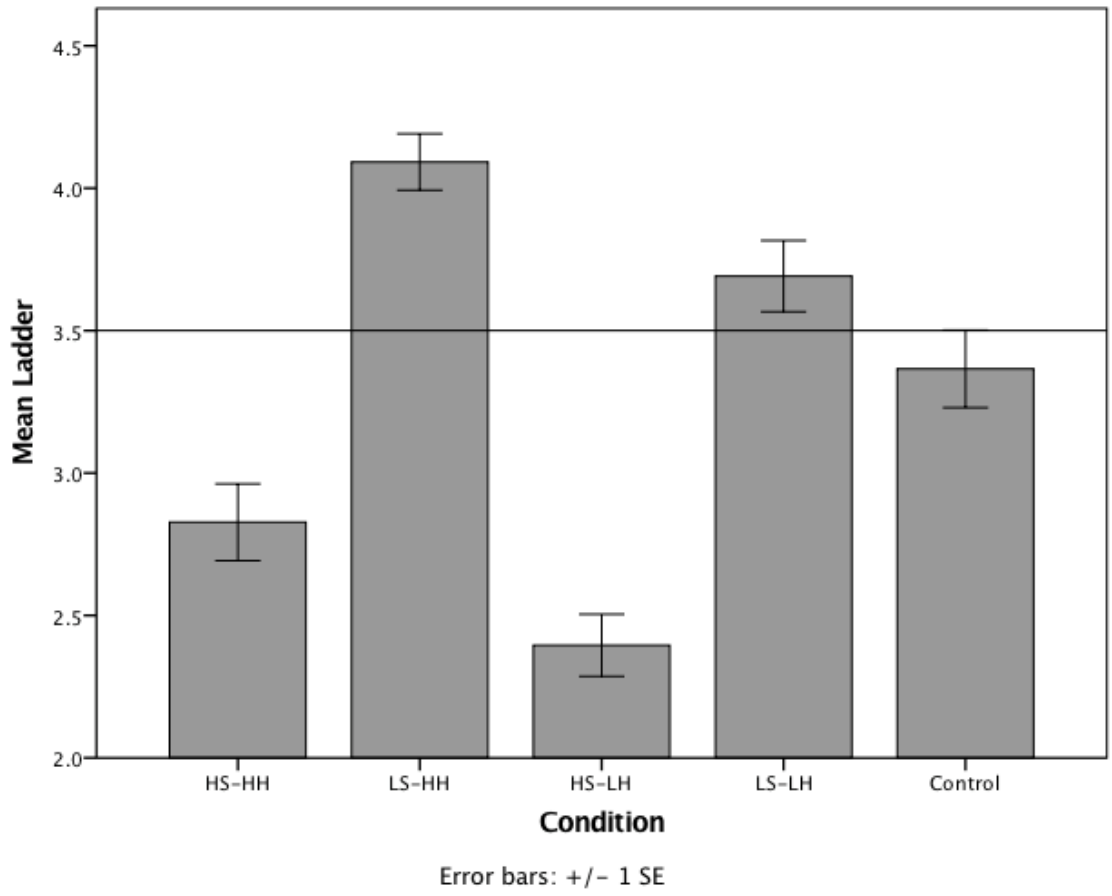

Figure 3. Composite status ratings for the ladder question for each type of target in Study 4. Scores lower than the neutral midpoint of 3.5 (indicated by the reference line) indicate that the Asian target was perceived to be higher status, relative to the White target, whereas scores higher than 3.5 indicate the opposite (that the White target was perceived to be higher status, relative to the Asian target). Results indicate that the manipulation was successful. All means and standard errors values are rounded to two decimal places. For ease of interpretation, HS-HH = High-Status/ High-Hardship, LS-HH = Low-Status/ High-Hardship, HS-LH = High-Status/ Low-Hardship, and LS-LH = Low-Status/ Low-Hardship.

