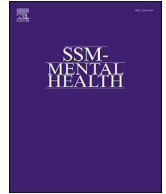




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# The impact of two types of COVID-19-related discrimination and contemporaneous stressors on Chinese immigrants in the US South

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## ABSTRACT

The global rise of the COVID-19 pandemic has been accompanied by an increase in anti-Asian discrimination with potentially deleterious effects on individuals of Asian descent. In the present study, we examine how two types of COVID-19-related anti-Asian discrimination and other contemporaneous stressors independently contribute to perceptions of stress in a population-representative sample of Chinese immigrants in North Carolina, as well as the moderating role of ethnic identity on the association between COVID-related discrimination and stress. Analyses rely on data collected among participants ages 18+ in the Chinese Immigrants in Raleigh-Durham (ChIRDU) study who completed surveys in 2018 and during the COVID-19 pandemic (July–September 2020). We utilize ordinary least squares regressions to examine associations of two types of COVID-related discrimination (measured by changes in perceptions of being feared by others and racism-related vigilance) and contemporaneous stressors (measured by general COVID-19-related stressors and acculturative stressors) with perceptions of stress by respondents' pre-pandemic reports of ethnic identity. Controlling for sociodemographic predictors and other stressors, racism-related vigilance is significantly associated with higher perceived stress for Chinese immigrants who identify as completely Chinese. For those who identify as at least partly American, new perceptions of being feared by others during the pandemic are significantly associated with higher perceived stress. Acculturative and COVID-related stressors are independently associated with higher perceived stress for both groups. These results suggest that COVID-related anti-Asian discrimination aggravates the psychological burden of multiple stressors in Chinese immigrants' lives by uniquely contributing to perceptions of stress alongside contemporaneous stressors. The results also highlight the heterogeneous mental health needs of Chinese immigrants and hold important implications for intervention development in the community studied here as well as in other Chinese communities in the US.

## 1. Introduction

The 2019 novel coronavirus (COVID-19) pandemic has exposed unprecedented numbers of individuals in the United States (US) and across the globe to severe health and economic risks, with long-term consequences for their health and well-being. The pandemic and associated disease mitigation efforts have also fueled a slew of traumatic events including the deaths of loved ones, caring for sick family members,

abrupt separations from one's social network, and delayed routine and specialty medical care (Dubey et al., 2020). Socially marginalized groups have borne the brunt of the pandemic in terms of risk of COVID-19 exposure, burden of disease, economic hardships, trauma sequelae, and stress responses (Moore et al., 2020). Compounding these stressors, the spread of the COVID-19 pandemic from China to the rest of the world has unleashed a surge of COVID-driven xenophobia, reinvigorated old stereotypes linking race and disease (Gee et al., 2020), and ignited a surge of

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anti-Asian sentiments. In the US and elsewhere, this surge has been fueled by political polarization and the racialization of the virus, which has been labeled the “Wuhan Virus”, “China Virus” or “Asian Virus” by public figures and for a (Nguyen et al., 2020). The reality of COVID-related racism has manifested itself through public fears of coming into close proximity to individuals of Chinese ancestry (Aratani, 2020), pre-lockdown avoidance of Chinese businesses (Tessler et al., 2020), incidents of face masks catalyzing anti-Chinese discrimination and attacks (Weale, 2020) despite face masks being a common hygienic practice in many Asian countries (Feng et al., 2020), and racially motivated hostility and attacks against members of the Chinese community (Aratani, 2020; Nguyen et al., 2020; Tessler et al., 2020) with spillover effects to other Asian communities (Gee et al., 2020). To scholars of race and Asian-American studies, COVID-related racism reinvigorates the stereotype of seeing and treating people of Asian descent as perpetual foreigners to be feared because of their association with the virus’ origin, highlighting that the position of Asians in the US today is still firmly anchored in America’s long history of anti-Asian racism and of othering Asian bodies (Tessler et al., 2020). For many, new perceptions of being noticed or feared because of their Chinese or other Asian ancestry and the vigilance associated with their heightened sense of vulnerability have likely increased the anxiety of those of Asian descent (Cowan, 2021), many of whom are first-generation immigrants (Budiman and Ruiz, 2021), and translated into a disproportionate impact of the pandemic on stress.

Here, we utilize data collected from members of a Chinese immigrant community in North Carolina to examine how two types of COVID-related discrimination (i.e., changes in perceptions of being feared by others and racism-related vigilance) and contemporaneous stressors (i.e., general worries about the pandemic and the process of acculturation) uniquely contribute to generalized perceptions of stress among Chinese immigrants. Because prior work suggests that ethnic identity may provide coping resources or exacerbate the mental health burden of discrimination (Woo et al., 2019), we also examine how these associations vary across pre-pandemic measures of strength of ethnic identity in order to inform adequate interventions.

### 1.1. Increased Anti-Asian discrimination in the US in the time of COVID-19 and the response of individuals of Asian descent

The rise of anti-Asian sentiments in the US became increasingly apparent as COVID-19 cases rose in March 2020, with reports of verbal harassment, physical attacks, and property damage toward people of Asian descent (Cheng, 2020; Tessler et al., 2020) and increased Sino-phobic behaviors in web communities (Gao and Liu, 2021). Most reported experiences of anti-Asian hate during the COVID-19 pandemic occurred outside of people’s homes (Tessler et al., 2020) despite pandemic-related social distancing, likely exacerbating fears associated with leaving one’s home and feelings of vulnerability in public spaces. Between March and December 2020, high levels of racism-related vigilance were measured among New Yorkers of Chinese descent, most of whom were foreign-born immigrants (Gao and Liu, 2021). Among this sample ( $N = 423$ ), 71% worried about their own or their family’s safety from a hate crime or harassment, 66% tried to avoid certain social situations or places due to worries about racial discrimination, and 61% felt unease in public areas or worried about how other people might look at them. Nearly half felt that people acted as if they were afraid of them (Gao and Liu, 2021). Furthermore, reflections by Asian American respondents recruited across the US and published by the *New York Times* in September 2021 indicated that, following the onset of the COVID-19 pandemic, many felt newly visible and vulnerable and became keenly aware of how they were seen by others (Cowan, 2021).

Even among those who have not directly experienced these types of discriminatory events, vicariously experiencing them by witnessing or learning about them from friends, family or highly publicized reports may still have impacts on their mental health (Bor et al., 2018; Curtis

et al., 2021; Turney, 2022). Past studies show that exposure to media coverage of collective traumas can increase perceptions of risk, stress, and depressive symptoms (Holman et al., 2014, 2020; Silver et al., 2021). In fact, social media use may reinforce the perception of discrimination experiences and worries about future discrimination among Asians in the US during the COVID-19 pandemic (Yu et al., 2020). This is particularly troubling since, in a March–May 2020 study of Chinese American parents ( $N = 543$ ) and their children ( $N = 230$ ), about 77% of parents and children reported witnessing vicarious racial discrimination online and 89% of parents and 92% of children reported witnessing vicarious discrimination in person (Cheah et al., 2020). It is possible that instances of vicarious discrimination during the pandemic, such as witnessing discriminatory events occurring to other people or through news or social media coverage, have enhanced Chinese immigrants’ sense of vulnerability and contributed to individuals’ anticipatory stress responses, including their vigilance while navigating everyday experiences.

These COVID-related experiences of discrimination have occurred alongside pre-existing forms of anti-Asian discrimination in the US, such as a history of exclusion, structural racism, and perpetuation of the Model Minority myth, which have been robustly associated with mental health and other chronic health conditions among Asians (Cowan, 2021; Gee et al., 2007; Tessler et al., 2020). Thus, to better understand how COVID-related discrimination uniquely shapes the mental health of Asians in the US, it is important to consider how new perceptions of being noticed or feared by others as public health threats and racism-related vigilance triggered by the surge in anti-Asian sentiments during the pandemic are associated with mental health and stress. Several recent studies have begun examining these relationships among Asian American populations, finding associations between various types of COVID-related anti-Asian discrimination and mental health outcomes (Cheah et al., 2020; Hahm et al., 2021). Additional research is necessary to understand how these unique types of COVID-related discrimination contribute to mental health outcomes independent of contemporaneous stressors, such as acculturative stressors among immigrant communities and general worries about COVID-19, and how these associations vary by ethnic identity.

