Wisconsin Center for Education Research
SCHOOL OF EDUCATION
UNIVERSITY OF WISCONSIN–MADISON

STEM Asianization and the Racialization of the Educational Experiences of Asian American College Students

WCER Working Paper No. 2024-2

July 2024

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Key words: Asian Americans, racialization, STEM Asianization, model minority discourse, colorblind meritocracy

Suggested citation: Wolfgram, M., Lee, S. J., Her, C., Pha, K. P, Smolarek, B., & Xiong, C. (2024). *STEM Asianization and the racialization of the educational experiences of Asian American college students* (WCER Working Paper No. 2024-2). University of Wisconsin–Madison, Wisconsin Center for Education Research.

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ABSTRACT

This article clarifies historical and sociocultural factors that impact the role of STEM in the racialization of Asian Americans. Drawing on critical race and other theories of Asian American racialization, and a review of empirical research on the experiences of Asian American college students in STEM, we develop a conceptual framework called *STEM Asianization* that highlights the role of STEM ideology in the model minority racialization of Asian Americans. Consequences for Asian American students include (1) erasure of the intersectional experiences of minoritized Asian American students; (2) dehumanization of Asian Americans and establishment of a bamboo ceiling; (3) representation of Asian Americans as a perpetual foreigner/Yellow Peril during times of cultural and political crisis; and (4) representation of Asian Americans who cannot or do not conform to the STEM achievement narrative as a failed minority. We argue that STEM Asianization reproduces White supremacy by ideologically reinforcing the colorblind meritocracy of STEM institutions in the United States.

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Introduction

Within the popular imagination, Asians and Asian Americans represent the racial "face" of STEM. Indeed, Asian American students are often characterized as being overrepresented in STEM and, in consequence, are assumed to not face any barriers to STEM education attainment. The association between STEM and Asian student identity is pervasive in discourses about STEM education, yet it is also undertheorized (Chen & Buell, 2018). We take up the challenge to theorize Asian Americans in STEM by focusing on the role of STEM in the process of Asian racialization since the mid-twentieth century. We develop a conceptual framework for the analysis of the experiences of Asian Americans in STEM by drawing on and extending the scholarship in AsianCrit (Iftikar & Museus, 2018; Museus & Iftikar, 2013), which highlights the specificity of Asian American racialized experiences. Thus, we advance this framework by drawing attention to the role of STEM ideology, technology, and discourse in the racialization of Asians in the United States.

Asian American scholars across various disciplines have written about the distinct racialization of Asian Americans. Legal scholar Robert Chang (1993) argued that "Asian Americans suffer from discrimination, much of which is quantitatively and qualitatively different from that suffered by other disempowered groups," further noting that the qualitative difference is that "Asian Americans suffer as Asian Americans and not just generically as persons of color" (p. 1247). As Gary Okihiro (1994) asserted in the 1990s, Asians are not Black or White. Scholars in Asian American Studies have long noted that the racialization of Asian Americans has perpetuated the ideas that Asian Americans are perpetual foreigners unable to assimilate and/or are high-achieving model minorities that have overcome racial barriers to prove that equal opportunity exists in the United States (Choy, 2022; Kim, 1999; S. J. Lee, 2009; Okihiro, 1994; Tuan, 1998; Wu, 2002). According to political scientist Claire Jean Kim's (1999) theory of racial triangulation, the U.S. racial order has two axes: superior/inferior and insider/outsider. Racial triangulation reveals that Asian Americans as model minorities are positioned between Whites and Blacks on the superior/inferior scale and as perpetual foreigners are positioned as outsiders on the insider/outsider scale. Building on Chang's (1993) early work, and the central tenets of critical race theory, Iftikar and Museus (2013, 2018) developed a racial framework that centers the following: Asianization; transnationalism; (re)constructive history; strategic (anti)essentialism; and intersectionality. We focus particularly on Asianization, which they define as the "pervasive nativistic racism in the U.S." that leads to the racialization of Asian Americans as "perpetual foreigners, threatening yellow perils, model and deviant minorities, and sexually deviant emasculated men and hypersexualized women" (Iftikar & Museus, 2018, p.

940). While neither Black or White, some scholars have argued for the need to acknowledge how the Black and White paradigm of race has shaped racializations of Asian Americans (Kim, 1999, 2023; Lee, 2005, 2009; Okihiro; Wu, F., 2002). In this article, we trace the history of Asianization—that is, how Asian Americans have been racialized since the mid-twentieth century through the present. We argue that the role of STEM has been key to the 21st-century iteration of the model minority stereotype of Asian Americans as STEM geniuses.

In this article we ask the following research questions:

1. How does the association of STEM with Asian Americans shape the racialization of Asian Americans as model minorities?
2. How does this racialization influence the experiences of Asian Americans in STEM education disciplines?

To answer these questions, we conducted an integrative literature review of diverse bodies of scholarship—histories of immigration, higher education policy, and the racialization of Asian Americans in the United States combined with STEM education and higher education research—which represent often-siloed disciplinary traditions that require integration to develop a critical theory of STEM Asianization. During 2023–2024, we searched a) key papers and bibliographic databases such as Academic Search Premier and Education Resources Information Center to identify empirical studies that investigate the characteristics, experiences, and outcomes of Asian American college students in STEM programs in the United States; and b) literature with historical, conceptual, empirical, and other research approaches on the racialization of Asian Americans. Our definition of STEM included disciplines categorized as science, technology, engineering, mathematics, as well as health science professions such as medicine and nursing. For this study, Asian Americans included Americans with ethnic backgrounds in South, East, and Southeast Asia, including Filipino but excluding other Pacific Islanders, who have a primarily Indigenous rather than immigrant history (Au, 2022). We did not exclude studies based on methodology, discipline, or publication type, although we limited our search to studies published after 1990, which is the date of the establishment of the H-1B visa, which spurred a dramatic expansion of STEM education through immigration (Dhingra, 2018).

The research team systematically analyzed the papers by describing their methods, data, findings, theories, and implications; and we compared the papers to identify analytical themes (Onwuegbuzie et al., 2012). In addition to describing and theming the research literature, we coded and annotated the literature by identifying patterns of Asian racialization identified in the research literature (e.g., model minority discourse, Asian threat discourse, perpetual foreigner discourse; Iftikar & Museus, 2018; Museus & Iftikar, 2013). We also employed a lens of intersectionality to highlight the impact of race, class, gender and other consequential social identities that may be obfuscated when research findings are aggregated within a larger "Asian" or "Asian American" category (Museus & Vue, 2013).

