

The Development of Gender Stereotypes About Brilliance in Chinese Young Children

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by

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ABSTRACT

The common stereotype associating brilliance with men seems to be internalized by American children as young as age 6, and this belief sets a barrier to women's engagement in many prestigious careers from early on. To date, however, research on this stereotype has not considered (1) its developmental trajectory in non-Western cultures, and (2) its intersection with the stereotype targets' race. To address these questions, we assessed 5- to 7-year-old Chinese children's gender stereotypes about White people's (Study 1, $N = 93$) and Asian people's intellectual abilities (Study 2, $N = 101$). The results suggested that Chinese children start to associate brilliance with White men (vs. women), but not Asian men (vs. women) at the age of 6. In fact, 5- to 7-year-old Chinese children perceive Asian men as less intellectually capable than Asian women. The present research adds to our knowledge of children's acquisition of stereotypes about brilliance in non-Western cultural contexts and highlights the importance of adopting an intersectional framework to understand the generalizability of these stereotypes.

BIOGRAPHICAL SKETCH

Yuhang Shu was born and raised in China. Before she went to Cornell, in 2019, she received a Bachelor of Science degree in Psychology at Beijing Normal University. With the interest of exploring young children's social cognitive development, she attended Cornell University to pursue her M.A. in Human Development. She appreciates this program to give her opportunities for scientific research and is looking forward to more explorations in children's social cognition in the future.

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CHAPTER 1

Introduction

Common stereotypes associate high intellectual talents with men more than with women (e.g. Furnham, Reeves, & Budhani 2002; Storage, Horne, Cimpian, & Leslie 2016; Zajenkowski, 2020). These gender stereotypes shape women's career aspirations, steering them away from the fields perceived as requiring "a spark of genius" (e.g., physics, mathematics, philosophy; Bian, Leslie, Murphy, & Cimpian, 2018; Leslie, Cimpian, Meyer, & Freeland 2015; Meyer, Cimpian, & Leslie, 2015; Storage et al., 2016). Although women's underrepresentation in a range of careers prizing brilliance manifests in full form during adulthood, the roots of this gender disparity are present much earlier in development. Bian and colleagues have found that children in early elementary school years are susceptible to the "brilliance = men" stereotypes (Bian, Leslie, & Cimpian, 2017, 2018). Specifically, although both boys and girls at age 5 tended to attribute brilliance to their own gender, in accordance with an ingroup favoritism (e.g., Halim, Ruble, Tamis-LeMonda, Shrout, & Amodio, 2017; Powlishta, 1995; Shutts, Roben, & Spelke, 2013), 6- to 7-year-old girls were less likely to make this association than boys. Moreover, children display these biases against girls' competence by selecting fewer girls as teammates for an unfamiliar game when it was said to be for "really, really smart" children than when it was not (Bian et al., 2018). These "brilliance = men" stereotypes begin to shape girls' interests as soon as they are acquired. For example, girls who endorse these gender stereotypes showed lower interests towards the games said for "really, really smart" children than boys (Bian et al., 2017).

The evidence so far points to the early emergence of the gender stereotypes associating brilliance with men in the United States. However, these research findings rely on

samples recruited from WEIRD (Western, Educated, Industrialized, Rich, and Democratic) cultures (e.g., O’Sullivan, C., Scholderer, J., & Cowan, 2005). The lack of comparative studies is problematic because it sets the WEIRD cultures as the standard and overlooks the differences that exist across distinct cultures. In particular, the cultural messages about the presumed cognitive profiles of males and females are likely to manifest in different degrees in other cultural contexts. In the present research, we investigate whether the gender stereotypes about brilliance extend beyond the American culture. To begin to explore possible cultural differences, we conducted two studies with Chinese children between the ages of 5 and 7 to document (1) the development of gender stereotypes about brilliance in China, and (2) the role of targets’ race in moderating children’s gender stereotypes about brilliance.

Our focus on Chinese children was motivated by the fact that China embraces a culture of gender equality that shares both similarities and differences with the American culture. On the one hand, Chinese women are consistently underrepresented in certain sectors of the academic world such as science and engineering, which presents a coherent picture as that of the United States. 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). This gender disparity is likely to be caused by the same barrier blocking American women’s pursuits, that is, the gender stereotypes associating brilliance with men rather than with women. According to a recent survey including 1600 employees at various academic institutions (Wang, 2015), women are generally viewed as “weak in research ability, thinking and vision” and “lack ambition and passion”, despite the fact that Chinese female scientists publish as many academic papers as their male counterparts (Tao, Hong, & Ma, 2017). On

the other hand, the gender segregation in education and the workforce is less severe in China than many developed countries (Charles & Bradley, 2009; Sikora & Pokropek, 2012; Charles, 2017). Women made up about 50% of the labor force in China, surpassing many large developed and emerging economies including the United States (Li & Li, 2008). Moreover, Chinese parents in urban areas hold relatively similar educational expectations for sons and daughters, which closes the gap in boys' and girls' math performance (Tsui & Rich, 2002) and inoculates children from internalizing the stereotypes of specific intellectual abilities favoring boys (Tsui, Xu, Venator & Wang, 2016). Likewise, it is possible that Chinese children's endorsement of the "brilliance = men" stereotypes is not as strong as that of children in the WIRED cultures.