### 1.2. Acculturation, acculturative stress, Anti-Asian discrimination, and ethnic identity

#### 1.2.1. Acculturative processes, discrimination, and mental health

Among Asians who immigrate to the US, the process of *acculturation*—when one undergoes changes in identity, beliefs, practices, and values after arriving in a new country and coming into contact with other cultural groups—shapes overall well-being (Berry, 1990). Due to the innate nature of uprooting one’s life and settling in a new and unfamiliar environment, immigrants may experience a range of challenges such as language barriers, discrimination, and familial conflict during the process of immigration, known as *acculturative stressors* (Lueck and Wilson, 2010). However, the relationships among acculturation, acculturative stressors, health, and well-being are complex and nuanced, and the strength of connection to one’s home and host cultures may moderate these associations (Hwang and Ting, 2008). Some studies based on national representative data find evidence that foreign-born Asians in the US benefit from an immigrant advantage in mental health, such that they display lower rates of mental disorders than US-born Asians (Takeuchi et al., 2007). These studies show that nativity is the most stable predictor of mental disorders for women, with second-generation immigrant women most at risk of experiencing them. Others interrogate the reasoning for this immigrant advantage in mental health, finding that US-born Asian women are more likely than foreign-born women to report stress exposures to discrimination and familial conflict despite their higher social standing and family support (Lau et al., 2013).

Still, the evidence on the relationship between the process of acculturation and health is mixed. In some contexts, increased adaptation can benefit Asian immigrants in terms of upward social mobility (Lueck,

2018), but, as first- or successive generations of immigrants acculturate to life in the US, they may adopt unhealthy behaviors that have been linked to physical health decline (e.g., more sedentary lifestyles (Daniel and Wilbur, 2011)). Acculturative stress, on the other hand, is consistently linked to worse mental health among Asian immigrants (Xu and Chi, 2013). For example, the longer Asian immigrants reside in the US, the more they may experience depression and anxiety because of their prolonged exposure to a unique configuration of acculturative stressors, such as minoritized status and higher levels of intergenerational family conflict (Lau et al., 2013). The experience of discrimination can also hinder the ability of immigrants to seamlessly adapt to life in a new environment, and in turn can have adverse psychological and health impacts. Among Asian immigrants, discrimination predicts acculturative stress (Lueck and Wilson, 2010), emphasizing the need to examine how discrimination shapes overall well-being independent of acculturative stress.

### 1.2.2. The moderating effect of ethnic identity

Ethnic identity, one important psychological aspect of acculturation (Hwang and Ting, 2008), can play a role in moderating the mental health burden of discrimination (Mossakowski, 2003). Social identity theory (Tajfel and Turner, 1986) offers insight into this moderating effect. This theory posits that individuals' social identities are based on their membership within distinct social groups and that they seek to achieve and maintain a positive identity by prioritizing membership within groups with higher social status. This categorization process can provide individuals psychological benefits as they focus on the positive aspects of their group compared to others, potentially boosting their self-esteem. Prior studies posit that the focus on positive group characteristics may mitigate the impacts of social identity-related discrimination for some groups, finding that the strength of one's ethnic identity buffers the psychological and mental health burden of ethnic discrimination for US-born Asians though not for foreign-born Asians (Yip et al., 2008).

Other studies emphasize that connection to one's host country, measured by the process of acculturation or ethnic identity, may have no buffering effect or may even intensify the negative relationship between discrimination and mental health. For example, a study of foreign-born immigrants in the US finds that higher levels of education acculturation and English-language acculturation exacerbate the negative relationships between perceived discrimination and depression (Finch et al., 2000). The authors suggest that acculturated individuals are more in tune with the language of discrimination, and are thus more likely to perceive discrimination and more sensitive to those experiences. A separate study finds that the ethnic identity of foreign-born Asians living in the US does not moderate the relationship between discrimination and psychological distress, but that the ethnic identity of US-born Asians can either exacerbate or buffer the relationship between discrimination and mental health depending on age (Yip et al., 2008). Together, these findings suggest that the moderating effect of ethnic identity on the association between discrimination and mental health may vary across population subgroups or the outcomes measured.

Immigrants may also react differently to experiences that threaten their ethnic identity depending on how important or meaningful (i.e., how "salient") their ethnic identity is to their conception of self. Thoits (1991) merges social identity theory and stress research to discuss "identity-relevant stressors", which are experiences that threaten the social roles or identities that are more salient in an individual's identity hierarchy. According to this theory, stressors that challenge a role-identity will have a higher impact on the psychological well-being of individuals that attach more value to that role-identity. This implies that an emphasis on the organization of identity hierarchy can help explain why some individuals are more reactive to certain stressors than others.

Woo et al. (2019) apply Thoits' theoretical concept of identity-relevant stressors to self-conceptions of race/ethnicity arguing that, because race is a socially constructed identity that shapes one's social positions and social interactions, racial/ethnic discrimination may

function as an identity-relevant stressor and exert a strong psychological burden on those who put a higher value on their racial/ethnic identity. Using nationally representative data, they find that, in the US, the moderating role of racial/ethnic identity is not uniform across racial/ethnic and nativity groups. Namely, results suggest that moderate (vs. low or high) racial/ethnic identity buffers the effect of racial discrimination on psychological well-being among individuals who identify as Asian or Black, but high racial/ethnic identity may worsen the mental health burden of discrimination among individuals who identify as White, American Indian/Native American, or Latinx. These different mental health impacts suggest that threats to one's identity can be especially damaging among those who put a strong value on it. Woo et al. (2019) also find that, overall, the exacerbating effect of racial/ethnic identity is more pronounced among those who are US-born compared to the foreign-born. It is possible that US natives place more meaning on their racial/ethnic backgrounds than their immigrant counterparts, leading to the stronger mental health burden. However, the authors are underpowered to find a similar interaction with nativity for Asians due to the small sample size of the pan-ethnic US-born Asian category.

### 1.2.3. Acculturation, discrimination, ethnic identity, and COVID-19

Several conclusions about the effect of anti-Asian discrimination on psychological well-being can be drawn from the literature. First, discrimination directed at Asian immigrants in the US during the COVID-19 pandemic may increase perceptions of being feared by others and ignite feelings of vulnerability and concerns for physical safety that give rise to anticipatory stress responses (i.e., racism-related vigilance), shaping psychological well-being. Moreover, within the same immigrant community, the psychological impacts of certain types of COVID-related discrimination may differ depending on the salience of one's Asian ethnicity to their identity. For example, the dominant stereotype of Asians as perpetual foreigners to be feared as public health threats may be particularly stress-provoking to those who are more acculturated to life in the US, or those who place less or partial value on their Asian ethnicity. Second, estimating the relationship between COVID-related anti-Asian discrimination and stress is complicated by the sudden and unexpected nature of the COVID-19 outbreak. Because of this, earlier studies examining the mental health burden of COVID-related anti-Asian discrimination often rely on exposures and outcomes measured *after* the COVID-19 outbreak and lack baseline measures before the pandemic. Third, the heterogeneity of Asian populations with respect to ethnicity, culture, and immigration history strongly suggests the need to conduct analyses by national origin rather than relying on the overly broad race and pan-ethnic category of "Asian". This is especially true of individuals of Chinese descent who represent a comparatively understudied population group despite Chinese being the largest Asian origin group and China being the second most common birthplace of immigrants in the US (Budiman and Ruiz, 2021). The data we utilize in this paper allow us to address these challenges and answer the questions left unanswered in the literature about the unique contribution of COVID-related anti-Asian discrimination to the psychological well-being of Chinese immigrants.

### 1.3. Study aims

This study, fielded among Chinese immigrants in North Carolina, has two aims. First, we estimate the associations between two types of COVID-related discrimination faced by Chinese immigrants—new perceptions of being feared by others and racism-related vigilance—and their perceptions of stress (Liu et al., 2020). We measure these associations controlling for other contemporaneous stressors, including the process of acculturation and general worries of COVID-19 (Tessler et al., 2020), to better understand how COVID-related anti-Asian discrimination adds to the mental health burden of these other stressors among Chinese immigrants. Importantly, our measures allow us to isolate the stress response of racism-related vigilance activated in immigrants who are constantly on guard and in fear of attacks and the stress response of new



perceptions of being feared by others as public health threats from the stress responses activated by acculturative stressors and general COVID-related stressors. Second, we evaluate the moderating role of ethnic identity on these associations.

