

Gender Stereotypes are Racialized:
A Cross-Cultural Investigation of Gender Stereotypes About Intellectual Talents

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The data, syntax, and research materials of all studies are available on Open Science Framework: <https://osf.io/d2cx6>. The design and analyses of the reported studies were not pre-registered.

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Abstract

In the U.S., there is a common stereotype associating brilliance with men. This gender brilliance stereotype emerges early and may undermine women's engagement in many prestigious careers. However, past research on its acquisition has focused almost exclusively on American children's beliefs of White people's intellectual talents. Therefore, less is known about how this stereotype develops in non-Western cultures and whether children consider other social identities such as race in forming this stereotype. To address these issues, the present research (1) provided the first cross-cultural test examining its development in 5- to 7-year-old Chinese and American children and (2) compared children's gender brilliance stereotype of White people with that of Asian people. Studies 1 ($N = 96$; Chinese children) and 2 ($N = 96$; Chinese children) revealed that, similar to American children, Chinese children associated brilliance with White men (versus White women) around the age of 6. In contrast, Studies 3 ($N = 96$; Chinese children) and 4 ($N = 96$; American children; 76.9% White) showed that 5- to 7-year-old children from both cultures associated brilliance with Asian women (versus Asian men). The results suggest that the gender stereotype about brilliance has a racial component and may be culturally consistent. Overall, these findings add to our knowledge of children's acquisition of the gender stereotype about brilliance in non-Western cultural contexts and highlight the importance of considering multiple social identities to understand the acquisition of stereotypes.

Key words: Gender brilliance stereotypes; Cross-culture; Intersectionality; Race

Over the past few decades, women have made significant advances in educational achievements that match or even surpass men's (Voyer & Voyer, 2014). Despite the gender parity in academic performance, it is commonly believed that high intelligence is a male quality (e.g., Beloff, 1992; Bennett, 1996; Furnham, 2000; Furnham, Reeves, & Budhani, 2002; Rammstedt & Rammsayer, 2000, 2002; Storage et al., 2016; Zajenkowski, 2020). The stereotype against women's intellectual talents sets barriers for women's engagement, contributing to the pervasive gender imbalance in a range of prestigious careers (e.g., Leslie, Cimpian et al., 2015). The present research tackles the developmental roots of this pernicious stereotype from cross-cultural and intersectional perspectives. Specifically, we included children from both China and the U.S. to investigate the development of the gender brilliance stereotype about White and Asian individuals. This research addresses two key questions: Do children in non-Western cultures endorse the gender stereotype associating brilliance with men? How does the gender brilliance stereotype manifest differently for different racial groups? In what follows, we first review previous findings on the acquisition and consequences of the gender brilliance stereotype and then lay out the rationale for performing the current studies.

The Early Emergence of the Gender Brilliance Stereotype

In Western cultures, women are generally perceived as less likely than men to possess intellectual talents (Gálvez et al., 2019; Rivera & Tilcsik, 2019; Storage et al., 2020). For instance, men in the United States, the United Kingdom and Germany consistently estimate themselves as more intelligent than women (Beloff, 1992; Furnham, Reeves, & Budhani, 2002; Kirkcaldy et al., 2007). Parents of sons also perceive their child as possessing higher

intelligence than parents of daughters (Neto & Furnham, 2011; Perez, et al., 2010). This gender stereotype shapes girls' and women's career aspirations and may steer them away from fields perceived as requiring high levels of intelligence (e.g., Bian, Leslie, Murphy, & Cimpian, 2018; Leslie, Cimpian et al., 2015; Meyer et al., 2015; Storage et al., 2016). For example, women are underrepresented in disciplines prizing high intellectual talents (Leslie, Cimpian et al., 2015), presumably because the gender brilliance stereotype undermined women's self-efficacy as well as their motivation to pursue educational or career opportunities said as requiring innate talents (Bian, Leslie, Murphy, & Cimpian, 2018; Emerson & Murphy, 2015; Smith et al., 2013).

Recently, a growing body of research indicates that even children in early elementary school years are susceptible to the gender brilliance stereotype (Bian, Leslie, & Cimpian, 2017, 2018; Jaxon, Lei et al., 2019). When shown pictures of unfamiliar men and women and asked to pick a "really, really smart" person, although 5-year-old boys and girls tended to choose individuals of their own gender, 6- and 7-year-old girls became less likely to do so than boys at this age (Bian et al., 2017). Mirroring the developmental trajectory in children's gender brilliance stereotype, 6- and 7-year-old girls became less interested in games portrayed as requiring high intelligence relative to boys, despite that girls and boys at age 5 were equally interested in playing these games (Bian et al., 2017). This gender stereotype also intensifies children's biases against girls when evaluating candidates for opportunities portrayed as valuing brilliance (Bian, Leslie, & Cimpian, 2018). For example, children selected fewer girls as teammates for an unfamiliar game when it was described to be for "really, really smart" children than when it was not (Bian, Leslie, & Cimpian, 2018).

The Gender Brilliance Stereotype Intersects with Race

Importantly, children consider race information in forming their gender brilliance stereotype. Although 6-year-old children associated brilliance with White men more than White women, they were more likely to choose Black women as being brilliant relative to Black men (Jaxon, Lei et al., 2019). Why does children's gender stereotype about brilliance manifest differently for different racial groups? One potential reason underlying this variability is that men and women of low-status, racial minority groups are seen as less prototypical of their respective gender category than men and women of high-status, racial majority groups (Ghavami & Peplau, 2013; Johnson et al., 2012). Since stereotypes often target directly at prototypical members (e.g., Purdie-Vaughns & Eibach, 2008; Vogel et al., 2021), men and women belonging to racial minority groups, by virtue of their non-prototypicality, may escape from common gender stereotypes (Donovan, 2011; Goff et al., 2008; Galinsky et al., 2013). The tendency to form social prototypes can be traced to early childhood (Lei et al., 2020; Leshin et al., 2021). For example, Lei et al. (2020) found that 3- to 8-year-old children were slower to categorize Black women than White women as women, and that they were already less likely to ascribe feminine traits to Black women than to White women.

The proceeding results suggest that young children not only develop associations between brilliance and gender, but they also adopt an intersectional framework such that their gender brilliance stereotype varies as a function of target race. The present research extends this prior work in three respects. First, past research on the early acquisition of the gender brilliance stereotype has exclusively relied on samples recruited from Western cultures. As

stereotypes are shaped by myriads of socio-cultural factors, the developmental trajectory of the gender brilliance stereotype may vary across cultural contexts. Given the pernicious influences of this gender stereotype on children's, especially girls', educational and career aspirations (Bian et al., 2017; Bian, Leslie, & Cimpian, 2018), it is imperative to examine the developmental trajectory of this stereotype in non-Western cultures to inform educators of the precise timeline to implement appropriate interventions.

Second, most developmental research on children's sensitivity to intersectional identities has primarily centered on children raised in multi-racial cultures in which race is a prominent group marker carrying social significance (Hirschfeld, 1998; Shutts, 2015). Open questions concern the development of intersectionality in racially homogenous contexts. Exposure to diversity influences race perception as early as infancy (e.g., Bar-Haim et al., 2006; Kelly et al., 2007) and subsequently moderates children's reasoning about race (e.g., Diesendruck et al., 2013; Lei et al., 2020; Kinzler & Dautel, 2012; Rhodes & Gelman, 2009). Therefore, including populations from racially homogeneous cultures is important to explore the scope to which the intersectional framework can be applied to.

Third, these studies suggest that children apply gender stereotypes more consistently to perceived prototypical than non-prototypical men and women (Jaxon, Lei et al., 2019; Lei et al., 2020), and yet the social mechanism underlying this variability is unclear. Specifically, it remains unknown which factor shapes children's social prototypes as well as the manifestation of their gender stereotypes. People may attend to a number of cues to make inferences about a group's prototypicality including its social status (e.g., Goh et al., 2021; Lei & Rhodes, 2021) and numerical representation (e.g., Dotsch et al., 2016). However, these

factors were largely confounded in past research that primarily contrasted children's gender stereotypes about high-status, racial majority group with those of low-status, racial minorities. One way to marshal evidence to disentangle the two factors is to examine children's gender stereotypes about racial majority groups with disadvantaged social status. This investigation will cast light on the social foundation underlying children's conceptual representation of social categories.

