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## Sources of ethnicity differences in non-cognitive development in children and adolescents

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In most multi-cultural Anglo-Saxon countries, children of Asian immigrants have higher academic achievement than children of native-born parents. Yet, little is known about their relative non-cognitive performance. This study is the first to compare the non-cognitive skills of children of Asian immigrants and children of native-born Australian parents and seek to understand the evolution of non-cognitive skills. We find large differences in non-cognitive skill development between children of Asian immigrants and children of parents from other ethnicity groups. Furthermore, the nativity gaps in non-cognitive skills vary significantly by informants of non-cognitive skills, types of non-cognitive skills and children's ages. According to teacher ratings, children of Asian immigrants are found to excel in almost all non-cognitive attributes, particularly after school entry ages. By contrast, Asian immigrant parents rated their children lower in some selected non-cognitive attributes and at early ages. Adopting a cumulative value-added regression model and an Oaxaca-Blinder decomposition method, this paper shows differences in initial child non-cognitive abilities, parenting styles and children's time allocations are the most important factors explaining the ethnic non-cognitive skill gap. Moreover, ethnic differences in parenting styles and children's time allocations both contribute to reducing the ethnic gap in non-cognitive skills. By contrast, differences in other child or household characteristics explain very little of the ethnic non-cognitive skill gap.

**Keywords:** Migration, Non-cognitive skills, Time Use Diary, Second-generation Immigrants, Australia.

**JEL classifications:** J13, J15, J22, J24.

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## 1. Introduction

It is well established that children of Asian immigrants in most English-speaking destinations have better academic performance than their native-born counterparts (Dustmann & Glitz 2011; Sweetman & van Ours 2015; Duncan & Trejo 2018; Nguyen *et al.* 2019a). Yet, little is known about their relative non-cognitive<sup>1</sup> performance. Investigating the relative development of children of Asian immigrants in socioeconomic outcomes other than cognitive scores would provide a more complete picture about how this “model minority” group fare in the host countries (Wong *et al.* 1998). The focus on non-cognitive skills is particularly relevant since a large body of research has demonstrated the central role played by non-cognitive skills in shaping schooling and labour market outcomes (Almlund *et al.* 2011; Heckman & Kautz 2013; Deming 2017).

This study contributes to the literature as the first to exclusively analyze the evolution of relative performance in non-cognitive skills of children of Asian immigrants. Current studies have mainly focused on relative academic performance of Asian immigrant children. This large research body, mostly from the US, often documents that, as compared to children of native-born parents, children of Asian immigrants have lower scores in English language-related subjects at early school ages, but catch up and overtake their peers from around 11–12 years of age (Fryer & Levitt 2006; Clotfelter *et al.* 2009; Choi *et al.* 2015; Gibbs *et al.* 2017). Asian immigrant children typically outperform their peers, however, in numeracy-related subjects from as early as the kindergarten entry ages of 4/5 years (Fryer & Levitt 2006; Nguyen *et al.* 2019a).<sup>2</sup> But we do not know how children of Asian immigrants compare against children of native-born parents on non-cognitive skills. This study seeks to answer that question.

We also advance the literature by exploring the factors driving the observed nativity gaps in non-cognitive skills. Particularly, we examine the role of the home environment, parental investments and children’s efforts in explaining the nativity gap in non-cognitive skills. We are especially interested in factors (e.g., parenting style (Huang & Gove 2015; Lundberg 2015) and effort (Hsin & Xie 2014; Nguyen *et al.* 2019a)) that have been shown to contribute to the Asian immigrant students’ academic achievements. There is an emerging literature exploring sources of racial/ethnic gaps in non-cognitive skills and all of them use US data and focus on the gap between black and

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<sup>1</sup> In the child development literature, cognitive skills are often measured by IQ tests or academic achievement tests. “Non-cognitive” skills are therefore used to describe the personal attributes not thought to be measured by IQ tests or achievement tests. “Non-cognitive” skills have been described under different names, including socio-emotional skills, soft skills, personality traits, non-cognitive abilities and character skills (Heckman & Kautz 2013).

<sup>2</sup> Reviews on academic performance by ethnicity/nativity can be found in Dustmann & Glitz (2011), Sweetman & van Ours (2015) or Duncan & Trejo (2018). Following the literature (Quintana *et al.* 2006), we use “ethnicity” and “nativity” interchangeably in this paper.

white students (Fryer & Levitt 2013; Elder & Zhou 2018; Hull & Norris 2018). This study thus provides the first evidence on the sources of the relative performance in non-cognitive skills of children of Asian immigrants.