We hypothesize that, since the COVID-19 outbreak, the two types of COVID-related discrimination we measure uniquely contribute to stress independently of contemporaneous stressors faced by Chinese immigrants (American Psychological Association, 2020). We also hypothesize that the association between each type of COVID-related discrimination and perceived stress varies depending on the value or strength immigrants place on their Chinese or their emergent American identities. In light of the surge of anti-Asian discrimination during the pandemic, the strength of ethnic identity among Chinese immigrants may moderate the relationship between experiences of COVID-related discrimination and mental health. Chinese immigrants who identify closely with their Chinese ethnicity may maintain positive feelings about their ethnic social group that mitigate the impact of new perceptions of being feared on stress. They may also be better able to collectively organize in response to the negative social perceptions of their group or to seek support from co-ethnics to cope with such experiences of discrimination (Tajfel and Turner, 1986). In contrast, Chinese immigrants who have a partial Chinese-American identity may place greater emphasis on their “partly American” identity in social interactions with US natives. The new realization of being scapegoated for the pandemic and feared as public health threats may challenge and disrupt this identity in ways that harm their psychological well-being because of the salience that their partial identification as Americans holds for them (Thoits, 1991). Alternatively, it is also possible that they can leverage this partial American identity to mitigate the harmful effects of anti-Chinese sentiments (Tajfel and Turner, 1986).

## 2. Methods

### 2.1. Data source

Data for this study are drawn from the Chinese Immigrants in Raleigh-Durham (ChIRDU) Study (Merli et al., 2022), which recruited a sample of first-generation Chinese immigrants aged 18 and above who were interviewed across two waves of data collection, in 2018 (Wave 1) and again four-to-six months after the COVID-19 outbreak in the US in Summer 2020 (Wave 2). The study fielded in 2018 had both methodological and substantive goals. Methodologically, it aimed to test an innovative sampling methodology—Network Sampling with Memory (NSM)—which relies on the social networks of respondents to probabilistically recruit successive waves of new respondents (Lau et al., 2013), and to evaluate the population-representativeness of the sample thus recruited. Substantively, it aimed to study the rapidly growing community of Chinese immigrants in the Raleigh-Durham area of North Carolina, an increasingly popular destination of immigration from China and India (Tippett, 2018), in particular how social networks facilitate or hinder immigrants’ social integration. The 2018 ChIRDU survey respondents were recruited and interviewed between March and December 2018 using multiple modes of data collection: in-person, phone, and web. In addition to egocentric social network information collected from respondents, the 2018 survey included the Everyday Discrimination Scale (EDS) (Williams et al., 1997), previously administered among Chinese origin respondents for the National Latino and Asian American Study (NLAAS) (Chan et al., 2012), as well as various measures of acculturation and ethnic identity. In the summer of 2020, following reports of the mental health burden of rising COVID-related racial discrimination towards Chinese and other Asians in the US and in response to calls for further research on the psychological impact of discrimination due to the COVID-19 pandemic (Misra et al., 2020), we designed and fielded a COVID-19 follow-up survey that included a battery of assessments and was administered to eligible and consenting 2018 ChIRDU respondents between July and September 2020. The 2020 survey repeated measures

of the EDS and ethnic identity from the previously administered survey and included first-time measures of perceived stress, racism-related vigilance, and acculturative and COVID-related stressors. Thus, while we have two time points of data collection for select variables (e.g., EDS, ethnic identity, sociodemographic and migration characteristics), most stressors and perceived stress were only measured in the 2020 survey. Both 2018 and 2020 surveys were approved by the Institutional Review Board at Duke University. Participants provided informed consent at the beginning of the Wave 1 and Wave 2 surveys.

### 2.2. Sample

Individuals were eligible for participation in the Wave 1 survey if they were born in China (including Hong Kong) or Taiwan, aged 18 or older, and resided in one of the three Raleigh-Durham area counties (Durham, Orange, and Wake counties). Because NSM techniques were used to recruit Wave 1 respondents, new waves of potential respondents were nominated by earlier respondents who referred them to the research team by sharing their phone, email, or WeChat<sup>1</sup> information. Nominated individuals who were selected by the NSM algorithm, contacted by the research team, and agreed to participate in the study were administered an in-person, phone, or web survey, depending on the interview mode of the referring respondent. Response rates, computed according to guidelines from the American Association for Public Opinion Research (American Association for Public Opinion Research, 2016),<sup>2</sup> yield 51% for the web arm of the study and 69.4% and 72.6% for the phone and in-person arms, respectively. These high response rates were achieved by relying on known models of survey participation as well as on the peer referral element embedded in NSM’s link-tracing design.<sup>3</sup> The final ChIRDU Wave 1 sample ( $N = 509$ ) very closely approximates the gender and age profiles of the local Chinese-born sample (weighted) in the American Community Survey (ACS). Except for the significantly higher percentage with college education in the Wave 1 sample (23%) compared with the ACS (14%), the percentages with high school education, 1–2 years of college, or more than college education in the ChIRDU study are strikingly similar to those in the ACS.<sup>4</sup>

While Wave-1 surveys were administered via multiple modes, Wave 2 respondents were invited to self-administer a web-survey because of lockdowns and social distancing rules. Of the original Wave 1 sample, 53.7% of respondents were successfully contacted and interviewed for the Wave 2 survey.<sup>5</sup> A total of 240 respondents (48.1%) were eligible to participate in the Wave 2 survey because they still lived in the US. For ease of explanation, herein we refer to respondents who completed both survey waves as the “longitudinal sample”. Comparisons of the sample of respondents who only participated in Wave 1 (i.e., 2018 respondents lost to attrition between Wave 1 and Wave 2) and of the longitudinal sample demonstrate no significant differences between the two samples in sociodemographic characteristics or acculturation and everyday

<sup>1</sup> WeChat is a social media/messaging platform that is commonly used among Chinese immigrants.

<sup>2</sup> Response rates were computed using, in the numerator, the number of completed interviews and, in the denominator, the sum of the number of completed interviews, of the number of individuals referred by a parent respondent and selected by the NSM algorithm who refused to participate, and of the number who failed to respond to the research team’s invitation after several contact attempts.

<sup>3</sup> Potential new respondents were approached by the research team after being informed about the study and encouraged to participate by the “parent” respondent who had referred them to the study.

<sup>4</sup> More details on the sampling strategy, response rates, role of peer referral in achieving high response rates, and comparison of the NSM sample with the ACS can be found in Merli and al. (Merli et al., 2022).

<sup>5</sup> Reasons for non-contact for the remaining 46.3% of the Wave 1 sample included not working or disconnected contact email address or phone number, or failure to answer email, phone, or WeChat invitations after several attempts.

discrimination measures (results not reported here but available upon request). This finding alleviates concerns of selection bias due to loss to follow-up between the two waves.

Due to a small amount of missingness on the outcome variable ( $N = 16$ ), the analytic longitudinal sample includes 224 respondents. The sociodemographic characteristics and acculturation and discrimination measures of respondents with missing values on the outcome variables are statistically similar to those of members of the longitudinal sample.

### 2.3. Measures

#### 2.3.1. Dependent variable: perceived stress

Our dependent variable is measured using the 10-item *Perceived Stress Scale (PSS)* (Cohen et al., 1983; Cohen, 1988), which is a measure of generalized stress. The PSS asks respondents to assess the degree to which situations in their life during the prior month were stressful. The scale was previously translated into Chinese and validated among Chinese populations in the US (Yew et al., 2015). Items (4 reverse-coded) are rated on a 5-point Likert scale from Never (=0) to Very Often (=4) and summed to create a total score ranging from 0 to 40, with higher scores indicating higher perceptions of generalized stress. The PSS was administered in Wave 2 and yields acceptable internal consistency (Cronbach alpha = 0.78).

#### 2.3.2. Everyday Discrimination Scale (EDS)

*Everyday Discrimination* is measured via five items representing the abbreviated version of the EDS as described by Sternthal et al. (2011) (“you were treated with less courtesy or respect than other people”; “you received poorer service than other people at restaurants or stores”; “people act as if they think you are not smart or competent”; “people act as if they are afraid of you”; and “you felt threatened or harassed”) and two items added by the research team (“people act as if they think you are dishonest”; and “people assumed that your English is poor”). Respondents indicate the frequency of exposure to these specific discriminatory experiences, with responses ranging from Never (=1) to Daily (=4). The summed discrimination measure ranges from 7 to 28, with higher scores indicating higher frequency of discriminatory experiences. The measure was administered in both Wave 1 (Cronbach alpha = 0.68) and Wave 2 (Cronbach alpha = 0.81). While in Wave 1 the reference period was undetermined, the reference period in Wave 2 was “since the COVID-19 outbreak started in China”.