The present research addresses these gaps by investigating three questions: (1) Do children in non-Western cultures endorse the gender stereotype associating brilliance with men? (2) Do children raised in racially homogenous cultures consider target race when constructing their gender brilliance stereotype? (3) If so, which social factor (social status vs. numerical representation) plays a more important role in shaping children's expression of the gender brilliance stereotype towards different racial groups? We set out to investigate these questions in China, a racially homogeneous country that shares both similarities and differences in terms of gender equality with the Western culture.

The Development of the Gender Brilliance Stereotype in China

Although China has made significant progress in improving women's rights, gender inequality persists. As indicated by the World Economic Forum's Gender Gap Index measuring overall gender equality, China was ranked 106th out of 153 countries in 2020 (World Economic Forum, 2020). Similar to many Western countries, men in China gain privileged access to economic opportunities and educational resources than women (e.g., Hannum et al, 2008; Zeng et al., 2014). The gender disparity manifests to a larger degree in the high end of educational attainment: women only made up 37.9 % of doctoral candidates

(Ministry of Education of the People's Republic of China, 2016). According to a recent survey including 1,600 employees at various academic institutions in China (Wang, 2015), women are generally viewed as “weak in research ability, thinking and vision”, despite that Chinese female scientists publish as many academic papers as their male counterparts (Tao et al., 2017). From this perspective, Chinese children may develop the gender stereotype associating brilliance with men, similar to their American counterparts.

On the other hand, there is evidence indicating that Chinese parents' beliefs about intelligence do not favor one gender over the other (e.g., Furnham, Rakow, & Mak, 2002; Furman & Wu, 2014). Although parents from Western cultures generally perceive their sons as more intelligent than their daughters (e.g., Furnhman & Gasson, 1998; Kirkcaldy et al., 2007), Chinese parents evaluate boys and girls as equally competent in intelligence (Furman & Wu, 2014). Chinese parents in urban areas, in particular, hold relatively similar educational expectations for sons and daughters (Tsui & Rich, 2002). Since parental beliefs is one of the major sources influencing children's gender stereotypes (Gunderson et al., 2012), it is possible that Chinese children are immune to the stereotyped notions linking intellectual abilities with men.

Chinese culture also presents a unique racial landscape given that it is a racially homogeneous country. According to the National Bureau of Statistics of China (2021), over 99% of population in China are Asians, and individuals of other racial groups only represent 0.06% of the population. In terms of ethnic diversity, there are 56 ethnic groups in China. The Han Chinese are the majority ethnic group, making up over 91% of the population of China (National Bureau of Statistics of China, 2021). The ethnic minorities typically reside in

specific geographic regions (e.g., Mongolia, Tibet) and most of the ethnic minorities are visually indistinguishable from their Han counterparts (Xiao et al., 2015). Unlike children raised in multi-racial cultures who are generally exposed to people of diverse racial/ethnic backgrounds, Chinese children of the majority ethnic group typically have little or no direct interactions with members of other racial/ethnic groups¹. Therefore, China provides a unique context to explore whether a lack of interracial contacts affects children's sensitivity to race in forming their gender stereotypes. One possibility is that growing up in a racially homogenous environment undermines race salience (Bigler & Liben, 2017), which might lead children to overlook race in their gender stereotypes. However, there is evidence suggesting that racially homogenous cultural contexts may in fact encourage children to imbue social meaning to race (e.g., Mandalaywala et al., 2019; Pauker et al., 2016; Rhodes & Gelman, 2009). Based on this reasoning, racially homogenous contexts may support children to consider race when they form gender stereotypes.

The Potential Role of Group Status

To explore these possibilities, we compared Chinese and American children's gender brilliance stereotype about Asian men (versus Asian women) with that about White men (versus White women). This comparison will also allow us to identify the social factor that explains the variability of children's gender brilliance stereotype by target race. Specifically, we hypothesized that this variability would map onto the racial category's social status, rather than its numerical presence. In other words, children's gender brilliance stereotype would be

¹ With globalization, a growing number of Western cultural products have been exported to Asia, and thus Chinese adults and children may be exposed to people of diverse racial backgrounds indirectly through the media (e.g., Rohn, 2009; Willnat et al., 1997).

more pronounced for men and women belonging to high-status racial groups than men and women of low-status racial groups. This hypothesis aligns with *Social Dominance Theory* suggesting that stereotypes are legitimized and often believed to reflect the characteristics of high-status groups to justify group-based inequalities (Sidanius & Pratto, 1999; Sidanius et al., 1994). In the same vein, and more broadly, philosophers and psychologists have argued that a society's hierarchical structure and power relations shape how biases are manifested for different groups (e.g., Cole, 2009; Lei & Rhodes, 2021; Roberts & Rizzo, 2021).

As noted earlier, developmental research lends some support for this hypothesis (Jaxon, Lei et al., 2019; Lei et al., 2020; Perszyk et al., 2019); nevertheless, social status was confounded with numerical representation in these studies. Comparing Chinese children's gender brilliance stereotype about Asians to that of White people presents a compelling context to tease apart the two social factors. Asians are the racial majority in China, and yet they are associated with lower social status relative to Whites with relation to historical reasons (Chen et al., 2018; Goon & Craven, 2003; Lan, 2016; Qian et al., 2016, 2019; Stohry et al., 2021). For example, Chinese adults perceived White people as obtaining higher education and more prestigious jobs than Asians (Qian et al., 2016), and Chinese children became more likely to match expensive possessions with Whites than Asians with age (Qian et al., 2019). More generally, white skin is linked with wealth and high social status in Chinese culture (Li et al, 2008; Sautman, 1994). If children's gender brilliance stereotypes vary as a function of group status, we expect Chinese children to apply the gender brilliance stereotype more consistently to White men and women than to Asian men and women.

The Present Research

In the present research, we included 5- to 7-year-old children from both China and the U.S. to investigate the developmental trajectory of the gender brilliance stereotype about Whites and Asians. We chose to test 5- to 7-year-olds because American children begin to ascribe brilliance to White men rather than White women in this age range (Bian et al., 2017, 2018). We first reported two studies investigating Chinese children's gender stereotype about White people's intellectual talents (Studies 1 and 2). Next, we reported another two studies investigating Chinese (Study 3) and American children's (Study 4) gendered notions about Asians' brilliance. Because school performance is available to children in their daily life and in principle signals intelligence, we examined whether children's gendered beliefs about school grades predict their gender stereotype about intellectual talents for exploratory purposes.

Study 1

In Study 1, we recruited children from China and assessed their inferences about the intellectual abilities of White men versus women. We set out to examine children's gender brilliance stereotype about White men and women because this provided a closely-matched comparison between Chinese and American children's stereotypes. Moreover, it served as a direct test of the applicability of the stereotype measures adopted from Bian et al. (2017) to children from non-Western cultural contexts. We also measured children's beliefs about which gender is "really, really nice" as a control assessment, because "nice" is familiar to children of this age, and yet it is not strongly associated with men more than women (e.g., Fiske et al., 2002).

Method

Power Analysis.

We conducted a priori power analysis (G*Power 3.1; Faul et al., 2017) for a regression model with three predictors (i.e., participant gender, participant age and their interaction). Informed by previous studies published on this topic (Bian et al., 2017; Jaxon, Lei et al., 2019), we specified a medium effect size ($f^2 = 0.15$) with alpha set at .05. The analysis suggested that the minimum number of participants was 77 to provide 80% power to detect significant predictors. Nevertheless, we included 96 children (48 boys and 48 girls) in each study, in line with Bian et al. (2017). This study and the following studies were not preregistered.

Participants.

Ninety-six children between the ages of 5 and 7 ($M_{\text{age}} = 6.5$ years, $SD = 0.8$; 48 girls, 48 boys) from Beijing, China were recruited. Beijing has a population of 21.5 million with 96% of its residents identified as Han Chinese. The demographic information was available for 89.6% of our sample; 88.4% of the subset identified as Han, 3.5% as Hui, 2.3% as Man, and 5.8% as another ethnicity. The median household income was 250,000 RMB (Approximately \$38,000). Eighty-five percent of the parents in the sample had at least a Bachelor's degree. Each participant's parent gave written informed consent, and the protocol was approved by the Institutional Review Board for Human Participants at Cornell University (Protocol ID#:1902008558; Title: Social Cognition and Development).