The contradictory cultural messages existed in China give rise to three possibilities. A first possibility was that 5- to 7-year-old Chinese children may share the developmental trajectory of American children's acquisition of the gender stereotypes about brilliance. In this case, compared to Chinese boys, Chinese girls would become less likely to choose their own gender as "really, really smart" with age. A second possibility was that Chinese children may not endorse gender stereotypes about brilliance at a young age. In this case, Chinese boys and girls would choose their own gender as "really, really smart", displaying a bias favoring their own gender group (e.g., Halim et al., 2017). Finally, a third possibility was that Chinese children's gender stereotypes about brilliance are moderated by the stereotype targets' race. In this case, the extent to which Chinese children attribute brilliance to men would depend on the race of the targets.

Which of the three preceding possibilities best described the development of Chinese children's beliefs about high intelligence? Prior research provides evidence suggesting that gender stereotypes are intersected with other social dimensions such as race (e.g. Eaton, Saunders, Jacobson, & West, 2020; Perszyk, Lei, Bodenhausen, Richeson, & Waxman, 2019; Ridgeway & Kricheli-Katz, 2013). In one adult experiment (Eaton et al., 2020), professors of physics in the U.S. were asked to evaluate the competence and hirability of a postdoctoral candidate whose name indicated its gender (male or female) and race (White, Black, Asian or Latinx). An interaction between candidate gender and race emerged in faculty's ratings, such that Black women and Latinx women and men candidates were rated the lowest in hirability compared to all others, in spite of their identical qualifications. More relatedly, Jaxon et al. (2019) examined the intersection between gender and race in American children's beliefs about brilliance. Five- to 6-year-old American children were presented with pairs of people and asked to choose one person in each pair as being "really, really smart." When shown pairs of White targets, consistent with Bian et al. (2017), boys and girls at age 5 were equally likely to attribute brilliance to their own gender, whereas 6-year-old girls were less likely than boys to favor their own gender group about brilliance. However, a different pattern was revealed when children made judgments about Black people's intelligence: at both ages, children generally associate brilliance with Black females more than with Black males.

The preceding results suggest that by age 6, American children adopt an intersectional framework in constructing their beliefs about social categories. In particular, they do not extend the gender stereotypes associating high intelligence with men to people of all racial backgrounds; instead, they perceived black women as more intellectually talented than black

men. What remains unknown is whether Chinese young children are sensitive to this nuanced pattern of intersectional bias about gender and race. To shed light on this question, we explored Chinese young gender stereotypes about brilliance towards White targets (Study 1) and Asian targets (Study 2).

We chose to compare children's assumptions of these two social groups for two reasons. First, most empirical research on intersectionality has focused on the stereotypes of Whites and Blacks (e.g., Donovan, 2011; Goff, Thomas, & Jackson, 2008; Jaxon et al., 2019) without extending the insights from this literature to other ethnic groups. Our studies fill this gap by assessing and comparing the acquisition of stereotypes associated with Asians and Whites. Second, this comparison provides insights on the sources contributing to children's gender stereotypes given the distinct venues of exposure they have with White people vs. Asian people. By the year of 2016, the proportion of immigrants in China accounts for 0.1% of the population, and all types of international students accounts for 0.46% (Wang, Miao, & Yang, 2018), suggesting people live in China have few chances to interact with people from other racial groups in real life. Therefore, Chinese children may construct their beliefs about Americans from indirect sources such as TV shows, news, and internet (Tan, Zhang, Zhang, & Dalisay, 2009). Asian individuals, in contrast, constitute the majority group numerically in China. Therefore, Chinese children have acquired extensive experiences of interacting with Asian people, which allows them to construct their stereotypes based on observations of Asian's actual behaviors. Consequently, Chinese children are likely to use different sources of information to form different assumptions about men's and women's brilliance across the two ethnic groups.

In the present research, we report two studies investigating 5- to 7-year-old Chinese children's gender stereotypes about White people's (Study 1) and Asian people's intellectual abilities (Study 2). Assessing Chinese children's gender stereotypes about White men and women also served as a direct test of the validity of the stereotype measures adopted from Bian et al. (2017) to children from other cultural contexts. Together, these studies suggested that Chinese children adopt an intersectional framework to construct their stereotypes about high intelligence.