#### 2.3.3. Types of COVID-related discrimination

**2.3.3.1. Change in perception of being feared.** The EDS measures the frequency of chronic and routine unfair treatment and is not a specific measure of COVID-related anti-Asian discrimination. To capture a unique form of COVID-related discrimination in the context of a narrative that positions Chinese immigrants as a public health threat, we utilize a single item of the EDS collected in both waves—“People act as if they are afraid of you”—to gauge the extent to which respondents report *changes in perceptions of being feared* by others since the COVID-19 outbreak started in China. Respondents are categorized into the following groups based on their responses: Never (i.e., reporting “Never” in Waves 1 and 2; reference category); Increase from “Never” in Wave 1 (i.e., reporting “Never” in Wave 1 and either “Yearly or Occasionally”, “Monthly”, or “Daily” in Wave 2); and Other (i.e., reporting some frequency of being feared in both waves [ $N = 6$ ] or reporting some frequency in Wave 1 and “Never” in Wave 2 [ $N = 7$ ]).

**2.3.3.2. Racism-related vigilance.** To capture a separate form of COVID-related discrimination, we also include a measure of *racism-related vigilance* developed by a research team at Columbia University (Gao and Liu, 2021). This 3-item scale assesses anticipatory stress activated by respondents’ feelings of vulnerability and concerns for their

physical safety since the outbreak of COVID-19 in China in January 2020. This scale uses the following items: “feeling unease in public areas or worrying how others may look at the respondent”; “trying to avoid certain social situations or places due to worries about racial discrimination”; and “worrying about your own and your family’s safety from a hate crime or harassment”. Responses measure the frequency on a 4-point scale ranging from Never (=1) to Often (=4) for a total range of 3–12, with higher scores reflecting more frequent internalization of COVID-related discrimination. This measure was administered in Wave 2 and yields acceptable internal consistency (Cronbach’s alpha = 0.88).

#### 2.3.4. Contemporaneous stressors

**2.3.4.1. Acculturative stress.** We measure *acculturative stress* via the 9-item scale used in the National Latino and Asian American Study (NLAAS) (Cohen, 1988). Items inquire if respondents: “felt guilty for leaving family and friends in China”; “felt they had the same respect in the US compared to China” (reverse scored); “felt that living out of China had limited their contact with family or friends”; “found it hard to interact with others because of difficulties with the English language”; “felt people treated them badly because of assumptions that their English is poor or they speak with an accent”; “found it difficult to find the work they wanted because of their Asian descent”; “were afraid of going to U.S. social or government agencies”; “were afraid of seeking health services due to financial costs”; and “were afraid of seeking health services due to other reasons”. Items are rated as No (=0) or Yes or Somewhat (=1) and summed to create a total score ranging from 0 to 9, with higher scores indicating higher acculturative stress. The measure was administered in Wave 2 and yields acceptable internal consistency (Cronbach alpha = 0.73).

**2.3.4.2. COVID-related stress.** To capture general stress related to COVID-19 pandemic worries, we rely on a measure of *COVID-related stress* developed for other surveys (American Psychological Association, 2020; Detroit Metro Area Communities Study). The measure assesses the significance of the COVID-19 pandemic as a source of stress with responses to a prompt: “Please indicate how significantly the COVID-19 pandemic is causing stress in your life.” Responses are rated on a 4-point scale from Not at all significant (=1) to Very significant (=4), with higher scores indicating more significant COVID-related stress. The measure was administered in Wave 2.

#### 2.3.5. Moderating variable: ethnic identity

Consistent with research finding that foreign-born individuals are more likely to describe their ethnicity using a national label (Fuligni et al., 2005; Rumbaut, 1994), we use a single item to capture pre-pandemic ethnic identity: “How much, if at all, do you identify as Chinese?” Respondents could identify as “completely Chinese” ( $N = 121$ ), “partly American, partly Chinese” ( $N = 95$ ), or “completely American” ( $N = 5$ ). Because of the small number of respondents who chose the third category, we group the second and third categories together creating a combined category of respondents who identify as at least partly American. Although this variable was measured in both waves, we rely on the Wave 1 measure in the analyses to avoid situations in which Chinese immigrants hide their ethnic identity or assert their status as Americans in an attempt to minimize COVID-related discrimination and attacks.

#### 2.3.6. Covariates: demographic characteristics

To characterize our sample of respondents, our analyses include sociodemographic characteristics such as age (continuous), sex (female = 1), and educational attainment (completed more than a college education = 1), and migration and acculturation measures such as country of origin (mainland China = 1 vs. Taiwan = 0), whether one

arrived to the US during childhood (=1), cumulative duration in the US (years), US citizenship (=1), and English proficiency (speaks English well or very well = 1). Age, sex, and educational attainment were collected in both waves, but Wave 2 measures are used in the main analyses because we anticipate that, given the time elapsed between the two waves (approximately 2 years), the change in characteristics during that time may be relevant (e.g., attainment of a graduate degree).

### 2.3.7. Other contextual characteristics: attitudes towards life in the US and trust in institutions

Pre-pandemic attitudes towards life in the US (Wave 1) and trust in US, Chinese, and international institutions regarding COVID-19 information (Wave 2) are summarized to capture the extent to which Chinese immigrants embrace the American way of life and the value they put into their American and/or Chinese identity. Furthermore, respondents are characterized by their frequency of working from home at the time of the survey to capture differences in potential exposures to the public during the pandemic that may intensify the anticipatory stress related to racism-related vigilance. These measures are used to contextualize the lives of Chinese immigrants in our sample and to better understand differences across ethnic identity groups. For example, it is possible that those who identify completely with their Chinese ethnicity are more trustful of Chinese institutions, media, and political figures regarding COVID-19 information. On the other hand, those who identify as at least partly American may have more favorable views regarding life in the US. Understanding any differences in these measures across groups will help inform our discussion of potential differences in the associations between types of COVID-related discrimination, contemporaneous stressors, and perceived stress across ethnic identity.

### 2.4. Statistical analyses

Because differences in how Chinese immigrants conceptualize their ethnic identity may introduce variation in the levels and impacts of perceived discrimination and other stressful experiences, we first describe key sociodemographic, migration, discrimination, and stress-related variables separately by self-reported ethnic identity. We test the differences in means and percentages across groups using two-sample t-tests of means and z-tests of proportions. Next, to predict the contribution of each unique stressor to perceptions of generalized stress, we rely on ordinary least squares (OLS) regressions to model perceptions of stress as a function of our two types of COVID-related discrimination and contemporaneous stressors. This model also includes controls for age, gender, and socioeconomic status (educational attainment), which are common covariates in analyses predicting mental health-related outcomes because they are associated with mental well-being (Hahm et al., 2021; Woo et al., 2019), and duration of residency in the US, because number of years in the US may be negatively associated with stress, at least in the short-term.

We stratify the analyses by pre-pandemic ethnic identity to identify potential differences in how types of COVID-related discrimination and contemporaneous stressors are associated with perceptions of stress across the two groups. Models that fully interact pre-pandemic ethnic identity with all independent variables are included in [Supplemental Table 1](#) and discussed when identifying significant differences across ethnic identity, but we only present stratified models in the Results section for ease of interpretation. All final models are estimated in Stata 16.1 with robust standard errors and using multiple imputation with chained equations (MICE; 50 imputations) (White et al., 2011) to account for missing data, although results are similar when using listwise deletion and alternative approaches to address item non-response for scaled variables. Pairwise correlation tests with Bonferroni corrections suggest low or no correlation between changes in perceptions of being feared, racism-related vigilance, acculturative stress, and COVID-related stress. Furthermore, collinearity tests that include all model variables alleviate multicollinearity concerns (mean VIF = 1.36).

## 3. Results

[Table 1](#) summarizes sociodemographic and migration characteristics, types of COVID-related discrimination, contemporaneous stressors, levels of perceived stress, and other contextual characteristics separately for respondents who identify as completely Chinese and for those who identify as at least partly American. The table also indicates statistically significant differences in the longitudinal sample of respondents by pre-pandemic ethnic identity. Compared with their counterparts who identify completely as Chinese, respondents who identify as at least partly American are more likely to have arrived in the US during childhood ( $p < 0.05$ ), report longer duration in the US ( $p < 0.001$ ), are more likely to be US citizens ( $p < 0.001$ ), and have a better mastery of the English language ( $p < 0.001$ ). They also report significantly lower levels of acculturative stressors ( $p < 0.01$ ) and of generalized perceived stress ( $p < 0.05$ ). In terms of differences across other contextual characteristics, those who identify as fully Chinese are more likely to report sometimes or never working from home ( $p < 0.5$ ; Wave 2) and are less likely to agree that there is no better country to live in than the US ( $p < 0.01$ ; Wave 1).