Children were tested in a research lab or at local libraries. For this and the following studies, the experimenter videotaped the sessions and recorded the children's responses on an

answer form. At the end of the sessions, children were debriefed and thanked for their participation with a small gift. Eighteen additional children were tested but excluded from the final sample because 17 of them did not pass the screener questions (see below) and 1 child did not finish the study.

Procedure and Measures.

The procedure and materials were adapted from Bian et al. (2017), consisting of three main phases. The first phase presented 12 screener questions to gauge children's understanding of the two main concepts (i.e., "smart" and "nice") used in our study. The second phase involved two stereotype tasks to measure children's gendered beliefs about brilliance and niceness. The third phase consisted of four questions measuring children's perceptions of White boys' and girls' school achievements.

We presented pictures of White men and women in the second phase (i.e., stereotype tasks), and White boys and girls in the third phase (i.e., perceptions of school achievements). These pictures had been normed by a sample of 30 American adults in Bian et al. (2017) on attractiveness, professional dress and age (for child pictures). In addition, we recruited 62 Chinese adult participants (38 women, 22 men, 2 did not report gender) to further validate that the male and female faces used in this and the following studies were perceived similarly. Upon viewing each picture, participants rated how attractive they were, how professionally dressed they were², how happy their expression was and how old they were. The analyses revealed no significant effect of target gender, $ps > .19$.

² The pictures used in Studies 2-4 featured individuals dressed in uniform heather grey t-shirts and thus we did not prompt participants to rate "how professionally dressed they were" for these pictures.

The script was translated from English into Chinese by the first author and then back translated into English by an independent translator to ensure accuracy. Any discrepancies between the back-translated script and the original version were resolved through discussion. The materials and scripts for all the studies reported here are available on Open Science Framework: <https://osf.io/d2cx6>.

Screener questions. We started with a set of 12 screener questions for two reasons: first, these questions tested whether children were able to understand the meaning of “smart” (6 questions) and “nice” (6 questions). Second, some prior findings suggest that Chinese people’s lay theories of intelligence may differ from Americans’ (e.g., Markus & Kitayama, 1991; Sternberg et al., 1981), therefore we assessed Chinese children’s conception of “intelligence” and corrected it if necessary, to ensure a closely-matched cultural comparison.

The “smart” and “nice” questions were presented to children in two separate blocks. The order of the two blocks, as well as the order of the questions within each block, was counterbalanced across participants. For each question, the experimenter placed a picture of an unfamiliar child behind a cardboard tent, and described a behavior of the child in the picture (e.g., “*This child can always answer even the hardest questions from the teacher*”). Participants were asked to answer whether the child in the picture possesses the relevant trait (e.g., “*Is this child smart, not smart, or are you not sure?*”). Children were corrected if they answered incorrectly. We hid the pictures of children from participants intentionally to avoid any interferences on their responses to the stereotype tasks. According to Bian et al. (2017), we used the exclusion criterion of 4/6 correct for each trait. Seventeen children were tested but excluded from the final data analysis because they did not pass the threshold. The dropout

rate (17 out of 96) was similar to that (19 out of 96) reported in Bian et al. (2017), suggesting that Chinese children and American children shared similar conceptual understanding of intelligence (at least within the scope of the behaviors examined here).

Stereotype tasks. After the screener questions, children received two stereotype tasks in counterbalanced order, assessing their tendency to attribute brilliance/niceness to their own gender. In Task (i), children heard two stories presented in counterbalanced order. One story was about a “really, really smart” person, and the other was about a “really, really nice” person. In each story, the gender of the protagonist was unspecified. After hearing each story, children were presented with pictures of four adults (2 White men and 2 White women, interspersed) and asked to pick the protagonist in the story among the four pictures. If children selected a person of the same gender as themselves, they received a score of 1, and 0 otherwise.

In Task (ii), children were presented with six pictures depicting two White adults in randomized order. Upon seeing each picture, children were told that one of the two people was either “really, really smart” or “really, really nice,” and asked to guess which individual possessed the trait. The first two trials presented two individuals of the same gender as the participant, serving as practice trials to camouflage the purpose of the study from children. In each of the next four test trials (2 brilliance trials and 2 niceness trials), children were presented with pictures showing a man and a woman. Children received a score of 1 if they selected a person of the same gender as themselves, and 0 otherwise.

Across the two tasks, children received three questions to measure their gender stereotype for each attribute. Following Bian et al. (2017), we averaged the responses within

a participant. The main dependent measure was children's own-gender stereotype score, that is, the proportion of questions in which a child chose the individual of their own gender as "really, really smart" (own-gender brilliance score) or "really, really nice" (own-gender niceness score).

Perceptions of school achievements. Four questions were designed to measure children's perceptions of boys' and girls' school achievements. In each of the first two questions ("Who do you think gets the best grades in school?"; "Who do you think is first in their class?"), children were shown four pictures of unfamiliar children (2 White boys and 2 White girls, interspersed) and were asked to select one picture to answer the respective question. Next, participants answered the same two questions again, except that they chose between "boys or girls". As in the stereotype tasks, if children selected a child of the same gender as themselves, they received a score of 1 for that question, and 0 otherwise. We used the average score across the four questions as an indicator of children's perceptions of school achievements (own-gender grade score).

Analytic strategy.

The main goal of this study was to explore the development of Chinese children's gender stereotype about White people's high intellectual abilities. Our primary test of children's endorsement of the gender brilliance stereotype was the contrast between boys' and girls' own-gender brilliance stereotype scores across age. Five- to seven-year-old children demonstrate a strong favoritism towards their gender group, such that they tend to associate positive attributes with members of their own gender (Dunham et al., 2011; Shutts et al., 2013; for reviews, see Levy & Killen, 2008). However, if children have internalized the

stereotype associating brilliance with White men, girls should be less likely than boys to choose their own gender as brilliant. We performed linear regression models on children's own-gender brilliance scores in R (Version 3.6.1, R Core Team, 2019), including participant age (continuous), gender (girl vs. boy) and their interactions as factors. To decompose interactions, we conducted follow-up tests using the *interactions* and *emmeans* packages.

In addition, an acquisition of the gender brilliance stereotype might also be revealed by comparisons to the gender-neutral 50% threshold. Thus, we recoded children's responses to capture how often they chose men as being "really, really smart" and compared these responses against chance (0.5). Although informative, this analysis was associated with some interpretive difficulties given children's ingroup bias. For example, even if girls have acquired the stereotype associating brilliance with men, their selections of men as being brilliant might be lower than 50% because they acted against a strong tendency to favor their ingroup members. Based on this reasoning, we reported deviations from chance across participant gender, so that boys' and girls' ingroup bias can cancel each other out.

Finally, we also conducted similar analyses on the other two dimensions (niceness, grade) to (1) rule out alternative explanations and (2) explore the sources of children's acquisition of the gender brilliance stereotype. The design and analyses of the reported studies were not pre-registered.

Open data. The data and syntax for this study, as well as all other studies reported here, are available on Open Science Framework: <https://osf.io/d2cx6>.

Results and discussion

Gender stereotype about brilliance. We first submitted children's own-gender brilliance scores to a linear regression model including gender (boys vs. girls), age (continuous), and their interaction as factors. The analyses revealed a main effect of gender, $B = 0.17$, $SE = 0.06$, $t = 2.78$, $p = .007$, which was qualified by a significant interaction between gender and age, $B = 0.18$, $SE = 0.07$, $t = 2.44$, $p = .017$. Tests of simple slope revealed that girls with age became less likely to choose their own gender as “really, really smart”, $B = -0.11$, $SE = 0.05$, $t = -2.18$, $p = .032$, whereas boys' tendency to choose people of their own gender as “really, really smart” did not vary by age, $B = 0.07$, $SE = 0.05$, $t = 1.29$, $p = .202$ (Figure 1 left). To further understand at what age the gender difference emerged, we performed simple slope tests at the median age of each age group. Mirroring the developmental pattern uncovered with American children (Bian et al., 2017), five-year-old Chinese boys and girls were equally likely to associate brilliance with their own gender group, $t = 0.07$, $p = .944$. In contrast, Chinese girls were less likely than Chinese boys to link intellectual talents with their own gender at the ages of six ($t = 2.74$, $p = .007$) and seven ($t = 3.67$, $p < .001$). As indicated by Johnson-Neyman Interval, girls became less likely than boys to associate brilliance with their own gender group by 6.2 years of age.