Employing rich and nationally representative longitudinal data on two cohorts of Australian-born children observed over 12 years, this paper reports significant differences in non-cognitive skill development between children of Asian immigrants and those of parents from other ethnic groups. We show that the ethnic gaps in non-cognitive skills vary significantly by who provides the measures of children's non-cognitive skills, the types of non-cognitive skills being evaluated, and children's ages. Specifically, using teachers' reports, relative to non-Asian children, children of Asian immigrants are found to excel in almost all non-cognitive attributes, particularly after school entry ages. By contrast, Asian immigrant parents rated their children lower in some non-cognitive attributes such as Pro-sociality, Emotional, Peer and overall non-cognitive skill scales and at early ages. However, we do not observe significant ethnic differences in non-cognitive skills between third-generation Asian immigrant children and their non-Asian peers.

Adopting a cumulative value-added regression model and an Oaxaca-Blinder decomposition method, we explore sources of the ethnic differences in non-cognitive skills. The decomposition results show differences in initial child non-cognitive abilities, parenting styles and children's time allocations are the most important factors contributing to the nativity non-cognitive skill gap. Furthermore, while the contribution of previous non-cognitive skills varies by type of non-cognitive traits and children's ages, both ethnic differences in parenting styles and children's time allocations contribute to reducing the non-cognitive skill advantage observed for Asian immigrant children for almost all non-cognitive skills and ages. By contrast, differences in other child or household characteristics, including family composition, parental education and family income, explain very little of the nativity non-cognitive skill gap.

The remainder of this paper proceeds as follows. Section 2 documents the nativity gap in non-cognitive skills among children, and how that gap evolves over the course of children's development. Section 3 reports decomposition results of factors contributing to the nativity non-cognitive skill gap. Section 4 represents results from various robustness checks and Section 5 concludes.

## 2. The evolution of the nativity gap in non-cognitive skills

### 2.1. Data

This study uses data from the Longitudinal Study of Australian Children (LSAC) (AIFS 2018). LSAC is a biennial nationally representative survey with an initial sample of 5,107 children born between March 2003 and February 2004 (the birth or “B cohort”) and 4,983 children born between March 1999 and February 2000 (the kindergarten or “K cohort”). The survey began in 2004 and the latest wave for which data are available took place in 2016 when children from both cohorts had been surveyed up to seven times.

### 2.2. Non-cognitive skill measures

To measure child non-cognitive skills, we use responses to the Strengths and Difficulties Questionnaire (SDQ).<sup>3</sup> The SDQ is a standard psychometric measure of children’s behavioral and socio-emotional skills (Achenbach *et al.* 2008; Goodman & Goodman 2009). The SDQ contains five sub-scales: pro-social behavior (hereafter called Pro-social), hyperactivity and inattention (Hyperactivity), emotional symptoms (Emotional), conduct problems (Conduct), and peer-relationship problems (Peer). Each SDQ sub-scale is scored as the summation of the item scores (from 0 (Not true), 1 (Somewhat true) to 2 (Certainly true)) on each of the five sub-items, so each has values from zero to 10. For ease of interpretation, we have rescaled the SDQ measures so that higher SDQ scores indicate more positive outcomes.<sup>4</sup> We also construct an overall non-cognitive measure which is the average sum of all five sub-scales described above.

The measure of pro-social behavior is based on five questions assessing the frequency with which the child is considerate of other people’s feelings, readily shares with other children, is helpful and kind to younger children or often volunteers to help. The Hyperactivity sub-scale is based on five questions that assess whether the child is able to stay still, whether the child is constantly fidgeting,

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<sup>3</sup> We follow some studies in this literature, including Australian studies which use the same dataset and similar child development outcomes as ours (Fiorini & Keane 2014; Nghiem *et al.* 2015; Le & Nguyen 2017) or studies which use datasets from other countries and an apparently similar set of outcomes to ours (Dooley & Stewart 2007; Cunha & Heckman 2008), to name measures derived from the SDQ as “non-cognitive” outcomes.

<sup>4</sup> We prefer using the “raw” scores of non-cognitive skills to converting each of them into a standardized scale (with mean 0 and standard deviation 1). The main reason is that, due to missing information and model specifications, we will use different samples in various parts of the analysis and each of them may have a different sample mean and standard deviation for each of non-cognitive skill measures. Hence, standardizing a sub-scale of non-cognitive skills in one sample does not necessarily mean that the same sub-scale is standardized in another sample, resulting in different interpretations of “standard deviations” in different parts of the same analysis. Furthermore, using the raw score, as we do, allows us to compare the magnitude of responses to the same set of the SDQ by different informants. For example, LSAC data indicate that, on average, mothers tend to give higher scores on Pro-sociality sub-scale for the children than teachers as the former score 8.2 and later give 7.5. LSAC also have other measures of non-cognitive skills assessing the child’s self-control or persistence. However, these measures are only available in some waves and only reported by the child’s parents so we do not use them in this analysis.

is easily distracted, stops to think before acting, or has a poor attention span. The Emotional problems measurement is based on five questions about the child's apparent presence of headaches, worries, sadness, anxiety and fears. The Conduct sub-scale is constructed from five attributes assessing the child's tempers, obedience, or engagement in fights, lying or stealing. Finally, the Peer sub-scale rates the child's skills in building and maintaining friendship or getting along with different people. Appendix Table A1 provides further details of these measures.