CHAPTER 2

Study 1

In Study 1, we investigated Chinese children's stereotypes about the intellectual abilities of White men and White women. In addition, to explore the potential sources of these stereotypes, we assessed Chinese children's assumptions of White children's school achievements and the relationship between these assumptions and their stereotypes about brilliance.

Method

Participants.

We recruited 93 children between 5 and 7 years old ($M_{\text{age}} = 6.52$ years, $SD = 0.82$; 47 girls, 46 boys) from Beijing, China. Sixteen additional children were tested but were excluded from the final sample because 15 of them did not pass the screener questions (see below) and 1 child refused to finish the study. The demographic information was available for 94.6% of the sample. 88.6% of the subset identified as Han, 3.4% as Hui, 2.3% as Man, and 5.7% as another ethnicity. The medium household income was 250,000 RMB. Eighty-four percent of the parents in the sample had at least a Bachelor's degree.

Materials and Procedure.

Written informed consent was obtained from each child's parents prior to the test session. Children were tested individually in a quiet room in the lab or at local libraries. Across the two studies, the experimenter videotaped the sessions and recorded the children's responses on an answer form.

The procedure and materials were adapted from Bian et al. (2017), consisting of two main phases: the first phase presented 12 screener questions to children to gauge their

understanding of two main concepts “smart” and “nice” used in our study, and the second phase involved two stereotype tasks to measure children’s gendered beliefs about brilliance and kindness.

Screening questions. We started with a set of 12 screening questions to examine whether children were able to understand the meaning of “smart” (6 questions) and “nice” (6 questions). “Nice” was included as a control characteristic, because it is familiar to children of this age and it is not strongly associated with men more than women (e.g., Fiske, Cuddy, Glick, & Xu., 2002). The “smart” and “nice” questions were presented to children as 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 (hidden from the participant), 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 gave the wrong answers. Since participants were not shown the pictures of the unfamiliar children, their responses to the stereotype tasks would not be interfered by their answers to the screening questions. According to Bian et al. (2017), we used the exclusion criterion of 4/6 correct for each trait. Therefore, 15 children were tested but excluded from the final data analysis because they did not reach the threshold.

Stereotype tasks. After the screening questions, children received two stereotype tasks in counterbalanced order, assessing their association between brilliance and their own gender. In Task (i), children were told about two stories. 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. At the end of each story, children were presented with pictures of four adults (2 males and 2 females, randomly interspersed) and were asked to pick the protagonist in the story among the four pictures. The order of the two stories was counterbalanced. In Task (ii), children were presented with six pictures one by one. Each picture depicted two adults. The first two pictures presented two individuals of the same gender as the participant, serving as practice trials. The following four pictures showed a man and a woman. In each trial, children were asked to guess which one of the two people was “*really really smart*” (3 trials) or “*really really nice*” (3 trials). The order of the pictures was counterbalanced. In each trial of the two tasks (except for the practice trials in Task (ii)), if children selected a person of the same gender as themselves, they received a score of 1 for that trial, and 0 otherwise. Following Bian et al. (2017), the main dependent variable is the proportion of trials for which a child chose their own gender as “really, really smart” or “really, really nice.”

Perception of school achievements. Four questions were designed to measure children’s perceptions about school achievements. In each of the first two questions (Question (i): *Who do you think gets the best grades in school?*; Question (ii): *Who do you think is first in their class?*), children were presented with four pictures of unfamiliar children (2 boys and 2 girls) and were asked to select one picture to answer the respective question. Next, participants were asked the same two questions again, but they were asked to make forced-choice between 2 verbally-presented options “boys or girls”. Responses across these four questions were coded as in the stereotype tasks and averaged.

At the end of the sessions, children were debriefed and thanked for their participation with a small gift.

Analytic strategy.

The data for this study, as well as all other studies reported here, are available on Open Science Framework: https://osf.io/d2cx6/?view_only=0fffbc8d611542b6a58b9ce104f6ef1c. In all three studies, we performed mixed-effects models using the *lmerTest* package in R (Kuznetsova, Brockhoff & Christensen, 2017). Unless otherwise noted, these mixed-effects models included random intercepts for subjects.

Results and discussion

The primary goal of this study was to explore the development of Chinese children's assumptions of high intellectual abilities of White men and women. The secondary goal was to examine the role of children's beliefs about school achievements in forming their gendered beliefs about brilliance.