As supplementary analyses, we recoded children's responses to capture the proportion of selecting White men as “really, really smart” and submitted these scores to a linear regression model including gender (boys vs. girls), age (continuous), and their interaction as factors. This analysis revealed a main effect of age, $B = 0.09$, $SE = 0.04$, $t = 2.44$, $p = .017$. With age, children became increasingly more likely to choose White men as “really, really

smart.” In addition, consistent with past research demonstrating children’s ingroup bias (e.g., Dunham et al., 2011), boys were more likely than girls to choose men as brilliant, $B = 0.23$, $SE = 0.06$, $t = 3.85$, $p < .001$. However, there was no evidence of a significant interaction between gender and age, $B = -0.04$, $SE = 0.07$, $t = -0.57$, $p = .571$, suggesting that boys and girls exhibited similar developmental trends in their gendered expectations of brilliance.

We then estimated the precise age at which children (as a whole) begin to favor White men in their selections of brilliant people. Following the Johnson-Neyman “regions of significance” approach (Johnson & Neyman, 1936), we subtracted 0.5 (chance level) from children’s proportions of selecting White men and submitted these scores to the linear regression model described above. Next, we estimated marginal means between ages 5 and 7 by 0.01 year increments. This analysis indicated that children’s proportion of choosing White men as being brilliant became significantly higher than chance at 6.22 years. Overall, these findings suggest that Chinese children may start to associate brilliance with White men (vs, White women) at the age of six.

Gender stereotype about niceness. With respect to “really, really nice”, the two-way interaction between gender and age was not significant, $B = 0.03$, $SE = 0.08$, $t = 0.40$, $p = .688$. Meanwhile, neither the main effect of age, $B = -0.02$, $SE = 0.04$, $t = -0.63$, $p = .530$, nor the main effect of gender, $B = 0.03$, $SE = 0.06$, $t = 0.41$, $p = .683$, reached significance (Table S1; Figure S1A). Comparing the average proportion of White male selections to the gender-neutral 50% threshold, we found that Chinese children did not seem to hold gendered beliefs with respect to niceness, $M = 0.51$, $t(95) = 0.44$, $p = .660$. This pattern held for both girls ($M_{girls} = 0.46$, $t(47) = -0.86$, $p = .394$) and boys ($M_{boys} = 0.57$, $t(47) = 1.70$, $p = .095$).

These results ruled out the possibility that 6- to 7-year-old children's tendency to choose White men as being "really, really smart" simply reflected their general positivity about White men.

Perceptions of school achievements. The analyses on children's perceptions of school achievements revealed a significant main effect of gender, $B = -0.27$, $SE = 0.06$, $t = -4.35$, $p < .001$. Compared to Chinese boys, Chinese girls between the age of 5 and 7 were more likely to choose their own gender as high school-achievers (Table S1; Figure S2A). We conducted a Pearson correlation to examine whether children's perceptions of school performance predicted their tendency to associate brilliance with their own gender. There was no significant relation between the two variables, $r = -0.15$, $p = 0.135$, suggesting that Chinese children's ideas of White people's brilliance are unrelated to their perceptions of which gender performs well in school.

Conclusions

Study 1 represents a first attempt to document the existence and emergence of the gender stereotype about brilliance in cultures outside of the U.S. Paralleling American children's acquisition of this gender stereotype, Chinese children around age six started associating brilliance with White men more than with White women. Future research involving a variety of countries is required to further investigate the generality of these findings, nevertheless, this present study speaks to the possibility that endorsing "brilliance = White men" from a young age is a global phenomenon.

Study 2

The results of Study 1 speak to the early emergence of the gender stereotype associating brilliance with White men in Chinese children. However, these children were recruited in Beijing, one of the most developed cities in China with high average household income. To test the robustness and generality of these findings, we made the following extensions in Study 2: First, we recruited children from a wide range of regions in China to acquire a more representative sample in terms of demographics and geography. Second, we presented children with a new set of White faces adopted from the Chicago Face Database (Ma et al., 2015).

Method

Participants. We recruited 96 children between 5 and 7 years old ($M_{\text{age}} = 6.5$ years, $SD = 0.8$; 48 girls, 48 boys) from multiple geographical regions in China including Hebei Province, Jiangxi Province and Chongqing to ensure a relatively diverse sample. The demographic information was available for 59.4% of the sample, with 94.7% of the subset identified as Han, 3.5% as Man, and 1.8% identified as another ethnicity. The median annual household income was 200,000 RMB (Approximately \$30,000), and fifty-eight percent of the parents in the sample had at least a Bachelor's degree. Thirty-six additional children were tested but were excluded from the final sample because 33 of them did not pass the screener questions and 3 of them did not complete the study.

Materials and Procedure. Twenty-eight children were tested in person at local kindergartens prior to the COVID-19 pandemic, and the rest of the children were tested online via Tencent Meeting.

The procedure of in-person testing was identical to that of Study 1. Children tested online received an identical procedure except that they first participated a warm-up session adapted from Sheskin and Keil (2018), in which an experimenter asked children to identify four different colors (i.e., blue, orange, green and black). The warm-up session served to make children feel comfortable answering questions over video and to ensure that they could differentiate the colors used to mark choices in the main session. In particular, to conceal our focus on children's choices based on gender information, we color coded the presented characters (i.e., each individual was placed on top of a colored box), so that the experimenter and the child could refer to each character by their associated color (rather than their gender).

The materials and tasks were identical to those of Study 1, with one exception. We selected pictures of White men and women from the Chicago Face Database (Ma et al., 2015) that were matched in attractiveness, age and emotion based on American adults' subjective ratings. As noted earlier, Chinese adults also provided similar ratings of the selected male and female faces on these dimensions.

Results and discussion

Gender Stereotype about brilliance. As in Study 1, we submitted children's own-gender brilliance scores to a linear regression model with gender (boys vs. girls), age (continuous), and their interaction as factors. We found a main effect of gender, $B = 0.16$, $SE = 0.06$, $t = 2.63$, $p = .010$, suggesting that girls at all ages were less likely than boys to associate brilliance with their own gender (Figure 1 right; Table S1). Although the interaction between gender and age did not reach significance, $B = 0.08$, $SE = 0.08$, $t = 1.09$, $p = .280$, we examined gender differences within each age group to better understand the developmental

trajectory. Similar to Study 1, we performed simple slope tests at the median age of each age group. Chinese boys and girls at the age of 5 did not differ in their tendency to choose their own gender as “really, really smart”, $t = 1.10, p = .276$. However, Chinese girls aged six ($t = 2.30, p = .024$) and seven ($t = 2.54, p = .013$) were significantly less likely than boys to associate brilliance with their own gender group. As indicated by Johnson-Neyman Interval, girls became less likely than boys to associate brilliance with their own gender group by 6.2 years of age. Following Study 1, we recoded children’s responses to capture the proportion of selecting White men as “really, really smart” and explored the precise age at which children began to favor White men in their selections. The analysis suggested that children’s proportion of choosing White men as “really, really smart” became significantly higher than chance at 6.18 years.

Overall analyses across Studies 1 and 2. To provide a higher powered test of children’s endorsement of the gender brilliance stereotype, we combined the data from Studies 1 and 2 and performed two additional sets of analyses. First, we submitted children’s proportion of selecting White men as “really, really smart” to a mixed-effects linear regression model using the *lmer* function, with gender (boys vs. girls), age (continuous), and their interaction as fixed effects and a random intercept for study. Again, we found a main effect of age, $B = 0.07, SE = 0.03, t = 2.49, p = .014$, and this effect was not moderated by child gender, $B = -0.03, SE = 0.05, t = -0.55, p = .580$. With age, both boys and girls became increasingly more likely to choose White men as “really, really smart.” Second, we categorized children into three age groups (five- vs. six- vs. seven-year-olds) and performed one-sample *t*-tests to compare their proportion of White male choices against chance. The

average proportion of choosing White men as brilliant was significantly above chance among six- and seven-year-olds ($M_{6\text{-year-olds}} = 0.59, t(63) = 2.30, p = .025$; $M_{7\text{-year-olds}} = 0.64, t(63) = 3.77, p < .001$), but not among five-year-olds ($M_{5\text{-year-olds}} = 0.51, t(63) = 0.27, p = .786$). These additional results reinforce the conclusion that Chinese children begin to attribute brilliance to White men (vs. White women) in early childhood, around the age of six.