The LSAC data contain responses to the same set of the SDQ asked separately of parents (both the mother and father) for all children aged 4 years and over, and teachers for children at school from 4 to 15 years of age, and the children themselves from age 10. While reports by various informants are highly correlated (see Appendix Table A3), we lack robust evidence about differentials in their reporting quality. Hence, we use and compare the evaluations of all four sources.

### **2.3. Parenting styles**

In addition to other common control variables in the literature (Fryer & Levitt 2013; Elder & Zhou 2018), we investigate the contribution of parenting styles to the observed ethnicity non-cognitive skill gaps. LSAC data have various questions asked both parents about their interactions with the child. To do this, we use 17 questions which are consistent across waves and cohorts to create parenting styles for both parents of children aged 4-15 years.<sup>5</sup> As has been done in the literature (Fiorini & Keane 2014; Zubrick *et al.* 2014; Cobb-Clark *et al.* 2019), for each survey wave and cohort, we employ a principal component method to construct two indicators of parenting styles, namely warmth and effective discipline parenting style (see Appendix Table A4 for details). We focus on maternal parenting styles in the main analysis because they entail fewer missing values and will examine the role of paternal parenting styles in Section 4.

### **2.4. The child's ethnicity classification**

We follow Nguyen *et al.* (2019a) to classify the child's ethnicity into three groups using information on countries of birth of both parents of the child. All the children in the sample were born in Australia.<sup>6</sup> These groups were: (1) "Asian immigrant children" defined as children with at least one Asian-born parent (10% of the sample); (2) "Native parent children" defined as children with two Australian-born parents (66% of the sample); and (3) "non-Asian immigrant children" defined as

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<sup>5</sup> Parents of children aged outside 4-15 years were not asked these questions.

<sup>6</sup> About 2% of LSAC children were born overseas and they are classified as "being born" in Australia in this study, as has been done in previous studies (Le & Nguyen 2018; Nguyen *et al.* 2019a). Using this ethnic identification, Nguyen *et al.* (2019a) show significant differences in academic performance between Asian immigrant children and those of other ethnic parents. Unreported results show little sensitivity when this small subsample is excluded from the analysis.

children with two non-Asian immigrant parents or one non-Asian immigrant and one Australian-born parent (24% of the sample).

Appendix Table A2 exhibits compositions of parents' countries of birth by the child's ethnicity. It demonstrates that Asian immigrant parents are dominantly from China, India, Vietnam, Lebanon, Sri Lanka, the Philippines, Iraq, Malaysia, Pakistan, Turkey, Afghanistan and Indonesia. By contrast, most non-Asian immigrant parents are from English-Speaking-Background (ESB),<sup>7</sup> Pacific (e.g., Papua New Guinea, Fiji and Samoa) or European (e.g., Germany, Italy, France, Switzerland and the Netherlands) countries.

## 2.5. *Summary statistics*

Table 1 suggests while there are some statistical differences in socio-economic background characteristics between children of Australian-born parents and that of non-Asian immigrants, the differences in observed characteristics between the children of Australian-born parents and the children of Asian immigrants are much more pronounced in terms of both statistical significance and magnitude. In particular, as compared to children of Australian-born parents, children of Asian immigrants are more likely to be breastfed at early childhood, have mothers with higher qualifications (but fewer working hours),<sup>8</sup> and are more likely to live with both parents. In contrast, Asian immigrant children have lower birthweight and their families have lower incomes, compared to children of Australian-born parents. Table 1 also indicates that Asian immigrant parents (both mothers and fathers) are less warm and less strict than Australian-born parents when interacting with their children.

[Table 1 and Figure 1 around here]

Figure 1 graphically summarizes means of non-cognitive traits by the child's ethnicity and ages and the informants of such non-cognitive skills. Panel A – Figure 1 focuses on the raw nativity differences in non-cognitive skills reported by mothers. It suggests that the nativity differences in non-cognitive skills are more profound when Asian immigrant children are contrasted to those of Australian-born parents. Furthermore, the Asian–Native gaps in non-cognitive skills vary by non-cognitive attributes and children's ages. In particular, as compared to children of Australian-born parents, children of Asian immigrants are scored statistically significantly lower in Pro-sociality, and this difference is most visible at ages 6/7 to 14/15 years. They also score lower on the Emotional scale from ages 4/5 to 10/11 years, and on the Peer sub-scale between the ages of 4/5 and 8/9 years.

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<sup>7</sup> English-speaking countries include Australia, UK, New Zealand, South Africa, Canada, USA and Ireland.

<sup>8</sup> Similar patterns have been documented in other Australian studies (Nguyen & Duncan 2017; Nguyen *et al.* 2019a).