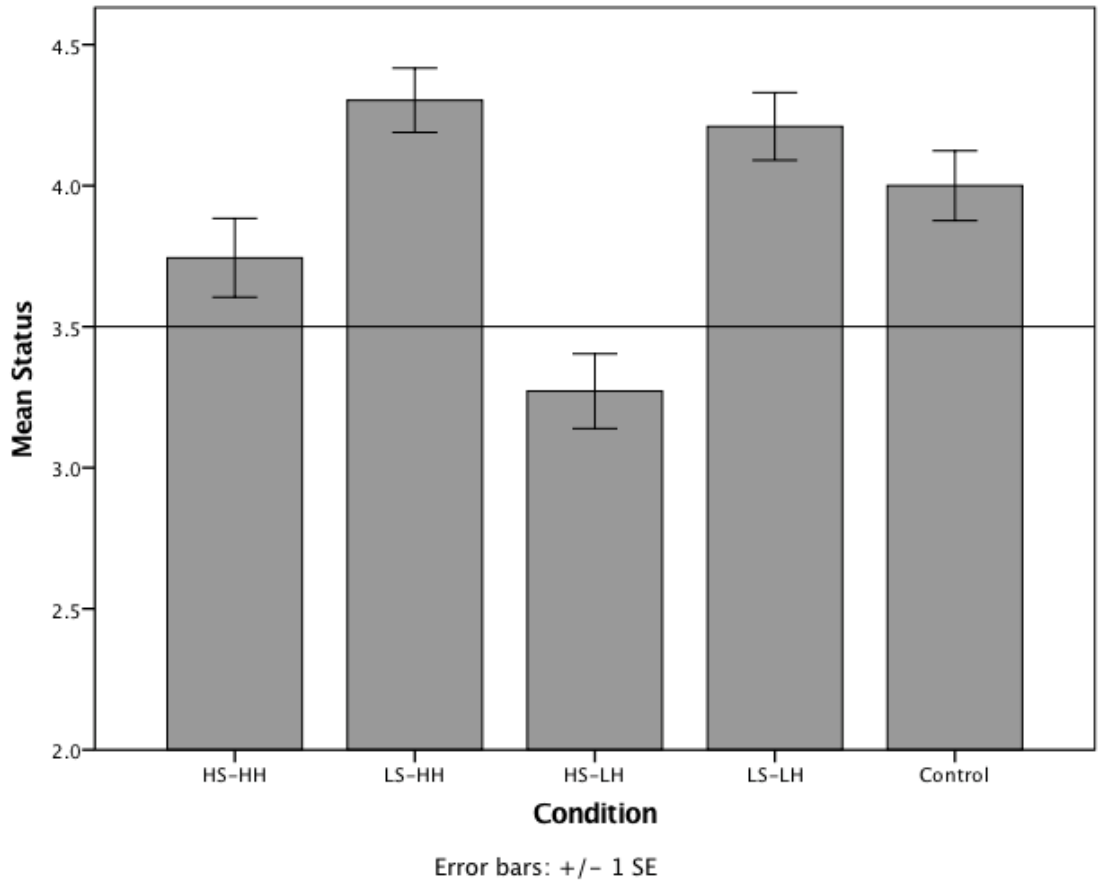

Figure 4. Composite status ratings for the explicit status question for each type of target in Study 4. Scores lower than the neutral midpoint of 3.5 (indicated by the reference line) indicate that the Asian target was perceived to be higher status, relative to the White target, whereas scores higher than 3.5 indicate the opposite (that the White target was perceived to be higher status, relative to the Asian target). Results indicate that the manipulation was successful. All means and standard errors values are rounded to two decimal places. For ease of interpretation, HS-HH = High-Status/ High-Hardship, LS-HH = Low-Status/ High-Hardship, HS-LH = High-Status/ Low-Hardship, and LS-LH = Low-Status/ Low-Hardship.