We argue that STEM ideology, technology, and discourse historically have become connected to Asian racialization in the United States in ways that harm Asian Americans and uphold the status quo of racial inequality. In particular, we argue that the complex racialized

experiences of Asian Americans in STEM programs, especially minoritized Asian American students, are erased. Furthermore, we argue that success stories of Asian Americans in STEM are used to reproduce colorblind meritocracy in STEM education institutions. Finally, we argue that there is an urgent need for more research on the factors and processes that simultaneously produce and make invisible the process of STEM pushout for minoritized Asian American college students.

STEM Nationalist Policy, Neoliberal Colorblind Meritocracy, and Asian American Racializations

STEM Immigration and Asian American Demographics

Prior to the Cold War, Asian Americans were generally stereotyped as culturally different foreigners who posed a threat to the nation (Ngai, 2021; E. Wu, 2014). As a result of the politics of racial liberalism that dominated the post-WWII era, the representation of Asian Americans in the national discourse shifted from unassimilable, perpetual foreigners to model minorities. As historian Ellen Wu (2014) states "Government authorities looking to differentiate the United States from its totalitarian adversaries welcomed ethnic Chinese into the fold" (p. 51). According to the mid-20th century iteration of the model minority stereotype, Asian Americans were to be lauded for their willingness to assimilate into American society, good citizenship, good family structures, industriousness, and economic self- sufficiency (E. Wu, 2014). Importantly, the idea that Asian Americans are "model minorities" has always been used to discipline and critique Black communities who are viewed as deficient and problematic. As such, the model minority designation has always reflected anti-Black racism (Kim, 2023; Lee, 2009; Poon et al., 2016).

Racial liberalism also played a central role in shifting immigration policy; the 1965 Hart-Celler Immigration and Nationality Act replaced the immigration bans and restrictions established by the Chinese Exclusion Act of 1882 and Johnson-Reed Act of 1924. STEM industries became central to U.S. geopolitics during the Cold War, further shaping immigration policies. The establishment of occupation-based preferences in the 1965 immigration policy played a central role in transforming the United States from a manufacturing economy to a knowledge and service economy. In contrast to the agricultural and industrial labor focus of the prior immigration regime, intellectual, scientific, and technical labor emerged as priorities during the Cold War. Asian American scholar Long Bui (2022) explains, "A big wave of migration by Asian educated migrants occurred under a preference for a professional category drafted in the 1950s as 'aliens of distinguished merit and ability.'" (p. 149). The impact of the Hart-Celler Act on Asian technical and scientific immigration began to manifest when large numbers of Filipino, Indian, South Korean, and Taiwanese medical professionals arrived in the United States in the early 1970s (Choy, 2022; Min 2006). While changes to U.S. immigration law limited Asian medical immigration in 1976, the subsequent Immigration Act of 1990 dramatically increased the quotas for technical and scientific immigrants (Min, 2006; Rumbaut, 2012).

Relatedly, the internalization of higher education has shaped the Asian American population and the racialization of Asian Americans. Large numbers of Chinese students have been coming to study science and engineering in the United States since the early 20th century, with a surge in

student numbers from 1945 to 1949 (Wang, 2010). Most Chinese international students during this period returned to China after completing their U.S. educations for a host of reasons, including family, national obligation to China, and discriminatory U.S. immigration policy. Even after the repeal of Chinese Exclusion and the 1949 Chinese Revolution, U.S. policy encouraged the return of Chinese students to their homeland, as a soft-power strategy to westernize Chinese citizens. Approximately 4,000 stayed in the United States after 1949 and thousands more migrated to the United States in the subsequent decades, facilitated by a post-1965 immigration reform that allowed Asian migrant students to apply for employer-sponsored permanent residency in the United States to work as scientists and engineers in military defense and space industries (Wang, 2010, p. 369). In their historical overview of STEM PhD training in the United States, Fernandez and colleagues (2021) note that "As the percentage of international students earning PhDs in STEM+ fields increased, so did the percentage of international PhD earners who undertook research in the U.S. In 1995, half of the international students who completed STEM+ PhDs intended to stay in the U.S." (p. 87). Reflecting neoliberal economic priorities, the 1990 Immigration Act introduced the H-IB visa that allowed engineers, mathematicians, scientists, and other technology professionals to work in the United States for 3 years, with some avenues toward permeant residence as well. Most H-1B visas were given to Asian immigrants. The H-1B visa program was popular with employers, because H-1B visa holders were not eligible for benefits and legal protections afforded to citizens. The 1990 Immigration Act limited the number of H-1B visa numbers to 65,000, but this number was increased to 195,000 by 2000 in response to the needs of high technology companies (Varma, 2002). In short, U.S. production, soft-power, and security concerns of the Cold War shaped immigration to serve the interests of STEM industries and higher education.

Post-1965 immigration policies have favored highly educated Asians in STEM fields, which has led to what immigration scholars refer to as the hyper-selectivity of Asian immigration (Dhingra, 2018; Feliciano, 2005, 2006; Lee & Zhou, 2015; Warikoo, 2022). For example, among Chinese immigrants, more than half have bachelor's degrees and a quarter have advanced degrees. South Asian Indian immigrants are the largest group of H-1B professional workers holding visas and are second to Chinese in terms of student F1 visas (Dhingra, 2018). Highlighting the hyper-selectivity of Asian immigration, sociologist Jennifer Lee (2021) notes that "U.S. Chinese immigrants are more than eighteen times as likely to have graduated from college than Chinese adults who did not emigrate" (p. 182). Asian Americans are now disproportionately concentrated in technological fields, and technology firms regularly recruit Asian international students (Nee & Holbrow, 2013). The changes in the Asian American population, particularly the increase of highly educated Asian immigrants working in STEM, has changed how Asian Americans are framed in the dominate racial discourse. Today, the stereotype of Asian Americans as model minorities centers their assumed dominance in STEM fields (Chen & Buell, 2018; Ma, 2010; McGee et al., 2017). Thus, the model minority stereotype is more of a social and political construction rooted in public policy and U.S. racial politics and ideologies, rather than an essential or cultural aesthetic within Asian culture. The model minority operates as a political ideology to harm minoritized Asian American groups.

While hyper-selective immigration policies have favored highly educated Asian immigrants, not all Asian immigrants are from privileged backgrounds. Indeed, Asian Americans are the most economically divided racial group in the United States (Kochhar & Cilluffo, 2018). Many of the Asian Americans in STEM reflect the hyper-selective immigration from East and South Asia, but there is significant class diversity even among East and South Asian Americans. Chinese immigrants, for example, experience some of the highest poverty rates among all racial and ethnic groups in New York City (Echeverria-Estrada & Batalova, 2020; Liu & Cherng, 2022; Wong 2021). In contrast to Asian American immigrants who are in the United States as the result of hyper-selective immigration policies, many Southeast Asian Americans come from refugee backgrounds. Much of the popular discourse and academic scholarship assumes that all Asian Americans are overrepresented in STEM. This assumption erases the experiences of Asian Americans from diverse backgrounds, including the children and grandchildren of Southeast Asian refugees (Museus, 2009; Teranishi et al., 2004).