However, using the mother's reports, Asian immigrant children aged between 10/11 and 12/13 years appear to have higher hyperactivity scores than Australian-born parent children of the same age. As a result, this contributes towards children of Asian immigrants having lower scores on the summary scale of the non-cognitive skills between ages 4/5 and 6/7 only. Panel A also suggests that the Asian-Native gap in Emotional and Peer sub-scales and the summary scale in favor of native parent children tends to narrow overtime.

The LSAC offers a rare opportunity to examine these differences using father-reported data. These observations confirm the same nativity differences in the same direction, but of smaller magnitude, in fathers' evaluations of their children's non-cognitive traits<sup>9</sup> (Panel B – Figure 1). This suggests a generally consistent direction of reporting between mothers and fathers in reporting their children's behaviors. An exception is that, according to the fathers, children of Asian immigrants score at least as well as children of Australian-born parents on the Emotional sub-scale and this results in a statistically insignificant difference in the overall non-cognitive scale scores for the three ethnic groups of children.

Panel C reports a strikingly different pattern of the nativity gap in non-cognitive skills as evaluated by the children's teachers. According to teachers, children of Asian immigrants appear to achieve higher scores than other children in almost all non-cognitive skills, especially after the kindergarten ages of 4/5 years. In particular, as compared to other children, children of Asian immigrants are rated by their teachers to be lower in Pro-sociality and Peer sub-scales at ages 4/5 years only. Asian immigrant children "catch up" and then achieve higher scores in all sub-scales and the summary non-cognitive scale, except Pro-sociality for children aged under 12/13 years. Similarly, Panel D – Figure 1 suggests that according to the children themselves, Asian immigrant children are rated higher than children of non-Asian immigrants on the Hyperactivity and Conduct sub-scales, but as well as in other sub-scales and the overall non-cognitive scale. Furthermore, also from the children's perspective, as compared to native parent children of the same ages between 12/13 and 16/17 years, Asian immigrant children score higher on the Peer sub-scale and the overall non-cognitive scale.

There is a rich and longstanding literature on the differences in the reports from various informants (e.g., parents or teachers) as this pertains to social and emotional functioning and mental health (De Los Reyes *et al.* 2015). We suggest there are three plausible reasons behind the differences observed by respondent type (e.g., parent vs. teacher), as shown above for nativity gaps in non-cognitive skills. First, parents from various ethnic backgrounds may have different expectations about their

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<sup>9</sup> It should be noted that we have fewer fathers' evaluations than mothers' evaluations, making some statistics in Panel B less precise than that in Panel A.



children and judge them accordingly. In our case, Asian immigrant parents may place very high expectations of their children and assess them to behave less desirably according to those expectations (Goldammer 2012; Le & Nguyen 2017). This prediction is in line with our earlier finding of the consistency in mothers’ and fathers’ reports about their children’s behaviors. It is also consistent with another finding that Asian immigrant children are rated more favorably by teachers or children whose reports are arguably less likely to be influenced by ethnic background than parents’ reports.<sup>10</sup> Second, it is also possible that parents and teachers may use different benchmark when evaluating the same child (Elder & Zhou 2018).<sup>11</sup> Third, it is likely that students behave differently in school versus home environments (Goldammer 2012).

### 3. Factors contributing to the nativity gap in non-cognitive skills

#### 3.1. Regression and decomposition models

We first apply the following equation to examine the impact of parenting styles ( $P$ ) and other factors on score ( $Y$ ) of child  $i$  in non-cognitive skill  $j$  at age  $k$ :

$$Y_{ijk} = \alpha_{0jk} + \alpha_{1jk}Y_{ij(k-1)} + P_{ijk}\alpha_{2jk} + P_{ij(k-1)}\alpha_{3jk} + X_{ijk}\alpha_{4jk} + \varepsilon_{ijk} \quad (1)$$

where  $\varepsilon_{ijk}$  is a vector of unobservable characteristics and  $\alpha$ s are parameters to be estimated. Following previous studies on race or gender gaps in non-cognitive skills (Bertrand & Pan 2013; Fryer & Levitt 2013), we include in  $X_{ijk}$  a rich list of variables describing the child's characteristics (i.e., gender, age, ethnicity, Indigeneity<sup>12</sup> and birth weight), early parental investment (as measured by breastfeeding at early childhood), family environment (maternal age, maternal education,

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<sup>10</sup> The data do not have information on teachers’ characteristics, including their ethnicity, for us to investigate whether teachers’ reports of students’ non-cognitive performance are influenced by teachers' characteristics. However, teachers’ ethnicity may not drive the nativity non-cognitive gap reported in this paper mainly because in Australia the majority (92% in 2013) of teaching workforce were born in Australia (82%) or born overseas in an ESB country (10%) (Willett *et al.* 2014). The hypothesis that non-cognitive skill reports by Australian-born children of immigrants are less likely to be influenced by their parents’ ethnicity is supported by evidence of the fading of ethnic and cultural attachments across generations as found in the literature (Nguyen & Connelly 2018; Figlio & Özek 2019).