Gender stereotypes. As a first look at children's gender stereotypes, we submitted children's stereotype scores (combined across the 2 tasks) to a multilevel mixed-effects linear model with trait (smart vs. nice; level-1 predictor), gender (boys vs. girls; level-2 predictor), and age (5- vs. 6- and 7-year-olds; level-2 predictor), plus all possible interaction terms, as categorical fixed effects and a random intercept for participants. In prior work (Bian et al., 2017; Jaxon et al., 2019), American boys and girls at the age of 5 associated brilliance with their own gender, but 6- to 7-year-old girls were less likely than boys to choose their own gender as really smart. If Chinese children develop similar gender stereotypes about White

people's brilliance as their American counterparts, we should find a similar three-way interaction among trait, gender, and age. Consistent with this possibility, the three-way interaction among age, gender and trait was marginally significant, Wald $\chi^2 = 4.87$, $p = .086$. Although this interaction did not reach conventional significance levels, it suggests that Chinese boys and girls developed different ideas about who is "really really smart" vs. "really, really nice" with age.

In our main analyses, we followed Bian et al. (2017) by performing the same model in which the 6- and 7-year-old children were combined into one age group. The interaction among trait, gender and age (5- vs. 6- and 7-year-old) was significant, Wald $\chi^2 = 4.44$, $p = .035$. Next, we explored the two-way interaction between participant gender and age for each trait separately. With respect to "really, really smart", the analyses revealed a significant interaction between gender and age, $F(1,89) = 5.80$, $p = .018$. Replicating the results of Bian et al. (2017), at age 5, Chinese boys ($M = 0.62$, $SD = 0.29$) and girls ($M = 0.67$, $SD = 0.20$) were equally likely to associate brilliance with their own gender group, $t(89) = 0.43$, $p = .97$; In contrast, Chinese girls aged 6 and 7 ($M = 0.50$, $SD = 0.32$) were significantly less likely than boys ($M = 0.77$, $SD = 0.26$) to associate brilliance with their own gender group, $t(89) = -3.87$, $p = .001$ (Fig. 1A, Table 1). Therefore, Chinese children's gender stereotypes about Caucasians' brilliance also emerged at the age of 6. To further understand if boys and girls demonstrated preferences for one gender over the other, we compared boys' and girls' proportion of choosing their own gender against the chance level, 50%. At the age of 5, girls' proportion of choosing their own gender as brilliant was significantly higher than the chance level, $t(11) = 2.87$, $p = .015$ (for boys, $t(13) = 1.55$, p

= .15), suggesting 5-year-old Chinese girls perceived White women as smarter than White men. However, girls aged 6 and 7 were equally likely to choose White men and women as “really, really smart”, $t(34) = 0.09, p = .93$, whereas 6- to 7-year-old boys chose White men as “really, really smart”, $t(31) = 5.9, p < .001$.

With respect to “really, really nice”, the two-way interaction between gender and age was not significant, $F(1, 89) = 0.31, p = 0.58$. Meanwhile, neither the main effect of age ($F(1, 89) = 0.05, p = .82$) or that of gender reached significance ($F(1, 89) = 0.03, p = .86$), suggesting that boys and girls in this age window were equally like to associate niceness with their own gender group (Fig 1B, Table 1).

Perceptions of school achievements. To explore children’s perceptions of school achievements, we submitted children’s achievement perception scores (combined across the four questions) to a multilevel mixed-effects linear model with gender (boys vs. girls; level-2 predictor), age (5- vs. 6- vs. 7-year-olds; level-2 predictor), and their interaction as categorical fixed effects and a random intercept for participants. The analyses revealed a significant main effect of gender, $F(1, 89) = 27.22, p < .001$. Compared to Chinese boys ($M_{boys} = 0.40$), Chinese girls ($M_{girls} = 0.72$) were more likely to choose their own gender as high school achievers, $t(89) = 4.33, p < .001$ (Fig. 2A, Table 2). Next, we compared the proportion of choosing their own gender group as high school achievers with the chance level. In this age range, girls’ proportion of choosing other girls as high school achievers was significantly higher than the chance level, $t(46) = 5.10, p < .001$. In contrast, boys’ proportion of choosing other boys as high school achievers was significantly lower than the chance

level, $t(45) = -2.33, p = .02$, indicating that 5- to 7-year-old Chinese boys and girls consistently regarded girls as high school achievers.

To examine the relationship between children's gender stereotypes about brilliance and their perceptions of school achievements, we conducted a Pearson correlation. There was no significant relation between children's stereotype scores and their achievement perception scores, $r = -0.12, p = 0.27$, suggesting that Chinese children's ideas of White people's brilliance were unrelated to their beliefs of who performs well in school.

Conclusion.

These findings suggest that, at the age of 6, Chinese children associated brilliance with Caucasian men more than with Caucasian women, which parallels American children's acquisition of the gender stereotypes associating brilliance with White men. In Study 2, we explored the role of stereotype target race in Chinese children's stereotype endorsement. In particular, do Chinese children hold a different set of gendered beliefs in evaluating Asians' brilliance?