In contrast to the 19th-century migrations of East and South Asians and Filipino Americans to the United States (Rumbaut, 2000), Southeast Asian refugees are a comparatively recent population in the United States. These groups include Vietnamese, Lao, Cambodian, Hmong, and other ethnic minorities (e.g., the Montagnard) who resettled as refugees after the end of the Vietnam War and the passage of the Indochinese Migration and Refugee Assistance Act of 1975 and the Refugee Act of 1980 (Takaki, 1998). While some Southeast Asian refugees (Vietnamese, in particular) who were elite community members or former military leaders benefited from their proximity to the U.S. government regarding their resettlement and integration into U.S. society, the majority lacked such resources, preparation, institutional knowledge, English language, and employable skills. Many of these refugees, such as Hmong, remained in refugee camps or other precarious situations in Thailand for decades prior to resettlement in the United States. They also received few resources to support their education and employment in the immediate post-resettlement period (Kula & Paik, 2016). Excluding the Vietnamese experience, the majority of Southeast Asian refugees lacked co-ethnic communities of mutual support to provide mutual aid in the resettlement process. Moreover, the formation of such enclaves was discouraged by the resettlement policy established by the Refugee Act of 1980 that required the distribution of refugees throughout the United States. The goals of this distributive resettlement policy were to expedite the assimilation of Southeast Asian refugees to American norms and to distribute the economic costs of refugee support around the country. This process ultimately isolated refugees and thwarted the establishment of supportive co-ethnic networks of mutual support for newcomers (Paik et al., 2014). Further, anti-refugee and anti-Asian racism was high following the conclusion of the unpopular Vietnam War, exacerbated by the fact that the majority of Southeast Asian refugees were resettled during an economic recession, with unemployment reaching 9% in 1981 (Rumbaut, 1989). The Refugee Act of 1980 prioritized the rapid attainment of "economic self-sufficiency," which pressured many refugees (even highly educated refugees) to integrate into low-wage and precarious secondary labor markets, forcing many to forgo the education and training needed for more remunerative and stable employment (Darrow 2015; Wolfgram & Van Auken, 2023)

Thus, unlike other Asian immigrants, many Southeast Asian refugees were not well situated or supported to access STEM education or career pathways. While the Vietnamese American community has fared better than other refugees from Southeast Asia, Southeast Asian Americans as a whole experience lower educational attainment and occupation measures compared with Whites or other immigrant groups (Niedzwiecki & Duong, 2011). One consequence of model minority STEM Asianization is the erasure of Southeast Asian refugee experiences by subsuming them within the larger Asian American aggregate (Kula & Paik, 2012; Paik et al., 2014). In the subsequent sections, we argue that STEM Asianization has negative consequences for all Asian and Asian American students in STEM, including those who appear to fit the STEM model minority stereotype.

Neoliberalism, Colorblind STEM Meritocracy, and Asian Americans

Neoliberalism emerged in the 1980s in the United States and among U.S. Western European geopolitical allies. This political approach championed classical liberal ideologies that advocated for the deregulation of markets and the expansion of private property as the foundation for prosperity, progress, freedom, and democracy. Neoliberalism advanced this tried-and-true formula of classical liberalism by advocating strongly for the restructuring of public institutions—from public education to health-care to civic governance—on the basis of free market principles (Harvey, 2007). Importantly, supporters of neoliberalism imagine a colorblind society where race no longer impacts opportunities (Harvey, 2007; Hursh, 2005; Kumashiro, 2008). Within the neoliberal imaginary, differences in life outcomes are largely the result of individual merit (Jones & Mukherjee, 2010; Torres, 2015).

Neoliberal ideologies have played a central role in shaping recent hyper-selective immigration policies in the United States. Highlighting the intersection of neoliberalism and immigration policy, political sociologist Christian Joppke (2024) writes, “The one immigration policy most obviously ‘neoliberal’ is for the highly skilled, which has become ubiquitous across rich OECD [Organisation for Economic Co-operation and Development] societies since the late 1990s. This preference is due to globalization and the accompanying ‘race for talent’ (Shachar 2006) in the technology sectors” (pp. 9–10).

The policy project of neoliberalism has become a central and often uncontested logic of governance in U.S. higher education (Saunders, 2010), and has involved the incorporation of private sector managerial techniques in higher education governance (Lorenz, 2012; Tolofari, 2005); the implication of audit culture accountability regimes (Apple, 2013; Shore, 2008); increased privatization of university services (Hamilton et al., 2022; Levine, 2018); commodification of academic and research knowledge (Saunders, 2010; Slaughter & Rhoades, 2004); state disinvestment in public higher education (Saunders, 2010; Mintz, 2021); and the coordination of university programs and curriculum with the labor needs of capital, which focuses on “employability” and “skills” as the primary outcomes of college (Holborow, 2012; Urciuoli, 2008). One of the consequences of state disinvestment from public higher education is to force American universities to increasingly outsource the costs of college to students by raising tuition. Thus, American universities have targeted high-tuition-paying international students (Green & Ferguson, 2011), many of whom are from China and other East and South

Asian countries (IIE, 2010). The increasing Asian internationalization of U.S. higher education is a consequence of the same neoliberal restructuring that dramatically increased the institutional prominence of STEM education.

Under neoliberal ideology, value is assessed based on the potential for institutions of higher education, and of their individual graduates, to produce value for the economy. Neoliberalism—as a producerist ideology—led to the establishment of policies based on the assumption that the primary purpose of a college education is job training for future employment in the market-place (Mintz, 2021). Neoliberal ideologies, governance and accountability structures, and policy priorities, which value producerist and instrumentalist aims of higher education (Chen & Buell, 2018), have all contributed to the expansion of STEM programs on U.S. campuses (Kleinman et al., 2012). The modern, STEM-focused research university took off in the United States in the mid-20th century (Fernandez & Baker, 2017). The promotion and expansion of STEM cultures in higher education has negatively impacted the experiences of minoritized college students, including the competitive and individualistic nature of STEM disciplinary cultures (Hurtado et al., 2012; Seymour & Hewitt, 1997; Smith et al., 2014) and the coordinate ideologies of meritocracy, which reproduce the objective neutrality of STEM disciplinary cultures (Carter et al., 2019; Museus et al., 2011). Colleges and universities have increased investment in STEM research and education (Kleinman et al., 2012), often at the expense of the humanities (Hartman, 2017).