Gender Stereotype about niceness. Analyses of children's own-gender niceness scores revealed no significant effect of age ($B = -0.04, SE = 0.04, t = -1.00, p = .318$), gender ($B = 0.004, SE = 0.06, t = 0.06, p = .950$) or their interaction ($B = 0.004, SE = 0.07, t = 0.05, p = .962$; Table S1, Figure S1). As in Study 1, Chinese boys and girls in this age window do not ascribe niceness to one particular gender (the proportion of White male selections: $M_{girls} = 0.44, t(47) = -1.21, p = .231$; $M_{boys} = 0.56, t(47) = 1.72, p = .091$).

Perceptions of school achievements. The analyses on children's perceptions of boys' and girls' school achievements yielded a significant effect of gender, $B = -0.17, SE = 0.05, t = -3.39, p = .001$. Five- to seven-year-old Chinese girls were more likely than Chinese boys to choose their own gender as high school-achievers (Table S1, Figure S2). We found no evidence for a relationship between children's own-gender brilliance scores and their own-gender achievement scores, $r = 0.02, p = 0.836$. Thus, in line with Study 1, Chinese children's ideas of White people's brilliance are not rooted in their perceptions of which gender performs well in school.

Conclusions

Replicating Study 1, we found converging evidence that Chinese children assimilate the stereotype associating intellectual talents with White men in early childhood. These

results speak to the pervasive existence of the gender brilliance stereotype in samples collected from a range of demographically diverse regions in China.

Study 3

In Study 3, we focused on the extent to which Chinese children apply the gender brilliance stereotype to Asians. If a lack of interracial contacts leads children to overlook target race when forming gender stereotypes, Chinese children would attribute brilliance to Asian men (vs. Asian women) to the same extent as to White men (vs. White women). However, another possibility is that racially homogenous environments may in fact highlight race as a meaningful social marker and encourage children to consider race in constructing gender stereotypes. Unlike White people who are direct targets of the gender brilliance stereotype, men and women belonging to low-status racial category, such as Asians, may escape from the gender brilliance stereotype by virtue of their non-prototypicality (Purdie-Vaughns & Eibach, 2008).

Method

Participants. We recruited 96 children between 5 and 7 years old ($M_{\text{age}} = 6.5$ years, $SD = 0.8$; 48 girls, 48 boys) from Beijing, China. Sixteen additional children were tested but were excluded from the final sample because they did not pass the screener questions. The demographic information was available for 95.8% of the sample, with 88.0% of the subset identified as Han, 4.3% as Man, 2.2% as Mongol, and 5.4% identified as another ethnicity. The median household income was 175,000 RMB (Approximately \$27,000). Seventy-five percent of the parents in the sample had at least a Bachelor's degree.

Materials and Procedure. Children were tested in person in a research lab or at local libraries. The measures and procedure were identical to those of Study 2, with two exceptions. First, in the stereotype tasks, we used pictures of Asian individuals from the Chicago Face Database (Ma et al., 2015). We chose pictures of Asian men and women matched in attractiveness, emotion and age based on the subjective ratings provided in Ma et al. (2015). These pictures were also matched with the ones used in Study 2 on these three dimensions, which allowed us to conduct a systematic comparison of children's gender stereotype about White and Asian people (see below). Second, we presented pictures of Asian boys and girls to assess children's perceptions of school achievements.

Results and discussion

Gender stereotype about brilliance. Children's own-gender brilliance scores were submitted to a linear regression model with gender (boys vs. girls), age (continuous), and their interaction as factors. The model yielded a significant main effect of gender, $B = -0.22$, $SE = 0.06$, $t = -3.71$, $p < .001$ (Figure 2 left). However, different from Studies 1 and 2, Chinese girls were more likely to choose their own gender as "really, really smart" than boys when making judgments about Asian individuals. This effect was not moderated by age, $B = -0.02$, $SE = 0.07$, $t = -0.27$, $p = .788$ (for descriptive statistics, see Table S2).

We then recoded children's responses to reflect their proportions of choosing Asian men and compared the average proportion of male selections against chance. Fix- to seven-year-old Chinese children's tendency of choosing Asian men as being brilliant was 0.39, which was significantly lower than chance, $t(95) = -3.44$, $p < .001$. These results suggested

that Chinese children between the ages of 5 and 7 associated brilliance more strongly with Asian women than with Asian men.

The influence of target race. To systematically test for the influence of target race on children's gender stereotype about brilliance, we combined the data from Studies 2 and 3. Children's own-gender brilliance scores were submitted to a mixed-effect linear regression model with target race (White vs. Asian), gender (boys vs. girls), and age (continuous), plus all possible interaction terms, as fixed-effect predictors, and study as a random intercept. Given our prior interest, we reported only the effects involving target race. The model uncovered a significant two-way interaction among target race and participant gender, $B = -0.37$, $SE = 0.08$, $t = 4.46$, $p < .001$. In particular, relative to Chinese girls, Chinese boys were more likely to choose their own gender as being "really, really smart" when making judgments about White people, $t(184) = 2.67$, $p = 0.041$, but they were less likely to do so when making judgments about Asian people, $t(184) = -3.64$, $p = .002$. Thus, Chinese children as young as age 5 adopt an intersectional stance, in that racial identities influence the content of their gender stereotype about brilliance.

Gender stereotype about niceness. With respect to Chinese children's ideas about Asians' niceness, there was no evidence of an effect of age ($B = -0.002$, $SE = 0.04$, $t = -0.07$, $p = .949$), gender ($B = -0.09$, $SE = 0.07$, $t = -1.32$, $p = .190$) or their interaction ($B = 0.04$, $SE = 0.08$, $t = 0.46$, $p = .647$; Table S2, Figure S1). In addition, neither girls' nor boys' average proportion of Asian male selections deviated from chance ($M_{girls} = 0.47$, $t(47) = -0.74$, $p = .460$; $M_{boys} = 0.44$, $t(47) = -1.13$, $p = .263$).

Perceptions of school achievements. The analyses on children's perceptions of Asian girls' and boys' school achievements uncovered a significant main effect of gender, $B = -0.42$, $SE = 0.04$, $t = -9.38$, $p < .001$, suggesting that Chinese girls between the age of 5 and 7 were more likely than boys to attribute excellent school performance to their own gender (Table S2, Figure S2). Next, we conducted a Pearson correlation to examine the relationship between Chinese children's gender brilliance stereotype and their perceptions of school achievements when making judgments of Asians. This analysis yielded a significant positive relation, $r = 0.36$, $p < .001$. The more children believed that their own gender excelled in school, the more likely that they associated brilliance to their own gender. Therefore, Chinese children's gender stereotype about Asians' intelligence may be informed by their observations of which gender excels in school performance.

Conclusions

The present results suggest that Chinese children do not extend the "brilliance = men" stereotype to Asian targets; instead, they associated brilliance with Asian women more than with Asian men. Although Asians are the racial majority in China, children may view Asian men as less prototypical of men than White men, presumably because Asians have disadvantaged social status relative to Whites in Chinese culture (e.g., Qian et al., 2016, 2019; Stohry et al., 2021). This study constitutes the first piece of evidence demonstrating that children in racially homogeneous cultures consider rich social identities including race and gender in forming stereotypes. It also provides initial evidence that children's expression of the gender brilliance stereotype is modulated by racial status.

Study 4

Study 4 sought to explore American children's gender stereotype about brilliance when reasoning about Asian men and women to paint a complete picture of the associations between brilliance and gender. In the U.S., Asian men are perceived as less representative of men compared to White men (Schug et al., 2015; Lei et al., 2020). If American children are already aware of Asian men's non-prototypicality, we expect them to refrain from attributing brilliance to Asian men.