CHAPTER 3

Study 2

In the current study, we began to explore the role of the stereotype targets' race in moderating Chinese children's gender stereotypes about brilliance. Specifically, we presented children with Asian targets and measured the extent to which they attribute brilliance to their own gender.

Method

Participants. We recruited 101 children between 5 and 7 years old ($M_{\text{age}} = 6.53$ years, $SD = 0.85$; 50 girls, 51 boys) from Beijing, China. Fifteen 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 98.0% of the sample. 87.9% of the subset identified as Han, 4.0% as Man, 3.0% as Mongol, and 5.1% identified as another ethnicity. The median household income was 175,000 RMB. Seventy-seven percent of the parents in the sample had at least a Bachelor's degree.

Materials and Procedure. The measures and procedure of Study 2 was essentially identical to that of Study 1 except that we used pictures of Asian individuals from the Chicago Face Database (Ma, Correll, & Wittenbrink, 2015), in which the pictures were normed for their attractiveness, emotion and age.

Results and discussion

Gender Stereotypes. As in Study 1, we first submitted children's stereotype scores (combined across the 2 tasks) to a multilevel mixed-effects linear model with trait (smart vs. nice; level-1 predictor), gender (boys vs. girls; level-2 predictor), and age (5- vs. 6- vs. 7-year-olds; level-2 predictor), plus all possible interaction terms, as categorical fixed effects

and a random intercept for participants. Distinct from Study 1, the three-way interaction among trait, gender and age did not reach significance, Wald $\chi^2 = 2.06, p = .36$.

Following Study 1, we performed the same model by combining 6- and 7-year-olds in our main analysis. Again, the three-way interaction among trait, gender and age was not significant, Wald $\chi^2 = 0.001, p = .97$. The model yielded a main effect of participant gender, Wald $\chi^2 = 10.05, p = .002$, reflecting that girls at all ages ($M = 0.63, SD = 0.32$) were more likely than boys ($M = 0.48, SD = 0.32$) to choose their own gender group for both “smart” and “nice”, $t(97) = 2.65, p = .009$. Next, we compared boys’ and girls’ proportion of choosing their own gender as brilliant against the chance level. Girls at all ages showed significantly higher proportion of choosing their gender group as being “really, really smart”, $M_{5\text{-year-olds}} = 0.67, SD = 0.26, t(17) = 2.77, p = .013$; $M_{6\text{- and }7\text{-year-olds}} = 0.77, SD = 0.27, t(31) = 5.6, p < .001$. In contrast, boys’ proportion of choosing their own gender as being “really, really smart” did not differ significantly from chance, $M_{5\text{-year-olds}} = 0.52, SD = 0.34, t(15) = 0.24, p = .81$; $M_{6\text{- and }7\text{-year-olds}} = 0.52, SD = 0.28, t(34) = 0.50, p = .62$. Therefore, in contrast to Study 1, Chinese children seemed to attribute brilliance to Asian women more than with Asian men. This evidence suggests that young children’s tendency to attribute brilliance to men (vs. women) is intersectional, in that it applies to White men and women but not to Asian men and women. The model also yielded a main effect of trait, Wald $\chi^2 = 12.18, p < .01$, suggesting that Chinese young children were more likely to attribute smartness than niceness to their own gender group, $t(97) = 2.76, p = .007$.

Gender stereotypes by race. To systematically compare Chinese children’s gender stereotypes of brilliance by the targets’ race, we combined the data across the two studies.

Children's gender stereotype scores of brilliance were submitted to a multilevel mixed-effects linear model with targets' race (White vs. Asian, level-2 predictor), gender (boys vs. girls; level-2 predictor), and age (5- vs. 6- and 7-year-olds; level-2 predictor), plus all possible interaction terms, as categorical fixed effects and a random intercept for participants. We reported only the effects involving targets' race because its moderating effect on children's gendered beliefs was our a priori interest. The model uncovered a significant three-way interaction among targets' race, gender and age, $F(1,186) = 5.44, p = .02$, suggesting the two-way interactions between gender and age were moderated by targets' race. Specifically, the content of Chinese children's stereotypes about brilliance relied on the gender and ethnicity of the target.