The ideology of meritocracy, which assumes that the most hard-working and talented individuals should be elevated to positions of power, is central to educational policies and practices in U.S. higher education under neoliberalism. Similar to assumptions behind neoliberalism, support for merit-based systems rely on assumptions of objectivity, neutrality, and colorblindness. Some scholars, however, point out that ideas regarding meritocracy are culturally produced and reflect the interests of powerful groups (Karabel, 2005; Liu, 2011). Among academic disciplines, STEM fields are assumed to be the most objective and merit-based and therefore superior. As Vakil and Ayers (2019) observe in their analysis of the racial politics of STEM, "Scientific knowledge is commonly presented as settled truth, rather than a dynamically evolving, contested and culturally mediated body of knowledge and set of practices deeply enmeshed with the human experience" (p. 451). Sociologists Blair-Loy and Cech (2022) argue, "Few beliefs are as sacred to scientists, engineers and mathematicians as the belief that science is a meritocracy" (p. 1). According to these perspectives, STEM fields are pure meritocracies driven by the pursuit of scientific knowledge, and are free from the cultural or political influences, including commitments to diversity (Blair-Loy & Cech 2022).

Research on the culture of STEM, however, complicates this dominant perspective, pointing to cultural practices that reproduce inequalities across gender and race, and exclude minoritized students based on cultural and linguistic norms (Hand et al., 2003). Specifically, several studies highlight how the culture of meritocracy hinders efforts to address inherent biases in the culture of STEM (Liu, 2011; Museus et al., 2011). For example, Doerr et al. (2021) describe the culture of engineering as "hegemonically masculine and hegemonically White" (p. 422). In their analysis of the "professional culture of STEM," Blair-Loy and Cech (2022) identify two widely

held beliefs in STEM culture—work devotion and scientific excellence —that contribute to the reproduction of inequality in STEM. The "work devotion" schema defines STEM as a "calling" that requires single-minded devotion and commitment to work in ways that disadvantage those with family responsibilities, particularly women. "Scientific excellence" is associated with those who are risk-takers and highly competitive, creating a cut-throat environment that holds women and people of color to different standards of behavior. Significantly, Blair-Loy and Cech (2022) found that these schemas are used to explain and excuse racialized and gendered inequality in STEM. Chen & Buell (2018) argue that "the [STEM] field itself has historically served and continues to serve as a site of reproduction for ideologies such as meritocracy and producerism that are fundamental to the neoliberal project and its accumulation of resources for White Americans" (p. 611).

STEM meritocratic cultures, historically amplified by the producerist ideologies and policy imperatives of the neoliberalization of U.S. higher education, marginalize the experiences of minoritized students in STEM settings, effectively pushing out minoritized students from competitive STEM programs (Hurtado et al., 2012; McCoy, Luedke, & Winkle-Wagner, 2017; Russell & Russell, 2015). Indeed, the presence of Asian Americans in STEM justifies and supports the belief that STEM meritocratic culture is colorblind and fair. In other words, Asian Americans in STEM fit the model minority stereotype, which has been used to uphold ideas regarding meritocracy.

Effects of STEM Asianization on Asian Americans

Above, we addressed the historical and geopolitical factors that constitute STEM Asianization as an ideological process that impacts the racialization and experiences of Asian Americans. This section documents how STEM Asianization impacts the experiences of all Asian Americans in STEM. Like earlier iterations of the model minority discourse, the stereotype of Asians as highly successful in STEM is inherently problematic. Asian Americans who appear to "fit" the model minority STEM racialization experience an ideological whitening that obscures the challenges they face in STEM. At times, STEM achievement narratives are used to dehumanize and exclude Asian Americans as being outside the (White) community and nation in ways that reflect the perpetual foreigner stereotype. While Asian Americans are viewed as a high-achieving group working in STEM fields that contribute to the economy, at other moments they can be seen as threats to national security (Bui, 2022). Finally, Asian Americans who do not live up to the model minority racialization in STEM are rendered invisible or subjected to an ideological blackening (Lee, 2005; Ong, 2013) that represents the lack of STEM achievement as deficit narrative.

As our historical review demonstrates, Asian racialization, U.S. immigration policies, and the rise of STEM technology and nationalism are interconnected. Unlike the mid-20th-century version of the model minority that focused on Asian American "character," the newer version focuses on Asian Americans' technological skills. As Choy (2022) observes, immigration policies that have prioritized the immigration of highly educated Asians have "created a simplistic perception that Asians were innately good at particular occupations and skills, especially in STEM fields" (77). Significantly, Min and Jang's (2015) analysis of the 2009–2011

American Community Survey found that for post-Hart-Celler generations of Chinese, Japanese, Korean, Indian, Filipino, and Vietnamese immigrants, there is a declining generational effect from participation in STEM and health-care careers, with extremely high STEM and health-care career participation of the first post-1965 generation followed by a gradual decline in subsequent generations.

Building on the scholarship on how hyper-selective immigration policies have shaped Asian America populations, social scientists interested in explaining the large numbers of Asian Americans in STEM have pointed to the role of pre-migration experiences on immigrant parents' engagement with their children's education in the United States, including narrow success frames that focus on success in high-paying STEM fields (Lee & Zhou, 2015; Warikoo, 2022). A second explanation suggests that Asian American parents' concerns regarding racism may lead them to push their children into STEM fields that are seen as more objective than other fields (Sue & Okazaki, 1990; Xie & Goyette, 2003; Louie, 2004). This explanation highlights the reality that Asian Americans express concerns regarding racism in ways that challenge the model minority rhetoric that suggests that Asian Americans have overcome racism. For example, in their intergenerational comparison of Asian Americans in STEM and health-care fields, Min and Jang (2015) conclude, "Asian immigrant parents' great mobility orientation, and their own and their children's experiences of racial discrimination, have affected their children's selection of these fields of study and occupations" (p. 856).

Model Minority Discourse and STEM Asianization

Scholarship reveals that the model minority stereotype shapes Asian American experiences in STEM majors and STEM fields. Within the context of neoliberal STEM meritocracy in U.S. higher education, Asian Americans are positioned as both model minorities and ideal neoliberal subjects (McGee et al., 2017). Furthermore, research demonstrates that Asian American students in STEM fields are generally stereotyped by others and by themselves as high-achieving model minorities who naturally excel in STEM (Else-Quest et.al., 2013; Sinclair, Hardin, & Lowery, 2006). Comparing the STEM experiences of Asian American students with the experiences of Black and Latinx students, one study found that unlike Black and Latinx students who were assumed not to belong in STEM, Asian Americans were assumed to be capable of doing well in STEM but they faced ridicule when they didn't fit the stereotype (Lee et al., 2020).