Although there are no other statistically significant differences across the two groups, we observe other important patterns (see [Table 1](#)). Slightly less than a fifth of respondents, regardless of how they identify, report new perceptions of being feared by others since the onset of COVID-19 outbreak. On average, both groups of respondents report low to moderate levels of racism-related vigilance (mean score of 6 on a scale of 3–12), and moderately high levels of COVID-related stress (mean score of 3 on a scale of 1–4). At the time of the second wave of data collection, both groups report low levels of trust in then President Trump (mean score of 0.56–0.66 on a scale of 0–2). Those who identify as completely Chinese report marginally higher levels of trust in the Chinese government (1.20 versus 1.04) and the World Health Organization (WHO) (1.16 versus 1.07) compared to those who identify as at least partly American, although the differences do not rise to the level of statistical significance.

[Table 2](#) shows predictors of perceived stress from OLS regression models stratified by pre-pandemic ethnic identity. The model on the left estimates the independent associations between two types of COVID-related discrimination and contemporaneous stressors and perceived stress among Chinese immigrants who identify completely as Chinese. The model on the right estimates the independent associations among Chinese immigrants who identify as at least partly American. Controlling for sociodemographic characteristics and measures of COVID-related discrimination, both contemporaneous stressors—acculturative and COVID-related stress—are positively and significantly associated with perceived stress, regardless of ethnic identification. Among respondents identifying completely as Chinese, shorter duration in the US is associated with higher perceived stress (beta coefficient:  $-0.170$ ; 95% confidence interval (CI):  $[-0.281, -0.059]$ ;  $p < 0.01$ ).

Importantly, the stratified analyses suggest that, in this Chinese community, the experiences of discrimination related to the COVID-19 pandemic are not uniformly positively associated with perceived stress and instead vary by pre-pandemic ethnic identity. Controlling for demographic characteristics and other stressors, racism-related vigilance is positively associated with stress among immigrants who identify as completely Chinese (beta coefficient:  $0.558$ ; 95% CI:  $[0.174, 0.942]$ ;  $p < 0.01$ ). For immigrants who identify as at least partly American, having a new, pandemic-related report of being feared by others is associated with a stress score that is 2.630 points higher than having a report of never being feared (95% CI:  $[0.458, 4.803]$ ;  $p < 0.05$ ).

To determine if these differences across ethnic identity are statistically significant, we also estimate a model with two-way interactions between ethnic identity and each of the independent variables included in the stratified models (shown in [Supplemental Table 1](#)). The interaction effects measure and assess the statistical significance of the difference in the association between the predictor variables and perceived stress for those who identify as completely Chinese compared to those who identify as at least partly American. Results suggest that ethnic identity

**Table 1**

Sociodemographic characteristics and measures of migration, COVID-related discrimination, contemporaneous stressors, and generalized perceived stress by pre-pandemic ethnic self-identification (completely Chinese or at least partly American), ChIRDU respondents in the longitudinal sample, Raleigh-Durham Area, North Carolina.

Measures	Identify as completely Chinese (N=124)			Identify as at least partly American (N=100)			P-value of difference
	N	Mean or %	SD	N	Mean or %	SD	
<b>Sociodemographic Characteristics (W2)</b>							
Age (years)	124	45.49	9.90	100	46.47	10.72	
Female (%)	124	64.52		100	62.00		
Education: > College (%)	124	58.06		100	69.00		
<b>Migration and Acculturation (W1)</b>							
Born in China (v. Taiwan) (%)	124	91.13		100	88.00		
Arrived in the US during childhood (<18) (%) <sup>a</sup>	124	2.42		98	10.20		*
Cumulative duration in the US (years)	124	11.40	8.45	99	17.09	8.88	***
Citizen (%)	124	30.65		99	61.61		***
Speak English well or very well (%)	124	62.90		100	87.00		***
<b>COVID-related Discrimination</b>							
<i>Everyday Discrimination Scale item: "People act as if they are afraid of you" (1 = Never, 4 = Daily)</i>							
People act as if they are afraid of you (W1)	124	1.06	0.02	100	1.06	0.02	
People act as if they are afraid of you (W2)	122	1.26	0.51	100	1.17	0.38	
<i>Change in perception of being feared ("People act as if they are afraid of you"; W1-2) (%)</i>							
"Never" reported in W1	124	95.16		100	94.00		
"Never" reported in W2	122	76.23		100	83.00		
Increase from "Never" in W1 to some frequency in W2 <sup>b</sup>	122	19.35		100	16.00		
Racism-related vigilance (W2) (3–12)	123	6.16	2.49	100	5.88	2.51	
<b>Contemporaneous Stressors</b>							
COVID-related stress (W2) (1–4)	124	2.80	0.80	100	2.78	0.76	
Acculturative stress (W2) (0–9)	83	3.43	2.55	59	2.20	1.63	**
<b>Generalized Perceived Stress</b>							
Perceived Stress Scale (PSS; W2) (0–40)	124	16.04	5.71	100	14.54	4.56	*
<b>Other Contextual Characteristics</b>							
<i>Work from home at time of survey (W2) (%)</i>							
Always work from home	122	35.25		99	46.46		
Sometimes or never work from home	122	40.16		99	26.26		*
Not currently employed	122	24.59		99	27.27		
<i>Trust in the following entities about COVID-19 (W2) (0 = not at all; 2 = a great deal)</i>							
Personal physician	116	1.60	0.53	97	1.52	0.06	
Friends, family, and coworkers	116	1.47	0.46	95	1.42	0.45	
President Trump	119	0.56	0.63	98	0.66	0.72	
US federal government <sup>c</sup>	115	0.96	0.42	95	1.04	0.44	
World Health Organization	119	1.16	0.69	98	1.07	0.76	
Home government	120	1.20	0.66	97	1.04	0.76	
<i>Sentiments on life in the US: agree that ... (W1) (%)</i>							
There is racial discrimination in economic opportunities in the US	122	70.49		100	63.00		
The American way of life weakens the family	124	30.89		99	28.00		
There is much conflict between different racial and ethnic groups in the US	123	45.97		100	58.59		
Non-whites have as many opportunities to get ahead economically as whites in the US	121	36.59		100	43.00		
There is no better country to live in than the US	123	12.40		100	30.00		**
Americans generally feel superior to foreigners	124	65.04		100	65.00		

Notes.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

The table estimates the mean or percentage of each measure for the two groups. Differences in the means (two-sample t-tests of means) and percentages (two-sample test of proportions) across ethnic identity are assessed, with p-values indicated in the column labeled "P-value of differences".

All respondents in the longitudinal sample reported ethnic identity in W1 (pre-pandemic).

The group of respondents who identify as at least partly American includes 5 respondents who identify as completely American, with the rest identifying as partly American.

<sup>a</sup> Due to the low sample size of respondents who identify as completely Chinese and who arrived in the US during childhood, we use the Fischer's exact test to compare the proportions across ethnic identity for this variable.

<sup>b</sup> Increase from "Never" feared in Wave 1 includes respondents who reported "Never" in Wave 1 and either "Yearly or Occasionally", "Monthly", or "Daily" in Wave 2. The comparison group includes those who reported "Never" in both Waves 1 and 2 (77% of the overall sample), as well as 6 respondents who reported some frequency of being feared in both waves and 7 respondents who reported some frequency in Wave 1 and "Never" in Wave 2 (5% of the overall sample combined).

<sup>c</sup> US federal government includes US government, White House Task Force, and US Congress.



**Table 2**

Predictors of Perceived Stress Scale (PSS) scores stratified by pre-pandemic ethnic identity: Ordinary Least Squares Regression, ChIRDU respondents in the longitudinal sample, Raleigh-Durham Area, North Carolina.

	Ethnic Identity			
	Completely Chinese		At Least Partly American	
	Coefficient	95% CI	Coefficient	95% CI
<b>Sociodemographic &amp; Migration Characteristics</b>				
Age (years)	0.002	(-0.084, 0.089)	-0.038	(-0.126, 0.049)
Female (=1)	1.373	(-0.518, 3.264)	-0.083	(-1.877, 1.710)
More than college (=1)	-0.665	(-2.586, 1.256)	-0.388	(-2.140, 1.364)
Cumulative duration in the US (years; W1)	-0.170**	(-0.281, -0.059)	0.038	(-0.097, 0.173)
<b>COVID-related Discrimination</b>				
Change in: "People act as if they are afraid of you"				
Never (W1&W2)	Ref.		Ref.	
Increase from "Never" in W1 to some frequency in W2 <sup>a</sup>	1.096	(-0.934, 3.126)	2.630*	(0.458, 4.803)
Other <sup>b</sup>	1.011	(-1.687, 3.710)	-1.875	(-4.112, 0.362)
Racism-related vigilance (3-12)	0.558**	(0.174, 0.942)	0.010	(-0.327, 0.347)
<b>Contemporaneous Stressors</b>				
Acculturative stress (0-9)	0.370*	(0.010, 0.729)	0.640*	(0.153, 1.127)
COVID-related stress (1-4)	1.534*	(0.258, 2.809)	1.802**	(0.574, 3.030)
Constant	7.993*	(1.852, 14.133)	8.959**	(3.117, 14.801)
Observations	124		100	

Notes.