Perceptions of school achievements. We investigated whether Chinese children's ideas about Asians' brilliance are rooted in their perception of Asian people's school achievements. Similar to Study 1, we first we submitted children's achievement perception scores (combined across the four questions) to a multilevel mixed-effects linear model with gender (boys vs. girls; level-2 predictor), age (5- vs. 6- vs. 7-year-olds; level-2 predictor), and their interaction as categorical fixed effects and a random intercept for participants. The analyses uncovered a significant main effect of gender, $F(1,95) = 84.74, p < .001$, suggesting that Chinese girls ($M = 0.77, SD = 0.19$) were more likely than boys ($M = 0.36, SD = 0.26$) to attribute excellent school performance to their own gender, $t(95) = 9.23, p < .001$ (Fig. 2B, Table 2). Compared with the chance level of 0.5, girls' proportion of choosing other girls as high school achievers was significantly higher than the chance level, $t(49) = 10.16, p = .01$. In contrast, boys' proportion of choosing other boys as high school achievers was significantly

lower than the chance level, $t(50) = -3.96, p < .001$. These results are consistent with Study 1, indicating that 5- to 7-year-old Chinese boys and girls regarded both Caucasian girls and Asian girls as high school achievers.

Next, we conducted a Pearson correlation to examine the relationship between Chinese children's gender stereotypes about brilliance of Asians and their perceptions of school achievements, which yielded a significant positive relation ($r = 0.37, p < .001$). The more children believed that their own gender perform well in school, the more likely that they attribute brilliance to Asians of their own gender. Therefore, children's ideas about whether Asian men or Asian women are intelligent are rooted in their perceptions of who performs well in school.

Conclusion

Combined with Study 1, these findings provided evidence for the third possibility suggesting that Chinese children's gender stereotypes about brilliance was intersected by race. Although Chinese girls start to assimilate the "brilliance = men" stereotypes when evaluating White people's intelligence around age 6, they attribute brilliance to Asian women.

CHAPTER 4

General Discussion

The present research makes two major contributions to the existing literature. First, our studies are the first to examine the acquisition of gender stereotypes in a non-WIRED culture. Although previous work has found that American children associated brilliance with White men (vs. White women; Bian et al., 2017, 2018), the fact that these studies focused exclusively on American children made it unclear whether children in other cultural contexts internalize this association. Second, our studies highlight the importance of applying an intersectional framework in understanding children's endorsement of stereotypes. We found that Chinese' children's gender stereotypes about brilliance intersected with race. When making judgments about White targets, Chinese children were more likely to associate brilliance with White men than with White women at the age of 6. In contrast, when making judgments about Asian targets, Chinese young children were more likely to associate brilliance with Asian women than with Asian men.

The similar "brilliance = White men" association found in Chinese young children is in accordance with previous studies focusing on the American culture (Bian et al., 2017; Jaxon et al., 2019). This cross-culture homogeneity provides evidence suggesting that associating brilliance with Caucasian men is likely consensual. Future research can support this conclusion by exploring other cultural contexts or involving more diverse and representative samples. The reversed patterns of gender stereotypes about Asian people's brilliance demonstrate how race intersects with this gender stereotype (Jaxon et al., 2019). Consistent with the intersection literature (e.g. Ghavami & Peplau, 2013; Perszyk et al., 2019) showing that adults and children are able to use multiple social identities such as

gender and race to guide their inferences, we found that the “brilliance = male” association do not extend to men and women from all racial groups. Therefore, we should be cautious enough when we generalize gender stereotypes to other racial groups.

To begin to explore the possible sources of the intersection between gender and race, we investigated whether the targets’ race moderated the relation between Chinese young children’s perceptions of school achievements and their stereotypes about brilliance. Our findings suggest that Chinese young children used school achievements as an indicator of Asian people’s brilliance. The more they perceive Asians of their own gender as achieving top school performance, the more likely they attribute brilliance to Asians of their own gender. On the contrary, this relationship was insignificant in Children’s judgments about White targets, suggesting that they did not make inferences about White targets’ brilliance based on their school performance. Why do Chinese children treat school achievements as an indicator of Asian people’s brilliance, but not of Caucasian people’s brilliance? Our data do not speak to this question directly, thus we make several speculations. It is possible that children’s *familiarity* with social categories dictates their use of direct vs. indirect information to make stereotypical inferences. Since Asian people represent the majority in the Chinese culture, children’s stereotypes about Asians may be a result of their direct observations of their behaviors that in principle is relevant to their brilliance, such as their school grades. However, due to their relative unfamiliarity with the Caucasian group, children’s stereotypes about intellectual talents may be shaped by indirect sources such as the mass media (e.g., Gálvez et al., 2019). Consistent with this possibility, the “brilliance = male” stereotype has been depicted in a large number of western films’ transcripts for around 50

years, and also presented in the movies targeted for young children (Gálvez et al., 2019).

Another possibility is that children's *conceptions of brilliance* may vary depending on the context. Contexts populated with Asian faces may automatically trigger children's ideas about being smart in schools (a characteristic strongly associated with Asians; e.g., Ambady et al., 2001; Ghavami & Peplau, 2013), whereas contexts with White people may lead children to define brilliance as being creative. Future research should identify the mechanism underlying the intersection between gender and race in children's stereotypes about brilliance.