<sup>11</sup> In particular, using US data from two cohorts of the Early Childhood Longitudinal Study, Elder & Zhou (2018) hypothesize that teachers tend to compare the student’s performance with other students in the same school when answering the non-cognitive skill questionnaires. Combining this prediction with the fact that black students normally attend schools with lower development outcomes, Elder & Zhou (2018) argue that the black-white gaps in non-cognitive skills in favor of white students might have been under-reported using teacher rated measures. Unfortunately, our data do not have measures of non-cognitive skills of other students in the same school that the LSAC children attended for us to directly test whether such a finding holds for Australia. However, unreported statistics from LSAC data show that, as compared to children of Australian-born parents, Asian immigrant children attended schools with statistically significantly higher test scores on average. Due to positive associations between cognitive and non-cognitive skills as documented in the literature (Nghiem *et al.* 2015; Le & Nguyen 2017), Asian immigrant children are reasonably expected to attend schools with peers having better non-cognitive skills. If teachers actually compare the student’s performance with other students in the same school as proposed by Elder & Zhou (2018), using teacher rated measures may under-report the Asian-Native gaps in non-cognitive skills in favor of Asian immigrant students in our case.

<sup>12</sup> The results are largely similar when Australian-born children with an Indigenous background are excluded from “Australian-born parent children”.

maternal working hours, family income, household size, number of siblings, living with both parents or living in an owned home) and indicators of neighborhood characteristics.<sup>13</sup> Adopting the dynamic theory of skill formation (Cunha *et al.* 2010), we also include in equation (1) a one-period lag of the respective non-cognitive score  $Y_{ij(k-1)}$ . The inclusion of a lagged non-cognitive score, in addition to the rich list of control variables,  $X_{ijk}$ , helps to ease concerns about unobservable factors which may be correlated with both the maternal parenting styles  $P_{ijk}$  and the child non-cognitive skill  $Y_{ijk}$  (Fiorini & Keane 2014; Del Bono *et al.* 2016; Del Boca *et al.* 2017). Additionally, as has been done in previous studies (Todd & Wolpin 2007; Fiorini & Keane 2014; Del Bono *et al.* 2016), we include a one-period lag of maternal parenting styles  $P_{ij(k-1)}$  in addition to the contemporaneous maternal parenting style variables in the model to address the issue of reverse causality.<sup>14</sup> Equation (1), which we refer to as the “cumulative value-added” (CVA) model, is our preferred model because it helps address two important issues, namely unobservable factors and reverse causality, relating to the possible endogeneity of the parenting style variables in the non-cognitive skill determinant equation. This model was preferred by Todd and Wolpin (2007) in their examination of the racial test score gap in the US.

We then apply an Oaxaca-Blinder (OB) decomposition method (Blinder 1973; Oaxaca 1973) to regression results from model (1) to examine the role that different factors play in contributing to the nativity non-cognitive score gap (Fortin *et al.* 2011). Specifically, the factors contributing to the nativity non-cognitive skill gap are examined by applying an OB type of decomposition of the form:

$$\hat{Y}_m - \hat{Y}_n = \underbrace{(\hat{Z}_m - \hat{Z}_n)\hat{\mu}^*}_{\text{"characteristic effect"}} + \underbrace{\left\{ \hat{Z}_m(\hat{\mu}_m - \hat{\mu}^*) + \hat{Z}_n(\hat{\mu}^* - \hat{\mu}_n) \right\}}_{\text{"return effect"}} \quad (2)$$

where  $\hat{Y}$  is the mean non-cognitive score of children of migrant ( $m$ ) or native ( $n$ ) parents,  $\hat{Z}$  is a vector of the mean observed characteristics,  $\hat{\mu}_m$  ( $\hat{\mu}_n$ ) is a vector of the estimated coefficients in the regression of non-cognitive skill on the set of covariates, including the constant, for migrant (native) children sample and  $\hat{\mu}^*$  is a vector of the estimated coefficients from a pooled sample of immigrant and Australian-born parent children with other covariates and the nativity status dummy. The

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<sup>13</sup> Local variables include percentages of individuals of various ages, year 12 completions, working, speaking English, being born in Australia, identifying as being of Aboriginal/Torres Strait Islander origin in linked areas, percentages of households with household income less than AU\$1,000/week in linked areas, and a metropolitan dummy. We also control for possible temporal and geographical differences in non-cognitive skill development by including dummies for quarters of survey time and state/territory dummies.

<sup>14</sup> Appendix Table A4 indicates considerable intertemporal variations in parenting styles for us to include both concurrent and lagged parenting styles in the regression. Unreported results show that excluding lagged parenting styles from the models largely does not change our findings.

nativity status dummy variable is included in estimating the reference structure ( $\hat{\mu}^*$ ) to obtain unbiased estimates of the coefficients on other variables (Fortin *et al.* 2011).