A large and growing body of scholarship on higher education examines issues of equity and diversity within STEM fields. This scholarship, and efforts to address inequality in higher education through activism, policy, and funding, tend to exclude Asian Americans because they are assumed to be high-achieving model minorities (Museus, 2009; Teranishi et al., 2004). The presence of large numbers of Asian Americans in STEM has contributed to their status as honorary Whites or being seen as White adjacent (Ong, 1999; Young, 2009). In consequence, one effect of model minority STEM Asianization is to fracture potential solidarities between minoritized communities of students, pitting Asians against other minoritized groups, Blacks and Latinx in particular, who are represented as deficient in various ways (Lee et al., 2017).

Asian Americans are usually grouped with White students in discussions of STEM education and excluded from institutional diversity, equity, and inclusion categories of racial management (e.g., "underrepresented minorities" or URMs). For example, Asian Americans are often excluded from research on the mental health needs and risk factors of college students, and when they are included, the data are not disaggregated by ethnicity (Xiong & Lam, 2013). Furthermore, the National Institutes of Health do not include any Asian American groups among those identified as underrepresented (National Institutes of Health, 2023; Shivaram, 2021). Similarly, Ma (2010) points out that "Asian Americans are the only minority group excluded by all federal initiatives to promote the representations of racial minorities in Science, Technology, Engineering and Mathematics (STEM) fields. This not only represents another case of the 'exceptional' profile of Asian Americans, but also reinforces the stereotypical 'model minority' image of Asian Americans" (p. 44). Likewise, programs designed with the explicit purpose of supporting minority college student participation in STEM, such as the National Science Foundation's Louis Stokes Alliances for Minority Participation (2024), exclude Asian Americans (including Southeast Asians) from the definition of "historically underrepresented" racial and ethics groups in need of consideration and support; and Asian Americans are excluded from U.S. government policy for expanding STEM participation of minoritized students over the next decade (National Science & Technology Council, 2018).

Asian Americans and Whites are also grouped together in scholarship on STEM pathways and have been identified as overrepresented in STEM occupations and STEM majors in college (Basile & Lopez, 2015; Bettencourt et al., 2020; Bottia et al., 2021; Maltese & Tai, 2011; Min & Jang, 2015; Xie & Goyett,e 2003; Xie et al., 2015). In their 2021 review on racially minoritized students in STEM, for example, Bottia and colleagues write, "Although Asians are racially minoritized students, those with origins in Pacific Rim nations are not underrepresented in the STEM fields. In this study, we group them together with White students because the majority of the studies synthesized in this review do so" (p. 619). In their qualitative study comparing "how minority- and majority-status students describe their interactions with practitioners, and how such relationships influenced their sense of mattering and marginality in STEM contexts," Salazar and colleagues (2022) group Asian American students with White students in the "majority-status" category. In other scholarship on racial barriers in STEM, the experiences of Asian Americans are simply not included (e.g., Vakil & Ayers, 2019).

Scholarship on Asian Americans in STEM confirms the view that Asian Americans are overrepresented in STEM education and STEM fields (e.g., Kang et al., 2023; McGhee, 2018). Based on an analysis of National Education Longitudinal Study 1988–2000, for example, Ma (2010) found that Asian Americans have the highest interest in majoring in STEM while in high school and highest persistence in STEM in college. Much of this research relies on large racial aggregates that obscure differences among Asian American ethnic groups (Min & Jang, 2015). As McGhee (2018) cogently argues, "[Due to] the lack of disaggregation of ethnic Asian groups and citizen/international distinction, it is difficult to report on statistics about Asians in STEM without reifying stereotypes" (p. 2). Similarly, Kang et al. (2021), argue that "researchers have not yet investigated the varied experiences and outcomes of specific Asian American subgroup

populations within the Asian American student group" (p. 1). The categorization of "Asian American students" into an undifferentiated aggregate obfuscates significant variation between ethic subgroups. Thus, education researchers (Museus & Vue, 2013)—as well as Asian American STEM practitioners (Vue et al., 2023)—have called for an intersectional disaggregation of research on the educational experiences of Asian Americans, to document and theorize how ethnic identifications and experiences are impacted or amplified by gender, social class, and social identities.

The impact of social class and class-mobility aspirations on STEM degree pathways have been a focus of investigation. For example, research has indicated that Asian American students (particularly those whose parents are recent immigrants and lower income) tend to prioritize STEM and business academic majors because of the higher economic returns on the degree, while they often face barriers to such mobility pathways (Ma, 2009; Steidl, 2012). Other research has examined the intersecting identities, revealing the gendered nature of Asian American experiences in STEM and in choice of college majors. One study (Castro & Collins, 2021), for example, documents the complex and intersectional negotiations of science, racial, and gendered identity, drawing on interviews (n =23) with Asian American female doctoral students in STEM programs—who experience racist and sexist aggressions and microaggressions in the White, male-dominated culture of STEM laboratory spaces. Furthermore, Lowinger and Song (2017) employed longitudinal survey data to identify factors associated with STEM major choice in college among Asian American students. The study reflected the research literature (Eng et al., 2008), finding that Asian American women and Southeast Asian Americans were less likely than male and other Asian ethnics to declare interest in or pursue STEM degrees. Another study (Jang, 2018), analyzing data from a 2009 National Center for Education Statistics High School longitudinal study, found that math achievement scores for Southeast Asian students were higher than other racial groups in the sample, but that in spite of their high math achievement, Southeast Asian female students' intention to go to college was both lower than Southeast Asian male students and the lowest among all female students.

Empirical research employing a critical intersectional lens to disaggregate and analyze quantitative educational data illustrates how the privileges and barriers that are structurally embedded in STEM pathways are obfuscated by the model minority discourse (Covarrubias & Liou, 2014; Jang, 2018). STEM Asianization is thus a mechanism that generalizes the experiences of a privileged segment of Asian Americans onto all Asian Americans—erasing differences produced by ethnicity, class, migration history, and gender.

Dehumanization of Asian Americans and Establishment of the Bamboo Ceiling

Racialization of Asian Americans as model minorities who are "White adjacent" obscures the racism experienced by Asian Americans. The generalization of Asian Americans as model minorities in STEM represents the community as both narrow and monolithic and erases the academic, occupational, and intellectual diversity among Asian Americans. This overly narrow representation of Asian American personhood is part of the processes of dehumanizing Asian Americans (Bui, 2022; Cooc & Kim, 2021). Asian Americans in STEM are often viewed as

hard-working "nerds" that contribute to STEM initiatives but lack creativity and social skills and are thus unfit for leadership positions.