To obtain a full picture of children's assumptions about brilliance, three questions remain to be examined in future work. First, it will be critical to expand the age range to examine the stereotypes internalized by children at age 8 and older. Though Chinese girls did not endorse the "brilliance = Asian men" at age 7, it is possible that the accumulated socialization experiences and cultural input may lead children to endorse the association of "brilliance = men" at a later age. In line with this possibility, Chinese girls at middle-school ages showed a lower level of self-assessment in their math ability (Liu, 2018), suggesting that at least in middle school, Chinese girls have endorsed some gender stereotypes about some specific intellectual talents. 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. Documenting the

nuances in children's stereotypes will paint a full picture of the early-developed biases. Third, it would be important to understand the role of exposure to different racial groups in shaping children's gender stereotypes about White vs. Asian people's intelligence.

Future work should also examine the consequences of the early-emerging stereotypes about brilliance. Past research has shown that these gender stereotypes undermine girls' and women's interests in pursuing intelligence-related fields in the American culture, which may eventually narrow their career options (e.g., Bian et al., 2017; Murphy, Steele, & Gross, 2007). Our present studies demonstrate that Chinese children do not associate brilliance with Asian men, therefore it is plausible that Chinese young girls' interests towards intelligence-related fields would be protected, which may shed light on the reasons underlying the relatively milder gender disparity in China. It will be important to examine the factors existing in the Chinese culture or their education systems that buffer girls against these negative stereotypes as well as their consequences. For example, teachers, especially female teachers, exhibit significant environmental influences on children's development (e.g., Gunderson, Ramirez, Levine, Beilock, 2012), but they may be associated with different attributes across cultures. Given teachers' significant role in China's elementary education, it is likely that Chinese children attribute intelligence to teachers. In contrast, elementary school teachers may act more as caring figures in the American education system, which may foster the "brilliance = men" stereotypes. In fact, a study conducted in the U.S. revealed that female teachers' anxieties about math is related to girls' stereotypes about who is good at math (Beilock, Gunderson, Ramirez, & Levine, 2010).

In conclusion, our studies systematically demonstrated that the acquisition of

stereotypes is differentiated based on gender, ethnicity and their intersection. By age 6, Chinese children begin to attribute brilliance to White men, in line with the previous studies conducted in the U.S. (e.g., Bian et al., 2017; Jaxon et al., 2019). In contrast, Chinese children between the ages of 5 and 7 attribute brilliance to Asian women than to Asian men, adding important knowledge about stereotypes of Asian's brilliance. The two different patterns highlight the importance of considering joint social identities in stereotype research. Since the stereotype of brilliance is one of the key factors leading to women's underrepresentation in many prestigious careers, adopting an intersectional framework in developmental research allows us to identify the root causes of the social issues on gender inequality and tailor interventions to combat the problems precisely and effectively.