Coefficient = Unstandardized betas; CI = Confidence Interval.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

All data were measured in Wave 2 unless otherwise noted in the table.

PSS scores can range from 0 to 40. Mean scores for each group are listed in Table 1.

The group of respondents who identify as at least partly American includes 5 respondents who identify as completely American, with the rest identifying as partly American.

<sup>a</sup> Increase from "Never" feared in Wave 1 includes respondents who reported "Never" in Wave 1 and either "Yearly or Occasionally", "Monthly", or "Daily" in Wave 2.

<sup>b</sup> "Other" (~5% of the overall sample) includes respondents who reported some frequency of being feared in both waves and respondents who reported some frequency in Wave 1 and "Never" in Wave 2.

indeed moderates the associations between duration in the US and racism-related vigilance and stress, although it is less clear if ethnic identity moderates the association between new perceptions of being feared and stress.<sup>6</sup>

Fig. 1 graphically presents these findings for each of the three independent variables, with predicted PSS scores on the y-axis. As shown in Panel A of this figure, longer duration in the US is associated with a reduced mental health burden among immigrants who identify completely as Chinese (blue line; two-way interaction term:  $-0.208$ ; 95% CI:  $[-0.381, -0.035]$ ;  $p < 0.05$ ) but not among immigrants who identify as at least partly American (main effect:  $0.038$ ; 95% CI:  $[-0.095, 0.171]$ ,  $p = 0.577$ ). This suggests a protective effect of longer duration in the US, but only among immigrants who identify as completely Chinese.

<sup>6</sup> Although the effect of newly being feared by others is not significant for those who identify as completely Chinese ( $p = 0.287$ ) in the stratified models (Table 2), the interaction term testing the difference in the effect compared to those who identify as at least partly American (who have a positive effect) is also not significant ( $p = 0.305$ ) (Supplemental Table 1).

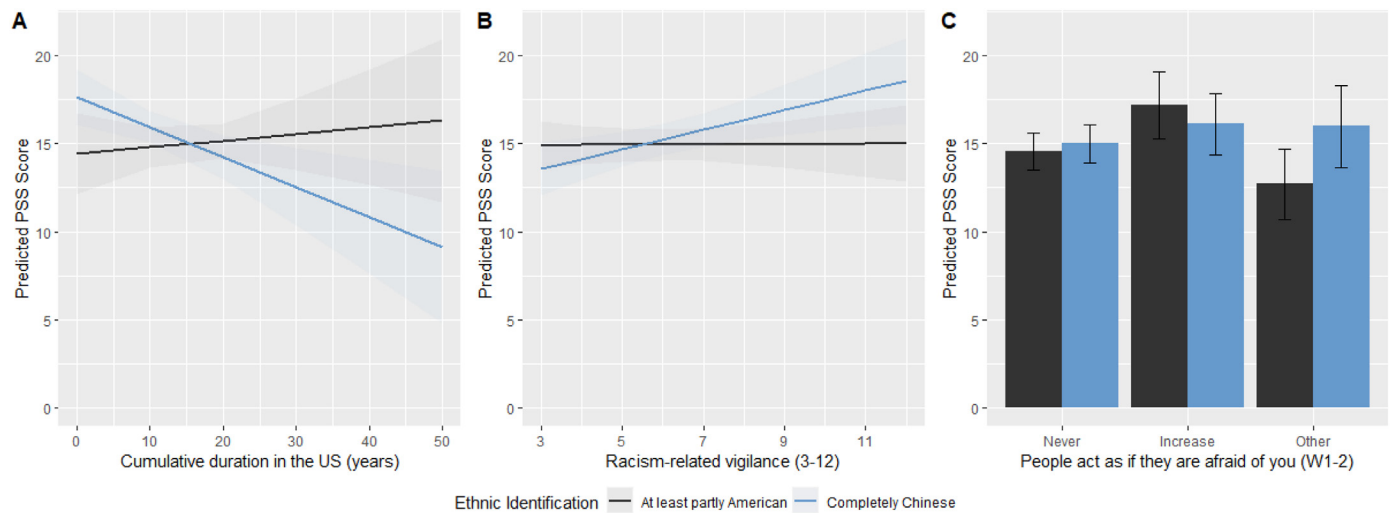
However, identifying as completely Chinese exacerbates the harmful effects of racism-related vigilance on stress (Panel B): while there is a flat association between racism-related vigilance and perceived stress among those who identify as at least partly American (main effect:  $0.010$ ; 95% CI:  $[-0.323, 0.342]$ ,  $p = 0.954$ ), the relationship is positive and statistically meaningful among immigrants who fully identify as Chinese (two-way interaction term:  $0.548$ ; 95% CI:  $[0.041, 1.054]$ ;  $p < 0.05$ ). While those who identify as completely Chinese have lower predicted stress scores at the lowest levels of racism-related vigilance, their predicted stress scores surpass those of immigrants who identify as at least partly American at the highest levels of racism-related vigilance.

Panel C presents the results for changes in perceptions of being feared between survey waves. Among those who identify as at least partly American, there is a significant, positive association between the new perceptions of being feared by others and perceived stress (main effect:  $2.630$ ; 95% CI:  $[0.487, 4.774]$ ;  $p < 0.05$ ). The interaction term is negative (two-way interaction term:  $1.875$ ; 95% CI:  $[-4.083, 0.333]$ ;  $p = 0.096$ ), suggesting a potentially buffering effect of a partial American identity, although we note that it is not statistically significant at the  $p < 0.05$  level). Ancillary analyses that are neither stratified nor interacted find no significant relationship between new perceptions of being feared and PSS, suggesting that the positive relationship between newly being feared and PSS is unique to those who identify as at least partly American, and that our fully interacted model is underpowered to detect a significant difference across ethnic identities.

#### 4. Discussion

In recent years, political polarization and the racialization of the COVID-19 pandemic have exacerbated extant patterns of anti-Asian discrimination and xenophobia, giving rise to hostility, hate crimes, and attacks directed at Asian groups, specifically immigrants. They therefore represent new, significant sources of stress in the lives of Asian immigrants in the US. Discriminatory experiences during the pandemic add to the mental health burden of contemporaneous stressors entailed by immigrants' acculturation process and with widespread statements, similar to those voiced by many Americans, that COVID-19 is a significant source of stress in one's life. We answer calls for research on the psychological impact of COVID-related anti-Asian discrimination (Chen et al., 2021; Tessler et al., 2020) with the analyses of two waves of data collected for the ChIRDU study among the same, population-representative sample of respondents in 2018 and again 4-6 months after the COVID-19 outbreak in the US. ChIRDU data include rich measures of multiple stressors related to acculturation, COVID-related stress, and two types of COVID-related discrimination (i.e., a change in the most salient encounter of everyday discrimination captured by responses to the question of how often "people act as if they are afraid of you"; and racism-related vigilance measured after the outbreak of COVID-19). The data also contain a measure of pre-pandemic ethnic identity that is not influenced by current pandemic-related stressors or experiences of discrimination, thus allowing the estimation of the associations between COVID-related discrimination and perceptions of stress a few months into the pandemic and the examination of whether these associations differ by ethnic identity. Analyses of the data collected from the ChIRDU population-representative sample also allow us to increase the generalizability of previous studies that find widespread perceptions of COVID-related discrimination and deleterious mental health effects among samples of Asian Americans and/or Chinese immigrants recruited by convenience (Cheah et al., 2020; Hahm et al., 2021).