The first term on the right-hand side in equation (2) is the part of the nativity non-cognitive skill gap due to differences in observed characteristics - the “characteristic effect”. The second term on the right-hand side is the difference in factors other than the observed characteristics – the “return effect”, sometimes interpreted as the “unexplained” or “discrimination” component. We focus on detailed decomposition of the characteristic effect because detailed decomposition results of the return effect are affected by the arbitrary scaling of continuous variables (Jones & Kelley 1984). To facilitate the interpretation of the results, we separate the variables that contribute to the non-cognitive development of children into five groups: (i) their characteristics, (ii) their families’ characteristics, (iii) their respective previous non-cognitive scores, (iv) maternal parenting styles, and (v) other factors.

In what follows, we focus on the gap in non-cognitive skills between Asian immigrant children and children of Australian-born parents since previously we found the differences in non-cognitive skills are more pronounced for them. Adapting some previous studies (Bertrand & Pan 2013; Le & Nguyen 2017; Elder & Zhou 2018; Hull & Norris 2018),<sup>15</sup> in this section, we use teachers’ reports of children’s non-cognitive skills because teachers’ reports may not be subject to the parental migration background. Due to the data availability and our modelling approach, we can apply models (1) and (2) to examine the Asian-Native gap in non-cognitive skills of children from ages 6/7 to 14/15 years.

### **3.2. Decomposition results**

Table 2 presents the aggregate results which decompose the total gap in non-cognitive skills into the overall characteristic and return components. The results show that, consistent with the “raw” gap observed in Figure 1 – Panel C,<sup>16</sup> from the teachers’ viewpoints, Asian immigrant children are rated lower than Australian-born parent children in Pro-sociality at ages 6/7 but they catch up by ages 11/12 years then achieve higher scores in later years. Furthermore, Asian immigrant children generally achieve higher scores in other non-cognitive sub-scales and the summary scale from ages 6/7 to 14/15 years. The results also show that, while the return component is usually larger than the characteristic component, the contribution of the characteristic component is quite substantial, with

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<sup>15</sup> However, other studies employing the same LSAC data use mothers’ reports of children’s non-cognitive skills (Fiorini & Keane 2014; Nghiem *et al.* 2015).

<sup>16</sup> Notwithstanding the results are from different specifications and samples. Because it is not meaningful to explain the total nativity gaps which are statistically insignificant, the focus is on the decomposition results where the gaps are statistically significant.

its contribution to the total gap accounting for up to 68% of the total gap as in the case of Hyperactivity sub-scale seen at ages 12/13 years.

[Table 2 around here]

Table 2 also reports contributions of various factors to the Asian-Native gap in non-cognitive skills. Estimates from this table suggest that Asian-Native differences in previous child non-cognitive skills and parenting styles are two most important factors explaining the ethnic non-cognitive skill gap because their estimates are highly statistically significant and typically dominant in magnitude. By comparison, conditional on children's previous non-cognitive skills and maternal parenting styles, differences in other child or household characteristics, including family composition, parental education and family income, explain very little of the ethnic non-cognitive skill gap.

In addition, Table 2 shows that the contribution of previous child non-cognitive skills to the overall gap varies by the type of non-cognitive attributes and children's ages. For example, for Pro-sociality, the estimates on previous non-cognitive scores at ages 6/7 and 8/9 years are negative and statistically significant, indicating Asian immigrant children's lower initial ratings in Pro-sociality and the very high persistence in the non-cognitive score results (see Appendix Table A6 for regression results).<sup>17</sup> Conversely, for other non-cognitive skills and the summary non-cognitive scale measured at 8/9 years of age or higher, estimates of lagged scores are usually positive and highly statistically significant, reflecting Asian immigrant children's initial rating advantages in these non-cognitive traits and at these ages as well as the positive returns to their initial non-cognitive skills. By contrast, the contribution of maternal parenting styles (i.e., warm and effective) to the total gap is always negative and statistically significant and this is the case for almost all non-cognitive skills and ages considered. The finding that ethnic disparities in maternal parenting styles make a negative and significant contribution to the aggregated ethnic gap in all non-cognitive skills and ages is consistent with two observations: (i) as compared to Australian-born mothers, mothers originating from Asian countries rate themselves as less warm and less disciplined when interacting with their children (see Table 1) and (ii) the positive returns to warm and effective discipline parenting styles (see Appendix Table A6).<sup>18</sup>

In terms of the magnitude, Table 2 reveals that the ethnicity differences in children's initial non-cognitive skills account for up to 59% (in absolute value, in the case of Conduct at ages 14/15 years)

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<sup>17</sup> The evidence of self-productivity of skills is in line with that in other studies (Cunha *et al.* 2010; Fiorini & Keane 2014; Nghiem *et al.* 2015; Attanasio *et al.* 2019).