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Figures

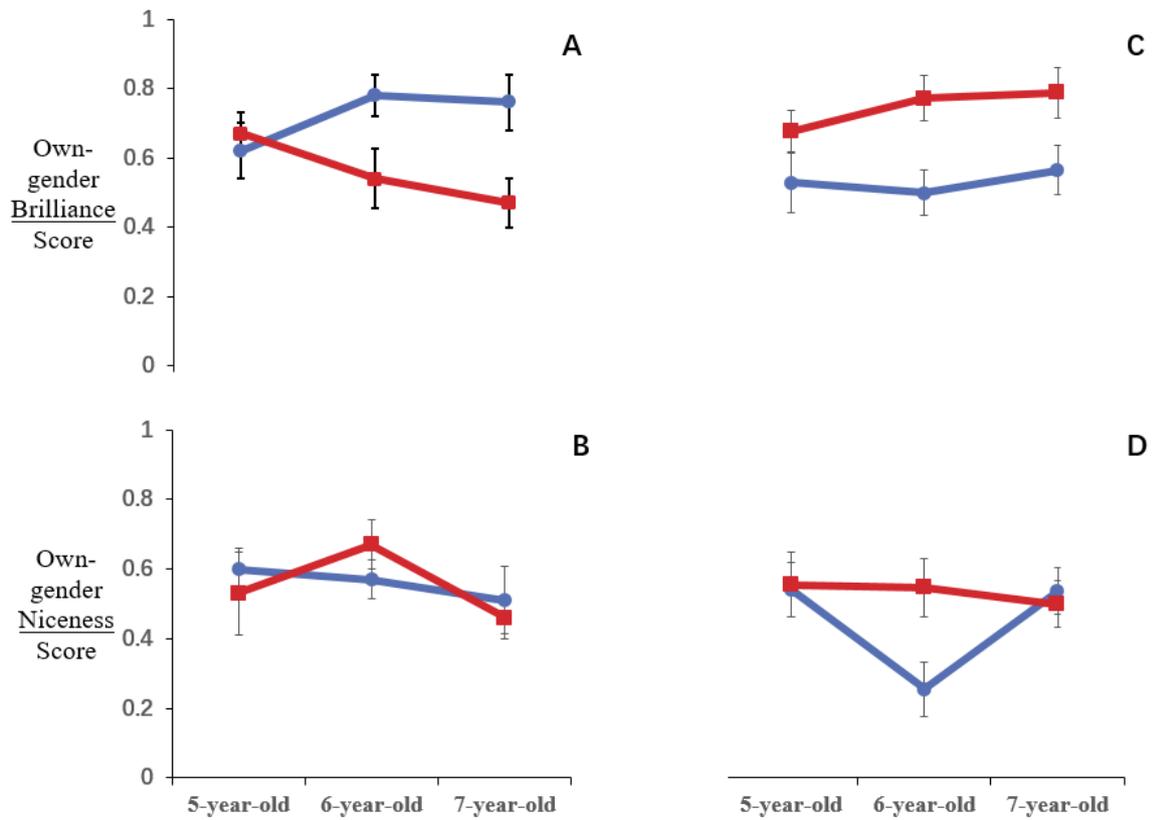


Fig. 1. Results of Studies 1 and 2. Boys' (blue) and girls' (red) stereotype scores in study one (A and B) and study two (C and D), by age group. Error bars represent ± 1 SE.

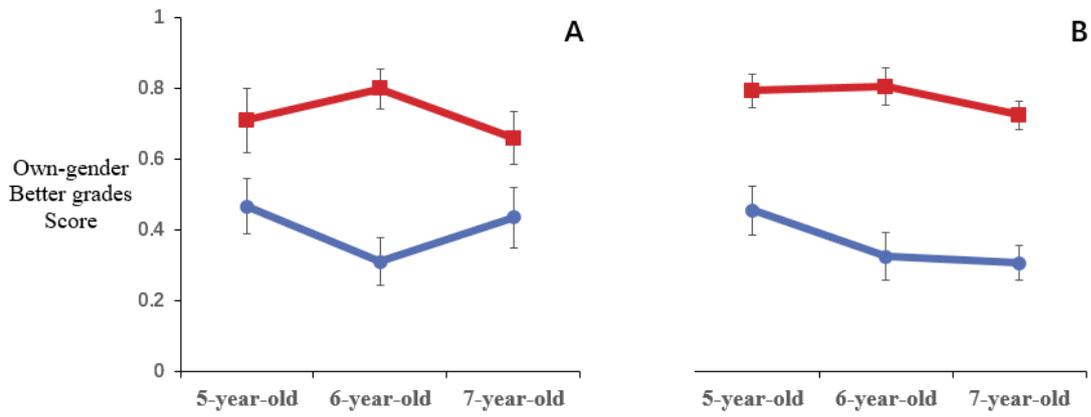


Fig. 2. Results of Study 1 and Study 2. Boys' (blue) and girls' (red) proportion of choosing their own gender as high school achievers in study one (A) and study two (B), by age group. Error bars represent ± 1 SE.

Tables

Table 1. *Boys' and girls' gender stereotypes scores in study one and two (Standard Deviations in parentheses)*

Age	Gender	Caucasian Faces (Study 1)		Asian Faces (Study 2)	
		Smart	Nice	Smart	Nice
5	Boys	0.62(0.29)	0.60(0.23)	0.52(0.34)	0.54(0.32)
	Girls	0.67(0.20)	0.53(0.41)	0.67(0.26)	0.56(0.40)
6	Boys	0.78(0.23)	0.57(0.23)	0.49(0.27)	0.25(0.32)
	Girls	0.54(0.34)	0.67(0.30)	0.76(0.24)	0.55(0.31)
7	Boys	0.76(0.29)	0.51(0.38)	0.56(0.30)	0.54(0.28)
	Girls	0.47(0.30)	0.46(0.25)	0.78(0.30)	0.50(0.29)

Table 2. *Boys' and girls' proportion of choosing their own gender as high school achievers in study one and two (Standard Deviations in parentheses)*

Age	Gender	Caucasian Faces (Study 1)	Asian Faces (Study 2)
5	Boys	0.46(0.29)	0.45(0.28)
	Girls	0.71(0.32)	0.79(0.20)
6	Boys	0.31(0.27)	0.32(0.28)
	Girls	0.80(0.23)	0.80(0.20)
7	Boys	0.43(0.33)	0.31(0.20)
	Girls	0.66(0.33)	0.72(0.17)