Our descriptive analyses show that, in the Chinese community we studied, during the pandemic, there was an increase in the frequency of responses to the question of how often "people act as if they are afraid of you" among all members of the sample as well as moderate rates of racism-related vigilance. These findings complement those of previous studies that find moderate to high levels of exposure to direct and vicarious forms of COVID-related discrimination among Asian and Asian



**Fig. 1.** Moderating effects of pre-pandemic ethnic identity on the associations between Perceived Stress Scale (PSS) scores and cumulative duration in the US (panel A), racism-related vigilance (panel B), and change in perceptions of being feared (panel C), ChIRDU respondents in the longitudinal sample, Raleigh-Durham Area, North Carolina

Notes: Predicted Perceived Stress Scale (PSS) scores and the corresponding 95% confidence intervals are estimated using the fully interacted model, available in [Supplemental Material Table 1](#), with all other covariates held at their means.

In Panel C, “Increase” includes respondents who reported “Never” in Wave 1 and either “Yearly or Occasionally”, “Monthly”, or “Daily” in Wave 2.

In Panel C, “Other” (~5% of the overall sample) includes respondents who reported some frequency of being feared in both waves and respondents who reported some frequency in Wave 1 and “Never” in Wave 2.

Racism-related vigilance (panel B) and change in perceptions of being feared (panel C) are types of COVID-related discrimination.

The group of respondents who identify as at least partly American includes 5 respondents who identify as completely American, with the rest identifying as partly American.

American communities in the US during the pandemic (Cheah et al., 2020; Hahm et al., 2021). However, our findings also underscore notable differences in the internalization of anti-Asian discrimination and related stress responses. A test of the independent association between the two types of COVID-related discrimination and perceived stress reveal that these patterns of association vary by pre-pandemic self-reported ethnic identity. Immigrants who identify as completely Chinese bear the psychological burden of the anticipatory stress of racism-related vigilance against possible threats to themselves and their families. However, consistent with our hypotheses, the new experience of being feared by others since the COVID-19 outbreak represents a significant source of stress in the lives of those who identify as at least partly American. These results reveal vulnerability in these two groups to different types of discrimination-related stressors.

The salience of a partial American identity for Chinese immigrants may mean that challenges to this identity are particularly stressful. For example, while respondents reported a substantial increase in the perception that other people acted afraid of them between Waves 1 and 2 irrespective of ethnic identity, the new perception of being feared is associated with stress only among those who identify as at least partly American. It is possible that this group’s (new) realization of being perceived by others as public health threats and becoming the target of anti-Asian sentiments (perhaps driven by increased attention to anti-Asian hate in the news) threatened their self-perceptions of achieved social identity, exacerbating the psychological burden of COVID-related discrimination (Thoits, 1991; Woo et al., 2019).

Although the psychological burden of newly being feared is less clear among those who identify as completely Chinese, this group may be more likely to focus on the positive traits related to their Chinese ethnicity and seek community and support from others belonging to their social identity group who experience similar discriminatory experiences (Tajfel and Turner, 1986), making them better equipped to cope with new perceptions of being feared. However, results suggest that these possible protective effects do not extend to racism-related vigilance, which might be explained by differences in how Chinese immigrants consumed and

internalized the news of a rise in anti-Asian discrimination in the US. Although our data do not contain direct information on respondents’ media consumption of the rising anti-Asian discrimination during the pandemic, it is possible that those who identify as completely Chinese had higher exposures to Chinese news sources that provided intense coverage of anti-Asian attacks and discrimination in the US, and that they shared this news in their social networks more frequently. Compared to those who identify as at least partly American, this group is, on average, composed of more recent immigrants, is less proficient in English, and report marginally higher trust in their home government and lower trust in the US federal government with regards to COVID-related information, which may signal differences in where and from whom respondents obtained their news. If there are indeed differences in media exposure by ethnic identity, vicarious trauma associated with media exposure may explain the intensified anticipatory stress of racism-related vigilance among those who identify as completely Chinese. Additionally, [Table 1](#) demonstrates that there are moderately higher levels of never or only sometimes working from home among those who identify as completed Chinese. The higher frequency of working outside of the home may have exacerbated the anticipatory stress related to racism-related vigilance for this group.

For both groups, COVID-related anti-Asian discrimination uniquely contributes to perceived stress independent of acculturative and COVID-related stressors, aggravating the psychological burden of multiple stressors in their lives.

#### 4.1. Limitations and future work

An important strength of our study is the population representativeness of our sample of Chinese immigrants in the Raleigh-Durham area of North Carolina (Merli et al., 2022). A limitation is that it reflects the experiences of the Chinese immigrant community in one metro area in the US South, which may differ from the experiences of Chinese immigrants in other communities across the US. Chinese immigrants in Raleigh-Durham are, on average, highly educated and economically

secure (e.g., less than 10% in our sample lost their job during the pandemic and less than 5% saw a decrease in pay or working hours). Many are employed in the area's three major research universities, information technology (IT), and pharmaceutical and life sciences companies. This means that, during the first year of the pandemic, they were at lower risk of infection due to their common ability to work remotely compared with other immigrant communities with a much larger share of essential and front-line workers. The psychological burden predicted by measures of COVID-related discrimination and acculturative stressors in this population may thus represent a low bound of the burden experienced by members of less privileged Chinese immigrant communities in the US who may have been exposed to a larger number of stressors or to more widespread stressful experiences. Furthermore, the unique contexts of local communities likely contribute to differences in the prevalence and frequency of discrimination experiences. For example, although reported levels of racism-related vigilance in Raleigh-Durham were comparable with those reported by New Yorkers of Chinese descent during the pandemic, the latter group reported more widespread perceptions of being feared (about 50%) compared to Chinese immigrants in the Raleigh-Durham area (21%) (Gao and Liu, 2021). This may be attributed to more opportunities for interpersonal interactions among New Yorkers who rely widely on public transportation compared with residents of the Raleigh-Durham area who do not.

Although the above referenced study of the COVID-related discrimination experiences of New Yorkers of Chinese descent did not measure generalized perceived stress, we acknowledge that different contexts of interpersonal interactions and social networks may also give rise to different shapes of associations between COVID-related discrimination and perceived stress. For example, as an emerging destination for Chinese immigrants in the US, Raleigh-Durham has a less established Chinese community compared to New York City where there may be more cultural organizations and larger co-ethnic social networks to buffer the effects of increased perceptions of being feared by others and racism-related vigilance on stress. Future studies should rely on data collection efforts across multiple communities with rigorous designs that permit meaningful comparisons. Furthermore, our study has opportunistically relied on a pre-pandemic data collection effort among a representative sample of Chinese immigrants and has followed members of this sample during the COVID-19 pandemic in order to assess the impact of two types of COVID-related discrimination and contemporaneous stressors on their psychological well-being. However, because of the spillover effects of pandemic-related racially-motivated hostility to other Asian communities, these associations should be explored across multiple Asian immigrant groups perhaps taking advantage of sampling approaches designed to efficiently and cost-effectively recruit samples of single-origin immigrant groups for inference and comparison.

A second limitation of our study is that we did not measure the organization of the identity hierarchy of Chinese immigrants so we can only speculate on the types of stressors that are likely to be identity-relevant in the context of the COVID-19 pandemic. This is particularly relevant when we consider that our longitudinal sample includes 25 respondents born in Taiwan and whose Chinese identity, regardless of strength reported, may be less salient in comparison to those who were born in China. Although ancillary analyses (not shown) suggest that these two sub-samples (China- v. Taiwan-born) do not vary significantly on the independent and dependent variables, ethnic identity, or characterizations of life in the US, the size of the Taiwan-born sub-sample is too small for meaningful sub-group analyses. Future studies of Chinese immigrants that include larger Taiwan-born sub-samples should consider how identity hierarchies differ among China- and Taiwan-born immigrants and how these differences shape the moderating effects of ethnic identity.

A third limitation is that, with the exception of everyday experiences of discrimination that were collected in both waves of the CHIRDU study, acculturative stressors, racism-related vigilance, and general perceptions of stress were only measured in Wave 2. This prevents us from examining how changes in perceptions of being feared, racism-related vigilance, and

contemporaneous acculturative stressors are associated with a change in stress over time. Fourth, while most measures we used were previously validated and administered among Chinese populations, we adopted a few measures that were already in use but whose psychometric properties have not been fully validated (e.g., racism-related vigilance and COVID-related stress). Fifth, we used a single indicator of ethnic identity. Studies employing multidimensional measures of ethnic identity have found that different dimensions of ethnic identity (e.g., achievement and affirmation, private regard and public regard), as discussed by Yip and colleagues (Yip et al., 2008), yield more nuanced relationships among ethnic identity, discrimination, and well-being. Lastly, our battery included two types of self-reported measures of discrimination, contemporaneous stressors, and perceived stress, which are subject to recall bias and may be influenced by current states of psychological distress or by differences in psychological hardiness across the two ethnic identity groups that may manifest in differential reporting of situations as stressful. For example, the EDS used to measure changes in perceptions of being feared is a subjective measure of perceived discrimination, not an objective count of discriminatory events, and therefore may be either underreported or overreported given the current context and impact of discriminatory events on an individual.