<sup>18</sup> Studies using data from Australia (Fiorini & Keane 2014; Cobb-Clark *et al.* 2019), Canada (Dooley & Stewart 2007) and the UK (Ermisch 2008; Del Bono *et al.* 2016) have also found significant associations between parenting styles and children's non-cognitive skill development.

of the total Asian-Native gap in non-cognitive skills. Likewise, the disparity in parenting styles between Asian immigrant mothers and Australian-born mothers explains up to 40% of the total gaps in their children’s non-cognitive skills (e.g., Pro-sociality sub-scale and the summary scale at ages 6/7 years). It is interesting to observe that, for children aged between 12/13 and 14/15 years, Australian-born mothers report warmer and more effective discipline parenting styles than their Asian immigrant counterparts and that these differences help to reduce the gap in measures of Conduct relative to Asian immigrant children. To the best of our knowledge, the finding of a negative contribution of the nativity differences in parenting styles to the Asian-Native gap in non-cognitive skills is novel to the literature. This finding, when observed with another finding of an insignificant role of parenting styles in explaining the Asian-Native gap in cognitive skills provided by Nguyen *et al.* (2019a), points to parenting styles as making different contributions to the cognitive aspects of child development compared with non-cognitive aspects. These findings also highlight a potentially important role of parenting styles in fostering non-cognitive skills in children over an extended and critical period of their lives.

#### **4. Robustness checks**

##### ***4.1. Relative non-cognitive performance of third-generation Asian immigrant children***

So far, we have focused on relative non-cognitive performance of second-generation immigrants, because our data have a very small number of children with grandparents originating from Asian countries. Nevertheless, in this section we rely on the grandparent country of birth, reported by the child’s parents, to classify LSAC children into third-generation immigrants. Specifically, third-generation immigrants are defined as Australian-born children with at least one foreign-born grandparent. We further classify third-generation Asian immigrants as those with at least one Asian-born grandparent. Applying these definitions, in Wave 1 of LSAC, of 5,918 children with valid information about birthplaces of their grandparents, 57% are identified as “Australian-born grandparent children”, 40% “third-generation non-Asian immigrant children” and 3% “third-generation Asian immigrant children”.<sup>19</sup> Appendix Figure A1 graphically exhibits little difference in non-cognitive skills between third-generation Asian immigrants and their peers and this is the

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<sup>19</sup> The small proportion of third-generation Asian immigrant children in our data is expected because Australia used to adopt “White Australia” policies which aimed to prevent people from Asia and the Pacific Islands from immigrating to Australia. Unreported results from LSAC data show that as compared to grandparents from other ethnic groups, grandparents originating from Asian countries on average had higher qualifications but the same labor force participation rates (both measured when parents of the study child were 14 years old). In this section, we do not control for socio-economic background variables of grandparents due to their significant missing information (i.e., retrospective questions about their education and work were asked in Wave 5 of LSAC only and responses are mainly available for parents of the children’s mothers (Hancock *et al.* 2016)). The results are largely the same when we control for other variables as described in Section 3.1.

case regardless of who provided children's non-cognitive measures. Our evidence of no discernable ethnic differences in non-cognitive skills among third generation immigrants is consistent with notion of the fading of ethnic attachments across generations as found in the literature (Nguyen & Connelly 2018; Figlio & Özek 2019).

#### **4.2. *The role of children's time investments and paternal parenting styles***

Previous work by Nguyen *et al.* (2019a) finds that children of Asian immigrants and those of Australian-born parents use their time very differently and that the nativity differences in time allocations significantly explain the Asian-Native cognitive skill gap. Motivated by that work, in this section, we explore the contribution of the differences in children's time allocation to the Asian-Native gaps in non-cognitive skills. To do so, we first use rich longitudinal time-use diaries of children to document their daily time allocations to various grouped activities, namely, sleep, personal care, school, education, active pursuits, chores, media use and travel.<sup>20</sup> We then additionally include a vector of variables describing children's weekly times allocated to various activities (with sleeping time set as the omitted activity) in regression model (1) and its corresponding decomposition model (2) to examine their contribution to the Asian-Native gap in non-cognitive skills. Similar to what has been done with parenting styles, to deal with potential endogeneity of children's time allocations, we include both their current and lagged values in regression model (1). Due to data availability and modelling choices, we can examine the contribution of children's time allocations to the Asian-Native gap in non-cognitive skills of K-cohort children from ages 6/7 to 8/9 years.<sup>21</sup>

The decomposition results are reported in Appendix Table A7 and indicate that ethnicity differences in children's time allocations statistically significantly and negatively contribute to the Asian-Native gaps in the Conduct, Peer and overall non-cognitive skill scales at ages 8/9 years. Specifically, at ages 8/9 years, the nativity differences in children's time allocation negatively contribute 20%, 48% and 17% to the overall Asian-Native non-cognitive score gap in the Conduct, Peer and overall non-cognitive skill scales, respectively. Sequentially, detailed decomposition results<sup>22</sup> of all time

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<sup>20</sup> Details about time use diaries (TUD) and construction of children's time allocation variables are described in Nguyen *et al.* (2019a; 2019b).