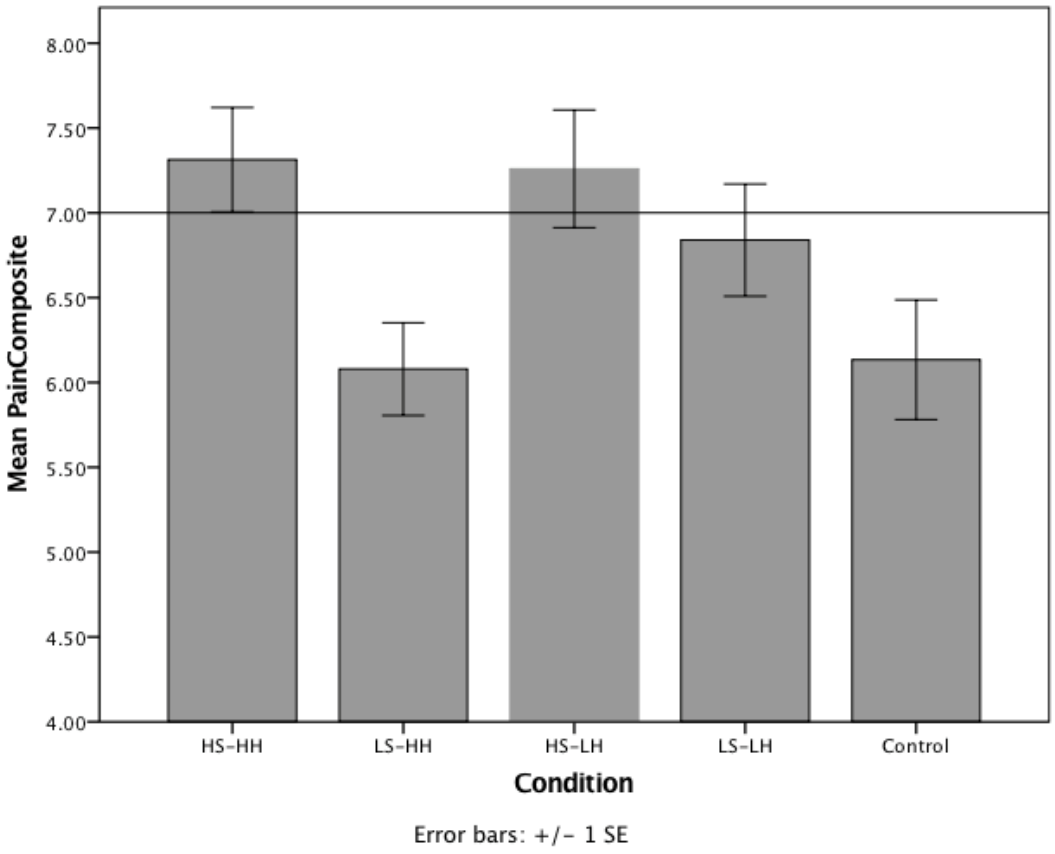

Figure 5. Composite pain ratings for each type of target in Study 4. Scores lower than the neutral midpoint of 7 (indicated by the reference line) indicate that the Asian target was perceived to feel *less* pain, relative to the White target—there was a main effect of status, such that low-status targets were perceived to feel relatively less pain than the White target, which was also true for the control target. Results show that low-status Asian targets, as well as the control, condition, were perceived to feel less pain. All means and standard errors values are rounded to two decimal places. For ease of interpretation, HS-HH = High-Status/ High-Hardship, LS-HH = Low-Status/ High-Hardship, HS-LH = High-Status/ Low-Hardship, and LS-LH = Low-Status/ Low-Hardship.

Appendix A

Sample pairing of an Asian and a White target used in Studies 1 and 2 (stimuli from Beaupré, Cheung, & Hess, 2000), in addition to a sample pain scenario from Study 1 in which participants had to choose which target experienced more pain (Waytz et al., 2014).

Name: John
Gender: Male
Race: Asian

Name: Jeff
Gender: Male
Race: White

Imagine that John and Jeff hurt themselves while assembling furniture.

Which of these people do you think would experience more pain?

John

Jeff

Appendix B

A list of all primary dependent measures of interest in Study 1. Study 2 used the same items as Study 1 (subject to any adjustment for the Likert scale), but included additional items.

For all pain scenarios, participants were presented with a scenario (detailed below), which was followed by the question, "Which of these people do you think would experience more pain?" These scenarios were adapted from Waytz et al. (2014).

Physical Pain Scenarios:

"Imagine that Jessica and Janet…"

1. Were involved in a car crash
2. Dislocated their shoulders playing sports
3. Were burnt by touching a hot dish
4. Had their wisdom teeth removed
5. Stapled their fingers at work
6. Slammed their hands in a car door
7. Hurt themselves while assembling furniture

Social Pain Scenarios:

"Imagine that Jessica and Janet…"

1. Best friend lied to them
2. Got dumped by their significant other
3. Tripped while they were walking, and all that people did around them was laugh
4. Got bullied by a colleague at work
5. Had an acquaintance that spread a mean rumor about them
6. Got picked last for a group assignment
7. Family forgot their birthday

Adversity Scenarios:

"Which of these people do you think…?"