Not insignificantly, Asian Americans' supposed prowess in STEM has led to their dehumanization as robots or technicians (Bui, 2022; Huang, 2019). As Shah (2019) argues, employing the "Asians are good at math" narrative ultimately dehumanizes Asian Americans as "calculators," with superhuman technical skills, but lacking full personhood associated with reason, creativity, and humanity. Similarly, Asian American Studies scholar Bui (2022) has argued that "work-focused Asians resonate with the model minority of Asian Americans as bookish and smart but not necessarily intellectual or creative, ever so proficient in engineering, mathematics, and technical subjects lacking a 'human touch'" (p. 2). As Bui (2022) notes, recent affirmative action debates have characterized Asian Americans as machine-like model minorities obsessed with success in STEM, in contrast to White students who are seen as being fully human.

Some scholarship suggests that Asian Americans face a "bamboo ceiling," defined as a barrier to managerial positions, that has led to the under-representation of Asian Americans in leadership positions across industries (Lu et al., 2020). The idea that Asian Americans are merely technocratic robots who lack creativity and leadership qualities has been cited as an explanation for the "bamboo ceiling." Asians have been found to face barriers to advancement in engineering, technology, and medicine (Bhatt, 2013; Shih, 2006). Some research on the bamboo ceiling points to differences among Asian Americans, whereby East Asians face more significant barriers than South Asians, and U.S.-born Asian Americans fare better than Asian immigrants (Lu et al., 2020; Shah, 2023). STEM Asianization entraps Asian Americans within a racial paradox. That is, while STEM degrees and industries are supposedly more lucrative and have more opportunities for upward mobility, racism prevents Asian Americans from advancing within STEM due to the effect of the bamboo ceiling.

Asian American women have been identified as earning PhDs in STEM at relatively high rates but are underrepresented in upper management or leadership positions in ways that highlight the intersection of race and gender (Ong et al., 2011; Wu & Jing, 2011). As Oh and Eguchi (2022) argue, "(t)he gendering of the model minority-as-nerd diminishes Asian American cultural capital and configures Asian Americans unfit as leaders, producing the aforementioned lack of promotion and the harsh reprisals when challenging White authority" (p. 475). In a qualitative study of gender and ethnic inequality in the high-tech field in Silicon Valley, Shih (2006) found that Asian immigrants feared being stereotyped as mere technicians unsuited for leadership positions.

Representation of Asian Americans as a Yellow Peril/Perpetual Foreigner During Times of Political Crisis

While the association between Asians and STEM is sometimes viewed as being a value to the United States, there are other moments when this association has positioned Asians and Asian Americans as potential threats to the nation (Bui, 2022; Choy, 2022). Contemporary representations of Asian Americans as a threat to American culture and society are rooted in an

earlier history of anti-immigration racist nativism that provided political support for anti-Asian immigration policies from the late 19th century to the first half of the 20th century. As noted earlier, this "Asian threat" or "Yellow Peril" nativist discourse propelled the raced-based system of immigration exclusion established by the Chinese Exclusion Act of 1882—which was later extended to other "Asians," codified into law by subsequent Federal Immigration Acts (1917 and1924), and coupled with U.S. Supreme Court decisions in *Takao Ozawa v. U.S.* (1922) and *Bhagat Singh Thind v. U.S.* (1923), which ruled respectively that Japanese and Asian Indians were ineligible for citizenship on racial grounds. U.S. immigration historian Mae Ngai (2004) argues that as legal citizenship became available to these racialized others, this situation created a racialized category of "alien citizen" for Asian immigrants, placing legal citizenship in a double bind with cultural and political exclusion, which reinforced the ideology of Asians as perpetual foreigners. This cultural and political exclusion was embedded in U.S. science education which pathologized Filipino and other Asian American immigrants as threats to public health, and as needing a lower-tier science instruction under rubrics of "benevolent assimilation" (Kirchgasler, 2023).

Representations of Asian Americans as model minorities by virtue of their STEM achievement can flip in moments of political crisis. As historian Catherine Choy (2022) has pointed out, "Asian Americans may be considered model minorities at one moment, but then quickly transform into something menacing" (p. ix). Writing about the relationship between model minority and perpetual foreigner discourse, Kawai (2005) argues, "People of Asian descent become the model minority when they are depicted to do better than other racial minority groups, whereas they become the Yellow Peril when they are described to outdo White Americans" (p. 115). The media controversy over Yale University Law Professor Amy Chua's celebration of "Asian parenting," and critique of "American parenting" in the book, *Battle Hymn of the Tiger Mom* (2011), is an example of how model minority behavior is reconfigured as a Yellow Peril/Asian threat in the popular imagination when Asian Americans are seen as diminishing the status or challenging the dominance of the majority (Hau, 2015).

When Asian Americans challenge White supremacy, "their positioning quickly shifts back to that of the 'Yellow Peril'" (Chen & Buell, 2018, p. 619). Asian Americans' precarious racial status in U.S. society also renders their humanity as precarious, thus contributing to their continued marginalization.

Model minority STEM Asianization poses a challenge to White dominance in STEM education and professional spheres of society, which can engender a dynamic of racial animus targeting Asian Americans (Kawai, 2005). Research in engineering education settings (Trytten et al., 2012) and other STEM settings (McGee et al., 2017), has documented how the diligent work habits and achievement of Asian students in STEM may engender inter-racial conflict among students based on the perceived threat of Asian students dominating the White majority; including experiences of racial microaggressions in STEM settings (Castro & Collins, 2021; Lee et al., 2020; McGee et al., 2017). In their qualitative study of Asian STEM college student experiences, McGee et al. (2017) found that even academically successfully Asian Americans

are “in a racially vulnerable position, where they are both admired and scorned for their success in STEM” (p. 14).

The association of STEM with an Asian national threat became tied with American economic national discourse with the rise of Japan as a technological and economic superpower in the 1980s, posing a challenge to U.S. competitive dominance in the world economy (Palumbo-Liu, 1999). With shifting U.S. geopolitical alliances in the Indo-Pacific, anti-Asian U.S. nationalism has re-focused on China and has been escalated by a cascade of global factors such as the COVID-19 pandemic; an ongoing trade war; concerns of techno-security and patent theft; and most alarmingly, bilateral preparations for war in the Pacific over a threatened invasion of Taiwan. This recent rise of Sinophobia and anti-Asian U.S. nationalism infuses the historically older Yellow Peril/perpetual foreigner with a STEM ideological “techno-Orientalist imaginary,” which impacts U.S. security, economic, and public health policy, as well as the experiences of Asian Americans—who are increasingly racially targeted, especially following the COVID-19 pandemic (Siu & Chun, 2020).