#### 4.2. Public health and policy implications

Our findings point to the heterogeneous mental health needs of a local Chinese community. We find that ethnic identity can exacerbate the burden of identity-relevant discrimination when discrimination threatens the value that one puts on their newly acquired identity. These findings suggest that mental health screenings and strategies to provide psychological support to Chinese immigrants should aim to protect an individual's sense of self-worth and belonging while considering the many challenges and vulnerabilities entailed by the processes of acculturation and ethnic identity development, as well as the ways in which these processes contend with and exacerbate the new or intensified types of discrimination that have emerged during the pandemic. But, consistent with the established literature indicating that the process of acculturating to a new environment can cause stress, our findings also highlight the link between acculturative stressors, types of COVID-related discrimination, and perceived stress. Although the recent public discourse related to psychological well-being of the US population during the COVID-19 pandemic has focused on the COVID-related stressors faced by many in America and on the types of COVID-related discrimination experienced by people of Asian descent, our study shows that acculturative stressors (e.g., limited contact with loved ones in one's country of origin, language barriers, challenges pertaining to documentation status) continue to independently affect communities of Chinese immigrants. Furthermore, lower levels of acculturation, measured by complete ethnic identification with one's home country and a psychological aspect of acculturation, may activate anticipatory stress responses to racism-related discrimination, suggesting that acculturation and acculturative stressors deserve continuous public health attention. We caution against a hyper-focus on addressing COVID-related stressors at the expense of contemporaneous acculturative stressors among immigrants. Any future health screenings should aim to capture a wide range of possible concerns, including acculturative and pandemic-related stressors and exposures to various types of discrimination.

These findings also hold important implications for public health and policy actions. Efforts must target and reduce the structural and interpersonal root causes of the acculturative stressors and discriminatory events that are linked to historical legacies of xenophobia and exclusion towards people of Chinese and others of Asian descent. Public health and policy interventions should also seek to bolster the resilience of individuals and their communities as well as increase the cultural competency of clinicians and the provision of culturally informed psychosocial support. Furthermore, all of these actions must take into account the heterogeneity of Chinese immigrants and differences in the experiences

and internalization of discrimination and in stress responses.

As a means for reducing future discriminatory behaviors towards members of Chinese immigrant communities, some have proposed mandating the inclusion of Asian American history and critical race theory (Museus and Iftikar, 2013) curricula that document the long-standing history of state-sanctioned, systemic discrimination and the marginalization of individuals of Asian descent. Aligned with this goal, there has been a great deal of scientific inquiry pertaining to brief interventions that can reduce implicit biases in individual interactions (i.e., automatic patterns of thinking) (FitzGerald et al., 2019; Pritlove et al., 2019), yet, to our knowledge, there have been none specific for reducing anti-Asian bias.

In recognition of the role of ethnic identity in moderating the heterogeneous effects of various types of COVID-related anti-Asian discrimination on the psychological well-being of Chinese immigrants, efforts within the mental health field should focus on the operationalization of culturally conscious therapeutic strategies that reduce the impact of these stressors and bolster resilience in the targets of discrimination (Miller et al., 2019). One model that offers guidance on culturally sensitive psychological treatment of Chinese immigrants is the QIAN curriculum proposed by Chang et al. (Chang et al., 2012). This curriculum, which stands for the importance of self-Questioning and critique, bi-directional cultural Immersion, mutually Active-listening, and the flexibility of Negotiation, recommends clinicians approach encounters with members of immigrant Asian communities, including Chinese immigrants, with cultural humility and educate themselves on the psychological impact of navigating distinct cultures especially in immigrant-hostile and Sinophobic climates.

There is also a need for the operationalization of therapeutic strategies that can bolster resilience in the face of the distinct stressors facing individuals of Asian descent. For example, the Tripartite Model of Collective Psychosocial Resilience, articulated by Cheng and colleagues (Cheng et al., 2021), proposes rechanneling the experience of COVID-related anti-Asian discrimination and empowering individuals of Asian descent through the development of critical consciousness around discrimination (i.e., cultivating an understanding of systemic oppression, specifically that underlying COVID-19 anti-Asian racism), critical consciousness-informed racial/ethnic identity (i.e., cultivating an understanding of one's ethnic identity and place within social structures that perpetuate oppression), and advocacy (i.e., removal of systems of oppression as well as elimination of barriers to human rights and well-being). In addition to resiliency-enhancing strategies, clinicians may also consider ways to reduce stressors. For example, in light of the nascent literature detailing the adverse psychological impacts of exposure to media coverage of collective traumas (Cheng et al., 2021; Yu et al., 2020), this may include limiting one's exposure to media coverage of anti-Asian discrimination.

Others have suggested bringing a trauma-informed lens when working with patients who have endured race-based discrimination as well as traumatic events before, during, and after migration (Miller et al., 2019). Prior work finds that the presence of safety-based, health-based and voluntary community organizations are associated with less psychological distress and fewer fears and worries about future adversity after place-based traumatic events (Jose et al., 2019; Kormendi and Brown, 2021). Thus, efforts to strengthen collective resilience within Chinese and other Asian communities experiencing the mental health burden of a surge of pandemic-related anti-Asian discrimination may benefit from the establishment of local community-based organizations that can provide psychosocial support (Dong et al., 2021). Furthermore, investing in task-sharing approaches (Kormendi and Brown, 2021) that mobilize community resources and empower community members to lead psychosocial support efforts may successfully address known access barriers to mental health care among people of Asian descent (Office of Minority Health) and build needed mental health care capacity within Asian communities.

At the policy level, scholars have proposed coordinating federal response to anti-Asian racism, including investment in mental health

services and community-based efforts (Misra et al., 2020). Importantly, we note that such efforts should always privilege the voices and desires of community members. Researchers, clinicians, and policymakers should foster the kinds of environments that engender empowerment such that these measures are attuned with the true needs of the community and are led by members of the community for whom they are developed.

Anti-Asian bias and discrimination is a malleable target for intervention. Targeting this complex problem will require sustained, multi-pronged approaches that reduce systemic and interpersonal biases and that support the communities and individuals exposed to discrimination. In light of the mental health burden of the stressors experienced during the COVID-19 pandemic by members of the Chinese community we have studied, intervening on the contexts and environments that give rise to them represents an important public health goal that warrants significant attention.

## 5. Conclusion

This study offers evidence of the associations between two types of COVID-related discrimination and perceived stress in a population-representative sample of Chinese immigrants in the US South interviewed before and during the COVID-19 pandemic. We isolated the impact of racism-related vigilance, changes in perceptions of being feared by others, and contemporaneous stressors (COVID-related and acculturative stressors) on perceived stress and evaluated the role of ethnic identity in moderating these associations. Results suggest that, during the COVID-19 pandemic and alongside contemporaneous stressors known to affect overall stress, a rise in perceptions of being feared by others and racism-related vigilance independently and significantly affect the mental health burden of members of a community of Chinese immigrants in the US South, despite minimal exposure to infection or economic insecurity of its members. However, these effects are heterogeneous across ethnic identity, suggesting that an emphasis on ethnic identity and the organization of identity hierarchy may help explain why some groups are more reactive to certain stressors than others. Results also highlight the heterogeneous mental health needs of Chinese communities in the US. In light of a hostile sociopolitical climate towards individuals of Asian descent and an evolving pandemic, our study underscores the importance of investigating the continued and long-term impact of the COVID-19 pandemic on stress, holding important implications for the need of culturally sensitive public health interventions and clinical practices to mitigate the impact of these stressors, strengthen individual resilience, and mobilize community resources to bolster collective resilience.

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## CRedit authorship contribution statement

**Allison Stolte:** Conceptualization, Methodology, Investigation,



Formal analysis, Validation, Writing – original draft, Visualization. **Gabriela A. Nagy:** Conceptualization, Methodology, Validation, Writing – original draft. **Chanel Zhan:** Writing – original draft. **Ted Mouw:** Conceptualization, Methodology, Investigation, Formal analysis, Validation, Writing – review & editing, Funding acquisition. **M. Giovanna Merli:** Conceptualization, Methodology, Investigation, Formal analysis, Validation, Writing – original draft, Supervision, Funding acquisition.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmmh.2022.100159>.

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