1. Is more privileged
2. Has had a harder life
3. Has been luckier
4. Has overcome more adversity
5. Has confronted more obstacles
6. Has been wealthier
7. Has confronted more suffering

Similarity, Identification, and Foreignness Items (Study 2 only):

"Which of these people do you think…?"

1. Is more foreign (Foreignness)
2. You are more similar to (Similarity)
3. "Which of these people do you identify with more?" (Identification)

Appendix C

Primary vignettes and dependent measures in Study 3 (see Trawalter et al., 2012, for relevant items).

Physical Pain Scenarios:

1. Sam disinfects a sore.
2. Sam gets an injection in the arm.
3. Sam gets hit on the head by a stray frisbee.
4. Sam hits his funny bone.
5. Sam gets a speck of dust in the eye.
6. Sam knocks his head on the corner of a piece of furniture.
7. Sam cuts himself with a sheet of paper.
8. Sam bites his tongue.
9. Sam stubs his toe on a chair leg.
10. Sam gets sunburned and someone touches him on that spot.
11. Sam catches his finger in a zipper.
12. Sam has a splinter under the skin of one finger.
13. Sam gets shampoo in his eye.
14. Sam gets sunburned on his face.
15. Sam burns his tongue tasting scorching hot food.
16. Sam gets his fingers caught in the car door.
17. Sam's lips are chapped.
18. Sam walks on burning sand.

Social Pain Scenarios:

1. Sam's best friend lies to him.
2. Sam gets dumped by his girlfriend.
3. Sam trips while he's walking, and all that people do around him is laugh.
4. Sam's pet dies.
5. Sam gets bullied by a colleague at work.
6. A waitress is rude to Sam.
7. Sam watches a sad movie.
8. Sam's friends keep him out of the loop about their Friday night plans.
9. An acquaintance spreads a mean rumor about Sam.
10. Sam gets picked last for a group assignment.
11. Sam goes to a party to see his friends, but feels invisible because no one notices that he's there.
12. Sam has a fight with his parents.
13. Sam gets the silent treatment from a friend.
14. Another driver cuts Sam off and calls him a nasty name.
15. Sam's girlfriend cheats on him.
16. Sam gets a haircut, and overhears people mocking him behind his back.

17. No one sits next to Sam at lunchtime in the cafeteria.
18. Sam's family forgets his birthday

Adversity Questions:

1. How privileged do you think Sam is?
2. How hard do you think Sam's life has been?
3. How lucky do you think Sam has been?
4. How much adversity do you think Sam has overcome?

Similarity, Identification, and Foreignness Questions:

1. How foreign do you think Sam is?
2. How similar do you think that you and Sam are to each other?
3. How much do you identify with Sam?

Sample Vignettes in Study 3:

Asian American Sam (same prompt as White American Sam)

Now we would like you to think about Sam, the person pictured here. Sam is American, and was born and raised in Chicago, Illinois. He has lived in the United States for his entire life. We are looking at how people make judgments about others whom they don't know. We would like you to fill out the same questionnaire as before, but for Sam. For each situation, please read the item carefully and then guess the intensity of pain that Sam would experience.

Foreign Asian Sam

Now we would like you to think about Satoru (who goes by 'Sam'), the person pictured here. Sam is Japanese, and was born and raised in Tokyo, but immigrated very recently with his family to the United States from Japan. He now lives in Chicago, Illinois. We are looking at how people make judgments about others whom they don't know. We would like you to fill out the same questionnaire as before, but for Sam. For each situation, please read the item carefully and then guess the intensity of pain that Sam would experience.

Foreign White Sam

Now we would like you to think about Sergei (who goes by 'Sam'), the person pictured here. Sam is Russian, and was born and raised in Moscow, but immigrated very recently with his family to the United States from Russia. He now lives in Chicago, Illinois. We are looking at how people make judgments about others whom they don't know. We would like you to fill out the same questionnaire as before, but for Sam. For each situation, please read the item carefully and then guess the intensity of pain that Sam would experience.