Another symptom of Yellow Peril/perpetual foreigner ideology is the targeting of Chinese nationals and Chinese Americans as industrial or government spies (Li & Nicholson, 2020). One study found that Chinese and other Asian Americans are disproportionately charged with espionage by the U.S. Department of Justice, with many of those charges dropped without explanation and innocent Asian Americans often suffering serious damage to their reputations and careers (Kim, 2018; e.g., Lee & Zia, 2021). In a striking manifestation of this type of paranoia, U.S. Senator Tom Cotton argued that Chinese students should be prohibited from studying STEM majors at U.S. universities (Li & Nicholson, 2020).

The Asian STEM achievement narrative has thus been reconfigured as a form of racial othering, representing Asians as an external threat or as a perpetually excluded and dehumanized other. Given this pattern of STEM Asianization—reconfiguring STEM achievement as STEM threat and otherness, especially during times of geopolitical crisis—it is anticipated that such racializations of Asian Americans may resurface with the current escalation of tensions between the United States and China. A major consequence of STEM Asianization for Asian American STEM students is the production of a hostile racial dynamic with their White majoritarian peers. Furthermore, this racialization has been shown to contribute to psychological stress among Asians (Lo et al., 2022).

Invisible and Hyper-visible

Within the current iteration of the model minority myth, “real” Asians excel in STEM fields. As such, Asian American groups who are not well represented in STEM are rendered invisible and/or hyper-visible as “failed” Asian Americans. As suggested in the previous sections, aggregate data on Asian Americans contribute to the invisibility of smaller groups of Asian Americans. Specifically, the high educational attainments of middle-class South Asian, Chinese and other East Asian Americans, eclipses and submerges the experiences and challenges faced by other Asian American students, in particular, Southeast Asian Americans including Hmong, Vietnamese, Lao, Cambodian, and Filipino. Within the scholarship on Asian Americans in K–12

education, Asian American students are generally represented as either "model minorities" or as "delinquents" and "gang members" (Lee, 2001; Ngo & Lee, 2007). Southeast Asian Americans from refugee backgrounds, for example, have been identified as being less academically successful than East and South Asian Americans. While disaggregated data has revealed these important variations among Asian ethnic groups, the focus on disaggregating Southeast Asian American data may unintentionally contribute to deficit-based thinking about Southeast Asian groups in ways that render the group hyper-visible as "failed" Asian Americans (Poon et al., 2017).

Too often, the explanations for the struggles faced by Southeast Asian Americans have focused on culture rather than on policies or structures that present barriers for the children and grandchildren of Southeast Asian refugees. The Hmong community in the United States has been the particular target of "culture clash" deficit narratives as the preferred explanation for educational inequality, in scholarship and in public discourse more generally (DePouw, 2012; Ngo, 2008). Such narratives represent Hmong culture as in a state of "clash" with the progressive, liberal, and pro-education values of White, middle-class Americans—including claims that Hmong parents and children disvalue education (Lee & Green, 2008; Xiong & Huang, 2011), and that early marriage, discouragement by in-laws, and family care obligations placed on Hmong girls (Vue, 2007; McClain-Reulle & Xiong, 2005), and traditional ceremonial obligations placed on boys (Supple, McCoy, & Wang, 2010), may conflict with the time and focus needed to succeed in education (McClain-Reulle & Xiong, 2005).

Despite the hegemony of the binary and deficit thinking that underlies this "culture class" narrative in scholarship, some scholarship demonstrates that the work of Hmong families toward educational goals is robust and that they are a source of cultural wealth and support for Hmong students. Hmong elders and families provide care, emotional, spiritual, and financial support to support youth's educational goals (Lee, 1997; Lor, 2008). Research indicates that Hmong families provided consistent encouragement and direct youth to prioritize their education; in fact, the youth who displayed values and behaviors most associated with Hmong "tradition" were judged by their teachers as the most academically engaged (Lee, 2005). In addition to this research evidence that challenges such deficit representations of Hmong culture as explanations of educational inequality, "culture clash" narratives both simplify and essentialize cultural difference, and thus obscure systematic, structural, social-economic factures that impact the possibilities of such students (DePouw, 2012; Lee, 2001; Ngo, 2008). Given the large body of research that demonstrates the link between K–12 math and science preparation and participation in STEM in higher education, more research is needed on the educational policies and practices that influence Southeast Asian American students' STEM pathways (Miller & Kimmel, 2012; Zhang & Barnett, 2015)

Southeast Asian Americans from refugee backgrounds have been identified as underrepresented in STEM (Kang et al., 2023). Kang et al. (2023) analyzed academic observational data from the National Center for Education Statistics High School Longitudinal Study of 2009, which tracked STEM educational participation for 26,305 students in the United States starting in 9th grade and following them for the subsequent 8 years. Among the Asian

Americans in the sample (n=1,367), the study found striking differences in socioeconomic status. For example, 76% of parents of South Asian students (Indian & Sri Lankan) were likely to have a college degree, and 70% of Chinese parents, but only 36% of parents of Southeast Asian students (Vietnamese & Thai) were likely to have a college degree. Similarly, Chinese and South Asian students were more likely to enroll in highly selective colleges than other Asian Americans in the sample; and, along with the East Asian students (Korean & Japanese students), they had higher high school math achievement than Filipino, Vietnamese, and Thai students. When considering the relationship between STEM major choice and college selectivity, the study found that underrepresented Asian Americans such as Southeast Asian and Filipino students were more likely than their counterparts to pursue STEM education at nonselective 2-year institutions, rather than selective and highly selective 4-year institutions. The study strongly suggests that more research is needed on the differentiation and stratification of STEM education pathways for Asian Americans—indicating that Southeast Asian Americans are more likely to be engaged in nonselective and entry-level STEM pathways.