Method

Participants. We recruited 96 children between 5 and 7 years old ($M_{\text{age}} = 6.5$ years, $SD = 0.8$; 48 girls, 48 boys) from diverse regions in the U.S. The geographic information was available for 86.5% of the sample; this subset was from 21 different states, in which 57.8% were from the northeastern area (e.g., New York, Massachusetts), 15.7% from the southeastern area (e.g., Maryland, Kentucky), 13.3% from the midwestern area (e.g., Illinois), and 13.3% from the western or southwestern area (e.g., California, Arizona).

The demographic information was available for 94.8% of the sample; 76.9% of the subset identified as White, 8.8% as Asian or Pacific Islander, 5.5% as Latino/Hispanic, and 8.8% identified as mixed or biracial. The median household income was \$125,000. Eighty-three percent of the parents in the sample had at least a Bachelor's degree.

Materials and Procedure. Eleven children were recruited and tested at local museums in Upstate New York prior to the COVID-19 pandemic, and the rest of the sample were tested online using Zoom. The materials and procedure were identical to those of Study 3, except that the script and questions were presented in English.

Results and discussion

Gender stereotype about brilliance. As in previous studies, children's own-gender brilliance scores were submitted to a linear regression model with gender (boys vs. girls), age (continuous), and their interaction as factors. The main effect of gender reached significance, $B = -0.18$, $SE = 0.06$, $t = -2.96$, $p = .004$ (Figure 2 right), indicating that American girls were more likely than boys to associate brilliance with Asians of their own gender (Table S2). Meanwhile, five- to seven-year-old American children's proportion of choosing Asian men as "really, really smart" was 0.41, which was significantly below chance, $t(95) = -2.87$, $p = .005$. This pattern held for White children and children of color (see Supplementary Materials). Together with Study 3, we found that both American and Chinese children between the ages of five and seven associated brilliance with Asian women more than with Asian men.

Gender stereotype about niceness. The analysis on children's own-gender niceness scores revealed a main effect of gender, $B = -0.25$, $SE = 0.07$, $t = -3.71$, $p < .001$ (Table S2, Figure S1), suggesting that American girls were more likely to attribute niceness to Asians of their own gender than American boys.

Perceptions of school achievements. We next explored American children's perceptions of Asian girls' and boys' school achievements. The analyses yielded no evidence for an effect of age ($B = -0.02$, $SE = 0.03$, $t = -0.46$, $p = .645$), gender ($B = -0.05$, $SE = 0.05$, $t = -0.99$, $p = .323$) or their interaction ($B = 0.03$, $SE = 0.07$, $t = 0.43$, $p = .667$) (Table S2, Figure S2). American boys and girls were equally likely to associate high school performance to Asian children of their own gender. These results also ruled out two alternative explanations for the observed gender stereotypes about brilliance and niceness. One

alternative explanation was that children simply hold a general positive view of Asian women compared to Asian men (e.g., Jackson et al., 1997; Liu, 2002). Another alternative suggested that perhaps the gender differences in children's selections reflected girls' stronger tendency to favor their ingroup members than boys (Shutts et al., 2013; Shutts et al., 2017). Nevertheless, the fact that boys and girls favored their own gender in their assumptions of school performance deemed the two alternatives unlikely.

Finally, we conducted a Pearson correlation to examine the relationship between American children's gender stereotype about brilliance of Asians and their perceptions of Asian boys' and girls' school achievements. The correlation did not reach significance, $r = 0.11$, $p = .292$, indicating that American children do not treat Asians' school achievement as an indicator of Asians' brilliance.

Conclusions

Study 4 provides evidence that American children do not endorse "brilliance = men" stereotype when making judgments about Asian people. Instead, similar to Chinese children, five- to seven-year-old American children associated brilliance with Asian women more than with Asian men. Combined with the previous three studies, this study provides converging evidence showing that the gender stereotype about brilliance has a racial component and may be culturally consistent.

Overall Analyses on Children's Gender Brilliance Stereotypes

To assess the robustness of our findings, we conducted two additional analyses. First, we pooled the data from Studies 1-4 and analyzed the proportion of male selections as "really, really smart." We performed a mixed-effect linear regression model with target race

(White vs. Asian), gender (boys vs. girls), and age (continuous), plus all possible interaction terms, as fixed-effect predictors, and study as a random intercept. The analyses revealed a significant effect of target race, $B = 0.18$, $SE = 0.03$, $t = 6.04$, $p < .001$, participant gender, $B = 0.20$, $SE = 0.03$, $t = 6.70$, $p < .001$, and an interaction between age and target race, $B = 0.09$, $SE = 0.04$, $t = 2.45$, $p = .015$. With age, children became more likely to associate brilliance with men in their judgments about White people ($B = 0.07$, $SE = 0.03$, $t = 2.51$, $p = .013$), but not in their judgements about Asian people ($B = -0.02$, $SE = 0.03$, $t = -0.95$, $p = .344$; see Figure 3). Across age, the estimated proportion of choosing White men as being brilliant was 0.58, 95% CI = [0.49, 0.67], whereas the estimated proportion of Asian men selections was 0.40, 95% CI = [0.31, 0.49], lower than chance.

Second, we performed two sets of random-effects meta-analyses using the *metamean* function to obtain a more reliable estimate of the tendency to associate brilliance with White men vs. Asian men among children of each age group. We first meta-analyzed the average proportion of White male selections from Studies 1 and 2. The estimates of each age group were as follows: $M_{+5\text{-year-old}} = 0.51$, 95% CI = [0.44, 0.58], $M_{+6\text{-year-old}} = 0.59$, 95% CI = [0.51, 0.67], and $M_{+7\text{-year-old}} = 0.64$, 95% CI = [0.57, 0.72]. It is noteworthy that the estimates of 6- and 7-year-olds, but not 5-year-olds, were above chance. Next, we meta-analyzed the average proportion of Asian male selections from Studies 3 and 4. The estimates of all three age groups were below chance: $M_{+5\text{-year-old}} = 0.42$, 95% CI = [0.34, 0.49], $M_{+6\text{-year-old}} = 0.40$, 95% CI = [0.32, 0.47], and $M_{+7\text{-year-old}} = 0.39$, 95% CI = [0.31, 0.47]. These results provide further support for the conclusion that children's gender brilliance stereotype is racialized. With age, children tend to associate brilliance with White men, but not with Asian men.

General Discussion

Across four studies, we found that children's gender stereotypes about brilliance are sensitive to target race and generalize across cultures. When making judgements about White people's intellectual talents, six- and seven-year-old Chinese girls were less likely than Chinese boys to associate brilliance with their own gender (Studies 1 and 2), which replicates in samples collected from a range of regions in China and is in accordance with past research involving U.S. children (Bian et al., 2017; Jaxon, Lei et al., 2019). In fact, Chinese children at this age tended to choose White men rather than White women as "really, really smart." When making judgement about Asians' intellectual talents, however, five- to seven-year-old girls from both China and the U.S. were more likely than boys to attribute brilliance to their own gender (Studies 3 and 4). Indeed, Chinese and American children tended to select Asian women as opposed to Asian men as brilliant. These findings contribute to a complete picture depicting children's gendered notions about brilliance.

Importantly, our studies are the first to document the early acquisition of the gender stereotype about brilliance in a non-Western culture. Preexisting work examining this question has focused exclusively on American children (Bian et al., 2017, 2018; Jaxon, Lei et al., 2019), posing challenges to draw conclusions beyond the Western contexts. We conducted closely-matched comparisons between Chinese and American children's endorsement of gender stereotype about brilliance and found similar developmental patterns. This cross-culture consistency provides evidence suggesting gender stereotypes about brilliance are likely consensual. However, we acknowledge that this is the first step examining the generalizability of the gender brilliance stereotype cross-culturally, and future

research can support this conclusion by exploring a broader range of cultural contexts and involving more diverse samples.