Appendix D

Sample vignettes for each of the four conditions used in Study 4. Condition 5 (the control condition) was identical to Studies 1 and 2, in which the Asian target was presented with no information, other than name, race, and gender.

Condition 1: High-Status, High-Hardship

Jessica was born and raised in a large city in the United States. Her childhood was difficult. Much of it felt like work. Her parents had incredibly high expectations of her. They expected her to succeed in everything she did, and when she didn't, they would scorn her. They also signed her up for both piano and violin lessons with the toughest teachers they could find. She would come home after a full day of school and 2 hours of piano and violin lessons being completely exhausted, and still having to practice both of them for an hour each. Practice was so grueling. Her hands would feel so dry and rough after practicing for so long. In addition, she took a lot of honors and AP classes in high school, and spent at least five hours per night doing homework to keep up with her classes. She graduated high school with a 4.0 GPA and as concert master of her high school orchestra.

Condition 2: Low-Status, High-Hardship

Jessica was born and raised in a large city in the United States. Her childhood was difficult. Much of it felt like work. Her parents expected her to be incredibly dutiful. They gave her a lot of family responsibilities, and when she didn't fulfill them, they would scorn her. Her mom and dad worked in a restaurant and expected her to go there right after school. She did most of the hard labor, like moving food crates, washing dishes, and wiping down the tables. Restaurant work was so grueling. Her hands would feel so dry and rough after working in the restaurant. English was her second language, so after she got home, she would spend at least five hours per night doing homework to keep up with her classes. Those were actually some of the most stressful hours of her day—she dreaded finishing up her day like that.

Condition 3: High-Status, Lower-Hardship

Jessica was born and raised in a large city in the United States. Her childhood was easy. Much of it felt like play. Even though her parents had incredibly high expectations of her, and expected her to succeed in everything she did, they let her be a kid. They did sign her up for both piano and violin lessons with the best teachers they could find. She would come home after a full day of school and 2 hours of piano and violin lessons being completely exhausted, and still having to practice both of them for an hour each. Practice was fun though. She enjoyed it. Her hands would fly over the piano, making excited sounds. She also took a lot of honors and AP classes in high school. She would spend a few hours doing homework for those classes, since those classes mostly came easy to her. She graduated high school with a 4.0 GPA and as concert master of her high school orchestra.

Condition 4: Low-Status, Lower-Hardship

Jessica was born and raised in a large city in the United States. Her childhood was easy. Much of it felt like play. Even though her parents expected her to be incredibly dutiful and gave her a lot of family responsibilities, they let her be a kid. Her mom and dad worked in a restaurant and expected her to go there right after school. She did most of the easy labor, like moving food crates, washing dishes, and wiping down the tables. She didn't mind it though, since it was fun to help out. English was her second language, so after she got home, she would spend a few hours doing homework to keep up with her classes. Those were actually some of the calmest hours of her day—she enjoyed finishing up her day like that.

Supplemental Materials

Study 1:

Study 1 revealed a racial bias in pain perception overall. Physical pain and social pain items were also analyzed separately. The racial bias in pain perception was mainly driven by physical pain (M = 2.87, SE = 0.25, against the neutral midpoint of 3.5), $t(54) = -2.52$, $p = 0.015$, as opposed to social pain ($M = 3.47$, $SE = 0.27$), $t(58) = -0.1$, $p = 0.924$. As expected, physical pain and social pain ratings were correlated, $r(53) = .28$, $p = 0.041$.

Study 2:

Study 2 replicated the racial bias in pain perception, such that participants assumed Asians felt less overall pain, relative to Whites. Analyzed separately, results were consistent for both physical pain: ($M = 3.63$, $SE = 0.06$), $t(67) = 2.24$, $p = .028$, as well as social pain ($M = 3.84$, $SE = 0.09$), $t(67) = 3.70$, $p < .0005$. As expected, physical pain ratings and social pain ratings were correlated, $r(66) = .31$, $p = .011$.