National data on the educational profile of Southeast Asian Americans suggests that they continue to face barriers to success in higher education. The National Center for Education Statistics (Snyder et al., 2019) reported that in 2017, Southeast Asian Americans aged 25 and over attained bachelor's degrees at significantly lower rates than the overall national average of 33.3%; the rate for Cambodians was 16.4%, Laotians – 18.0%, Hmong – 18.4%, Burmese – 21.3%, and Vietnamese – 29.5%. In contrast, Asian Indian (74.2%), Korean (56.3%), Pakistani (56.2%), Chinese (55.4%), and Japanese (51.6%) groups had college graduation attainment rates that were significantly above the national average. Enduring effects of social, economic, and educational challenges associated with displacement and refugee resettlement for Southeast Asian Americans are evidenced in the educational profiles of these refugee communities. More than 30 years after resettlement, for example, Hmong Americans' high school graduation rate was 27.2% (contrast with the national average at 49.7%), college graduation rate was 11.7% (national average, 21.9%), and graduate or professional degree attainment was 1.5% (national average, 8.9%) (Yang & Pfeifer, 2004). Now, over 50 years after resettlement, Hmong Americans remain underrepresented in higher education in U.S. states such as Wisconsin, where Hmong are the largest Asian American population (Smolarek et al., 2019). Research on the experiences of Hmong American students in higher education settings has shown that they face barriers that are not often discussed in the education research literature (Smolarek et al., 2023), including challenges accessing needed institutional support and feelings of alienation on campus (Gloria et al., 2017), as well as overtly racist experiences and microaggressions (DePouw, 2012). One interview study of Hmong college students (n=66) at a predominantly White institution in Wisconsin (Smolarek et al., n.d.), found that students were pushed out of STEM programs and redirected toward non-STEM and nonselective majors, where they could graduate "on time" yet received little to no advice on the career consequences of the change in major. This study adds to the larger body of scholarship on STEM pushout experienced by Black and Latine students in higher education (Hurtado et al., 2012; McCoy et al., 2017; Russell & Russell, 2015). The process of STEM pushout and redirection involves gatekeeping procedures such as selective enrollment requirements; required high-enrollment and lecture-style "weed-out" classes with

grading based on curves and a heavy emphasis on tests; a competitive and individualized peer culture in the discipline; and transactional and deficit forms of academic advising that discourage students.

Discussion: STEM Asianization and the Colorblind Meritocracy of STEM Institutions

The Historic Rise of STEM Asianization

In this paper we traced the relationship between STEM and the racialization of Asian Americans as model minorities from the mid-20th century to the present. This central role of STEM is an undertheorized feature of the history and politics of Asian racialization in the United States, and in consequence, education research and theory lack a critical framework for understanding the education and career experiences of Asian Americans and other racially minoritized groups.

Asian people and groups are represented as model minorities on account of their achievement in STEM, but high-achieving Asians in STEM are also subjected to dehumanization as "robots" or "Asian calculators," and their mobility pathways are obstructed by a bamboo ceiling. During times of geopolitical conflict (e.g., Japan and China), Asians in STEM are seen as a "threat," which reinforces the idea that Asian Americans are perpetually foreign. Finally, Asian American groups who do not excel in STEM are either erased and rendered invisible by aggregate data or they become hyper-visible as "failed" Asians from deficient cultures. Southeast Asian Americans have been particularly vulnerable to this racialization. In short, the racialization of Asian Americans in STEM is dependent on the imperatives of White supremacy.

The consequence of this process of STEM Asianization in the United States, for newer Asian immigrant and refugee minorities such as Southeast Asian communities, is to simultaneously erase their experiences by aggregating them within the demographically larger Asian American group, and also to minoritize them within educational institutions through processes of cultural, institutional, and interpersonal STEM pushout (Smolarek et al., 2023; Smolarek et al., n.d.). The consequence for even high-achieving Asian Americans is exclusion from belonging in the national political body, as perpetual, potentially threatening foreigners, regardless of their citizenship. The significance of this Asian threat/Yellow Peril narrative correlates historically with moments of Asian-Pacific geopolitical conflict. Given the escalation of anti-Asian racism in the United States with the COVID-19 pandemic and the continued economic and geopolitical tensions with China, it is likely that hostile racializations of Asian Americans have not reached their historic apex.

The Ideological Production of STEM Meritocratic Institutions

Since the Civil Rights era, the stereotype of Asian Americans as model minorities has been used to reproduce the status quo by supporting the narrative of colorblind equal opportunity and individualistic notions of achievement, and silencing concerns about racial barriers in society. For example, conservative Asian policy-lobbying organizations and thinktanks have played a central role in advocating and successfully overturning in the U.S. Supreme Court the legal precedent for the use of race-conscious affirmative action policies in college admissions. The

arguments developed and submitted to the Court draw upon the meritocratic, individualistic, and colorblind ideologies that are also implicated in the Asian racialization of STEM education and careers in the United States (Park et al., 2022). Likewise, research on perceptions of model minority discourse among Asian American STEM students (Trytten et al., 2012; Zheng et al., 2024), includes themes of Asians as "uncomplaining" and the tendency to view racism as interpersonal rather than systematic—which further reproduces the ideology of the colorblindness within STEM institutions.

While the model minority stereotype may appear to be a form of inclusion, scholars have long pointed to the fact that Asian Americans have always experienced a conditional status in the United States (Choy, 2022; Louie, forthcoming). Similarly, model minority STEM Asianization has been used to support the idea that STEM cultures are colorblind and meritocratic. Within the hegemonic culture of STEM, individual achievement is valorized in ways that erase racialized, classed, and gendered experiences. STEM Asianization obfuscates the social, economic, and political conditions that undermine the notion of "merit" within educational institutions. For example, by normalizing and universalizing Whiteness as an objective indicator of meritocratic achievement, institutions reproduce harmful colorblind ideologies (Carter et al., 2019). As our discussion of STEM Asianization demonstrates, however, Asian American inclusion in STEM is always conditional. Even while the numbers of Asian Americans in STEM fields is high, these citizens remain vulnerable to exclusion as mere technicians unworthy of leadership positions (i.e., the bamboo ceiling) or targeted as potential spies who threaten the United States (i.e., Yellow Peril/perpetual foreigner).

Call for Future Research: The Need for a Critical and Intersectional Disaggregation of Data in Education Research

Scholars have long called for disaggregating data on Asian Americans to reveal the unique challenges faced by some Asian American ethnic groups (Museus & Vue, 2013; Vue et al., 2023). Some scholars, however, have pointed out that one of the unintended consequences of data disaggregation is that groups that fail to live up to the image of the successful model minority are viewed as "failed" Asians who are exceptions to the model minority norm (Poon et al., 2015; Vue & Mouavangsou, 2021). We call on future studies to disaggregate quantitative and qualitative data using intersectional frameworks that expose how nested and multiplex power structures impact students' experiences (Núñez, 2014). More research on the experiences, processes, and consequences of STEM pathways for intersectional minoritized Asian Americans is needed, including research and theory on the processes of STEM pushout for Asian Americans and other students of color. Additionally, more research is needed on how processes like STEM Asianization reproduce colorblind meritocratic ideologies—and how this ideology frustrates the process of transforming STEM institutions to make them racially just.

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