The present research also extends the current literature on the development of intersectionality to children living in racially homogenous environments. Past research revealing children's capability of considering gender and race in representing social categories has centered on children from multi-racial cultures (e.g., Lei et al., 2020; Perszyk et al., 2019). Unlike these children, our participants are raised in a racially homogenous country in which they have few opportunities to interact with racial outgroup members directly; nevertheless, the distinct differences between Chinese children's gender brilliance inferences about Asians vs. Whites suggests that they also hinge on race in their endorsement of gender stereotypes. These findings accord with past research showing that racially homogenous cultural contexts may highlight, rather than undermine, the social significance of race as a meaningful way of categorizing people (e.g., Kinzler & Dautel, 2012; Mandalaywala et al., 2019; Pauker et al., 2016; Rhodes & Gelman, 2009). For instance, compared to children in racially diverse contexts, children raised in homogenous contexts were more likely to essentialize race such that they perceive members of different racial groups as sharing distinct essence that makes them fundamentally different from each other (Pauker et al., 2016). Another study took a step further and found that increased exposure to racial outgroup members was associated with lower tendency to essentialize race, and this relation held for both White and Black children (Mandalaywala et al., 2019). Based on this evidence, it is not surprising that children living in racially homogenous cultural environments also consider race in constructing stereotypical beliefs about gender.

Together, our findings, in line with past research (e.g., Bian et al., 2017), demonstrate that children attribute brilliance to White men (vs. White women), but they endorse a reversed gender stereotype about Asians' brilliance. This pattern, combined with children's tendency to ascribe superior intelligence to Black women as opposed to Black men (Jaxon, Lei et al., 2019), presents a compelling illustration of the so-called "switch intersectionality" (Bright et al., 2016). The "switch intersectionality" claim suggests that the experiences of being stereotyped and discriminated are activated only for individuals who occupy intersections of identities. In the current context of the stereotypes about brilliance, White women are more likely to face stereotypes against their intellectual talents than individuals sharing only gender (e.g., Asian women, Black women) or race identities (e.g., White men). In a similar vein, Purdie-Vaughns and Eibach (2008) suggest that groups with a single subordinated identity (e.g., White women, men of color) are often the focus of discrimination relative to advantaged groups (e.g., White men). However, targets that are subordinated along two dimensions (e.g., women of color) should be less susceptible to those biases.

What social mechanism explains this variability? The data presented here do not speak to these questions directly, but they suggest a potential role of social hierarchy in shaping children's social prototypes as well as their stereotypic beliefs. Specifically, it is possible that whether men and women of a racial category are seen as representative of their respective gender category depends on the racial category's social status (Cole, 2009; Lei & Rhodes, 2021; Roberts & Rizzo, 2021). Supporting this, White men and women, members of the high-status racial group, are seen as more prototypical of their respective gender category than men and women of color in the U.S. (Johnson et al., 2012; Lei et al., 2020). Because

men and women belonging to high-status racial groups are perceived as the prototypical members, they are often direct targets of gender stereotypes (e.g., Purdie-Vaughns & Eibach, 2008). Vice versa, common gender stereotypes may not apply to men and women of relatively low-status racial groups. Since Asians are believed to possess relatively lower status than White people in both the U.S. (Gaither et al., 2014) and China (Chen et al., 2018; Qian et al., 2016, 2019; Stohry et al., 2021), Asian men may be rendered as less representative of men relative to White men. As a result, gender stereotypes of prototypical men may not extend to Asian men. Indeed, Lei et al. (2020) found that American children in early childhood were already aware of racial categories' prototypicality and were less likely to ascribe masculine traits to Asian men relative to White men. However, we did not directly test the relation between children's perception of group status and their social prototypes. Future work should assess children's perceived social status of racial categories and examine whether this correlates with the manifestation of children's gender stereotypes across race.

One limitation of the present studies is that they relied on forced-choice measures in which children had to choose a man or a woman as being "really, really smart." This forced-choice format makes it somewhat difficult to determine the direction of the gender stereotype about brilliance. Do children associate brilliance with men, or do they perceive women as not brilliant, or both? Although past research with adults and older children using a range of measures has provided evidence in favor of the first possibility (e.g., Bian, Leslie, & Cimpian, 2018; Furnham, Reeves, & Budhani, 2002; Storage et al., 2020), future research in which children are allowed to evaluate the intelligence of individual men and women and to

provide egalitarian responses would provide more definitive evidence regarding the direction of the gender brilliance stereotype.

Our findings open a number of promising directions for future research. First, one interesting aspect of the gender stereotype investigated here concerns how intellectual abilities are conceptualized. Across our studies, we adopted the notion of intelligence commonly accepted by lay people (e.g., Being smart means that someone can answer difficult questions very quickly), and we asked children six screener questions to ensure they endorsed this conception. However, there might be variability in how children from different cultural backgrounds conceive intelligence. For example, compared to Western beliefs about intelligence, Chinese people tend to attribute intelligence to more contextualized and external factors as opposed to fixed and inherent traits (e.g., Markus & Kitayama, 1991). Additionally, Chinese culture places a strong emphasis on effort and self-improvement (Cheng & Hau, 2003), and thus it is possible that making effort is seen as a crucial facet of being intelligent (Yang & Sternberg, 1997). How these conceptions moderate children's gender brilliance stereotype requires future investigation.

Second, although children consider multiple social identities in forming their assumptions of intellectual talents, it remains unknown how they rank these dimensions. Consider the situation in which children encounter a White man and an Asian woman. Who they perceive as intellectually talented depends on their ranking of the multiple identities. If race prevails in children's judgments, they would choose the Asian woman as brilliant; if gender trumps race, they would choose the White man instead.

Third, it would be worthwhile to explore the development of racial stereotypes about intellectual capacities. In the U.S. culture, Asians are stereotypically assumed to excel in intellectual tasks (e.g., Ambady et al., 2001; Eagly & Kite, 1987; Fiske et al., 2002; Ghavami & Peplau, 2013; Shih et al., 1999), and children as young as age six begin to internalize these ideas (Baharloo et al., 2021). Just as children hinge on race in constructing their gender stereotypes, their racial stereotypes may have a gender component. Because Asian men are rendered as less representative of their racial group relative to Asian women (e.g., Galinsky et al., 2013; Schug. et al., 2015), we expect stereotypes about prototypical Asians (e.g., Asians are intellectually competent; Ghavami & Peplau, 2013) to apply more strongly to Asian women than Asian men, consistent with our present findings.

Future research should take a broader perspective to explore the mechanisms contributing to the global gender disparity in academic fields and prestigious careers. As reviewed earlier, Chinese women are consistently underrepresented in certain sectors of the academic world such as science and engineering. For example, Chinese females occupy 5% of the scientist positions in the Chinese Academy of Sciences and the Chinese Academy of Engineering (Zhao & Li, 2008). Although our present studies demonstrate that children do not hold stereotypes against Asian women's intelligence, many other obstacles, such as traditional gender roles constraining women's career pursuits (e.g., Croll, 2000; Hannum et al., 2009; Liu, 2014), biases downgrading women's productivity and quality of work (e.g., Bornmann et al., 2007), and masculine disciplinary culture unwelcoming to women's involvement (e.g., Di et al., 2016; Ma et al., 2018), can contribute to the pervasive gender disparity. Identifying barriers to women's development from a global perspective will

provide a foundation for us to devise interventions to reduce female underrepresentation ultimately.

In conclusion, the present research takes a cross-cultural and intersectional approach to understand the development of the gender stereotype about brilliance. By age six, similar to American counterparts, Chinese children begin to attribute brilliance to White men than to White women. In contrast, Chinese and American children between the ages of five and seven attribute brilliance to Asian women than to Asian men. The two different patterns highlight the importance of considering joint social identities in stereotype research. This work also sheds light on the root causes of the pervasive gender inequality and allows us to tailor interventions for different cultures to combat the problems precisely and effectively.