I also explored other mechanisms that might pertain to pain perception might be perceived identification and similarity with the target. Prior work on pain perception has shown that empathy (being able to understand and *identify with* another person) plays an important role in evaluating another person's pain (Cheon et al., 2011; Drwecki, Moore, Ward, & Prkachin, 2011; Mathur, Harada, Lipke, & Chiao, 2010; Xu, Zuo, Wang, & Han, 2009; Zuo & Han, 2013). If participants construed the Asian targets as perpetual foreigners, they likely failed to identify with those targets and, perhaps then, failed to appreciate the extent to which they might feel pain. In Study 2, I thus included measures of similarity, identification, and the perceived foreignness of the target. I averaged the similarity and identification items to form a composite score.

Participants perceived the Asian target to be *less* similar (identified less) to them, relative to the White target (M = 3.93, SE = 0.15), $t(67) = 2.89$, $p = .005$, $d = 0.35$. Unsurprisingly, participants also perceived the Asian target to be more foreign, relative to the White target (M = 2.24, SE = 0.10), $t(65) = -12.69$, $p < .0005$, $d = 1.57$. Coded as a continuous measure, overall pain ratings once again did not correlate with similarity/ identification, $r(66) = .12$, $p = .329$, nor did they correlate with foreignness, $r(64) = -.20$, $p = .111$. In Study 2, in addition to Studies 3 and 4, after completing the primary dependent measures, participants also completed additional exploratory measures to assess perceptions of the targets (e.g., exploratory adversity questions, warmth/ competence, masculinity/ femininity, etc.). However, as these variables were exploratory and varied across studies, they will not be discussed further.

Study 3:

Analyzed separately, the main effect of race held for both physical and social pain. For physical pain, the main effect of race emerged: $F(1, 235) = 17.64$, $p < .0005$, such that Asian targets were perceived to feel more pain (M = 2.29, SE = 0.03) relative to White targets (M = 2.14, SE = 0.03). The same was the case for social pain: $F(1, 235) = 7.78$, $p = .006$, such that Asian targets were perceived to feel more social pain (M = 2.75, SE = 0.04) relative to White targets (M = 2.60, SE = 0.04). The partial correlation between physical and social pain, controlling for gender and self-ratings for these measures, was significant, $r(236) = .42$, $p < .0005$.

Study 4:

Study 4 found a main effect of target status for pain ratings. Separated into physical and social pain, the main effect of status was mostly driven by physical pain, such that low-status targets were perceived to experience less physical pain relative to the neutral midpoint (M = 2.62, SE = 0.15): $t(156) = -5.94$, $p = < .0005$. This was also true for targets in the control condition (M = 3.04, SE = 0.25), $t(81) = -1.88$, $p = .063$. However, this was not the case for high-status targets (M = 3.44, SE = 0.16), $t(163) = -0.38$, $p = .705$. Interestingly, relative to the neutral midpoint, low-status targets were perceived to feel more social pain (M = 3.85, SE = 0.15), $t(156) = 2.36$, $p = .020$. This was also the case for high-status targets (M = 3.85, SE = 1.90), $t(163) = 2.35$, $p = .020$. However, once again, Asian targets in the control condition were perceived to feel less social pain relative to the neutral midpoint (M = 3.10, SE = 0.22), $t(81) = -1.84$, $p = .069$. Once again, across all conditions, as expected, physical pain and social pain were significantly correlated, $r(401) = .11$, $p = .026$.

Supplemental References

Cheon, B. K., Im, D. M., Harada, T., Kim, J. S., Mathur, V. A., Scimeca, J. M., ... & Chiao, J. Y. (2011). Cultural influences on neural basis of intergroup empathy. *Neuroimage*, *57*(2), 642-650.

Drwecki, B. B., Moore, C. F., Ward, S. E., & Prkachin, K. M. (2011). Reducing racial disparities in pain treatment: The role of empathy and perspective-taking. *Pain*, *152*(5), 1001-1006.

Mathur, V. A., Harada, T., Lipke, T., & Chiao, J. Y. (2010). Neural basis of extraordinary empathy and altruistic motivation. *Neuroimage*, *51*(4), 1468-1475.

Xu, X., Zuo, X., Wang, X., & Han, S. (2009). Do you feel my pain? Racial group membership modulates empathic neural responses. *The Journal of Neuroscience*, *29*(26), 8525-8529.

Zuo, X., & Han, S. (2013). Cultural experiences reduce racial bias in neural responses to others' suffering. *Culture and Brain*, *1*(1), 34-46.