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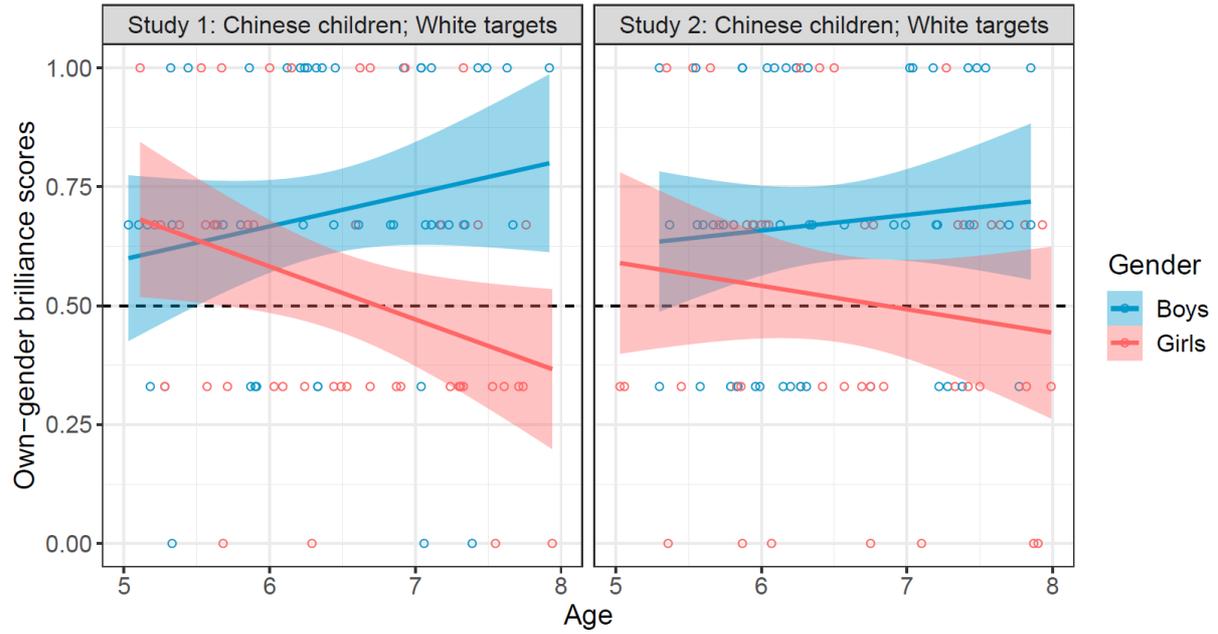


Figure 1. The association between age and own-gender brilliance scores by participant gender in Studies 1 (left) and 2 (right). The lines show the predicted values from a linear regression model predicting children’s own-gender brilliance scores from age; the dashed line represents chance; the circles represent the data of individual participants; the shaded areas represent 95% CI.

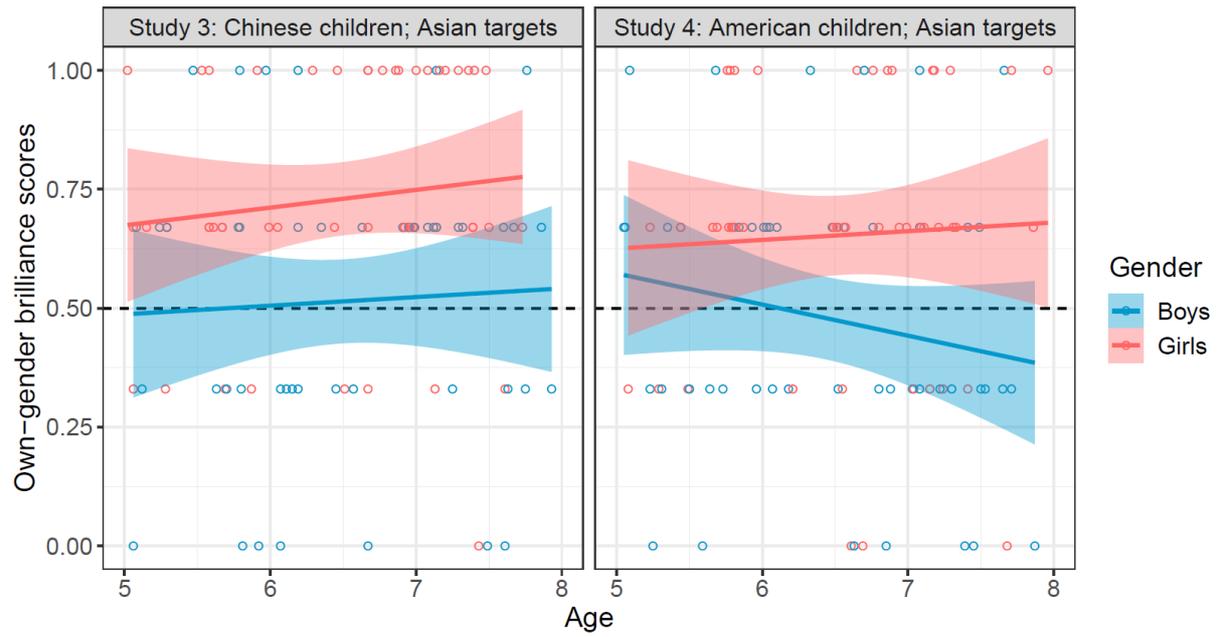


Figure 2. The association between age and own-gender brilliance scores by participant gender in Studies 3 (left) and 4 (right). The lines show the predicted values from a linear regression model predicting children’s own-gender brilliance scores from age; the dashed line represents chance; the circles represent the data of individual participants; the shaded areas represent 95% CI.

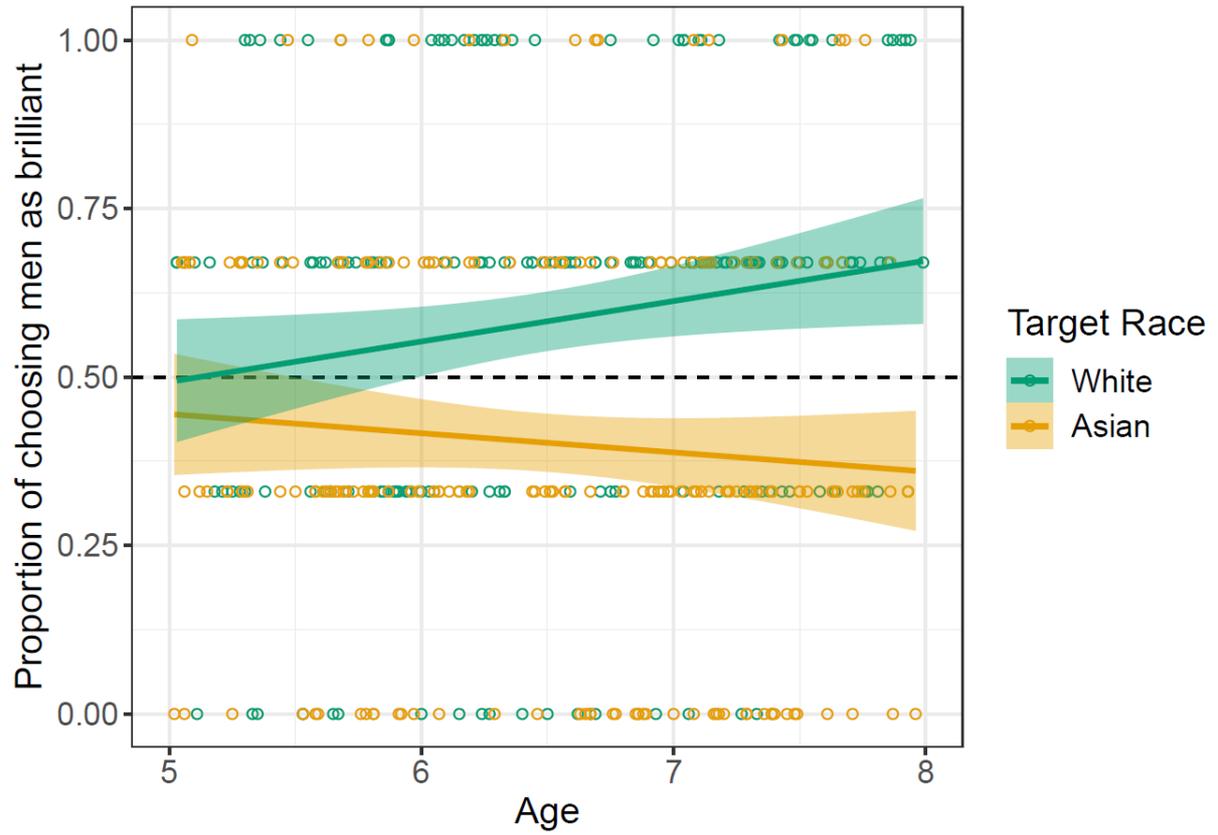


Figure 3. The overall association between age and children’s proportion of choosing men as brilliant by target race across Studies 1-4. The lines show the predicted values from a mixed-effects model predicting children’s proportion of choosing men; the dashed line represents chance; the circles represent the data of individual participants; the shaded areas represent 95% CI.