<sup>21</sup> In particular, our empirical models require panel data in both time-use diaries and non-cognitive scores. Furthermore, we wish to measure the time allocation on a weekly basis, requiring that each child has two TUDs (one on a weekday and one on a weekend day) per wave to be included in the final sample. While children of both cohorts were asked to complete two TUDs per wave in the first three waves of the LSAC data, only K-cohort children were asked to complete non-cognitive skill questions in the first three waves. These sample restrictions are also employed in previous relevant studies (Fiorini & Keane 2014; Nguyen *et al.* 2019a). The CVA model is probably the most robust model applied to examine the impact of children's time allocation on their development outcomes (Fiorini & Keane 2014; Del Bono *et al.* 2016; Del Boca *et al.* 2017).

<sup>22</sup> These results are not reported for brevity and will be provided upon request.

allocation variables suggest that the contribution of time allocations is mostly attributable to the differences in physically active time between Asian immigrant children and children of Australian-born parents. The finding of a negative and statistically significant contribution of nativity disparities in time allocations to the aggregated Asian-Native gap in the Conduct, Peer and overall non-cognitive skill scales at ages 8/9 years is consistent with two observations: (i) at ages 8/9 years, children of Asian immigrants are much less physically active than children of Australian-born parents (see Appendix Table A8) and (ii) the estimate of the contemporaneous active time variable is positive and statistically significant in the regressions of these non-cognitive traits at ages 8/9 years (see Appendix Table A9). This finding, when viewed with evidence that ethnic differences in time allocations *positively* explain the Asian-Native gap in cognitive skills provided by Nguyen *et al.* (2019a) highlight the opposite roles that the nativity differences in children's time allocations contribute to the ethnic gaps in cognitive and non-cognitive skills.

Furthermore, combining the finding that ethnic differences in time spent on educational activities is the greatest contributing factor, among all grouped activities, to the academic success of the Asian immigrant children presented in Nguyen *et al.* (2019a), and the finding here that the nativity difference in time spent being physically active plays a key role in explaining Asian immigrant children's advantage in non-cognitive traits, suggests the following: a reduction in the academic disadvantage of children of Australian-born parents relative to Asian immigrant children might be achieved by an increase in their educational time but this could come at the cost of a reduction of the time Australian children spend being physically active.

The decomposition results in Appendix Table A7 also show that ethnic differences in initial non-cognitive skills and maternal parenting styles continue to play a dominant role in explaining the Asian-Native gap in non-cognitive skills, particularly at ages 8/9 years. Taken together, our results indicate that ethnic differences in maternal parenting styles and children's time allocations both contribute to reduce the nativity non-cognitive skill gaps at ages 8/9 years.

We next investigate the role of paternal parenting styles by adding their current and lagged values in regression model (1) and its corresponding decomposition model (2). Decomposition results reported in Appendix Table A10 indicate that ethnic differences in paternal parenting styles negatively and statistically significantly (at least at the 10% level) contribute to the Asian-Native gap in Hyperactivity (at ages 8/9 to 12/13 years), Emotional (8/9 years), Conduct (8/9 years), Peer (8/9 years) and the overall non-cognitive scale (8/9 to 10/11 years). The negative and statistically significant contribution of nativity disparities in paternal parenting styles is in line with two observations: (i) unreported results indicate the positive returns to warm and effective discipline

parenting styles by fathers and (ii) Asian immigrant fathers have less warm and less effective parenting styles than Australian-born fathers (see Table 1). The decomposition results additionally suggest quantitatively meaningful contributions of the ethnic differences in paternal parenting styles to the total non-cognitive skill gaps. For instance, nativity differences in paternal parenting styles contribute 24% (in absolute value) to the total Asian-Native gap in Conduct rated at ages 8/9 years. However, the contribution of the ethnic differences in paternal parenting styles is usually less pronounced, in terms of the magnitude and statistical significance, than that of maternal parenting styles, suggesting a more important role of maternal parenting styles in forming children's non-cognitive skills, as has previously been found in the literature (Aunola & Nurmi 2005).<sup>23</sup>

## 5. Conclusion

This paper has documented, for the first time, the evolution of the ethnic gap in non-cognitive skills of Australian-born children and adolescents. Using a standard psychometric measure of children's behavioral and socio-emotional skills gathered from multiple informants, we find large differences in non-cognitive skill development between children of Asian immigrants and those of parents from other ethnicity groups. Furthermore, the ethnic gaps in non-cognitive skills vary significantly by informant-type, the nature of the non-cognitive traits being assessed, and children's ages. For instance, according to parent reports, children of Asian immigrants are scored lower on the Pro-sociality, Emotional, Peer and overall non-cognitive skill scales and these ethnicity gaps appear to be more pronounced when mothers' evaluations are used and for younger children. By contrast, from teachers' ratings, children of Asian immigrants achieve higher scores than children of other parents in almost all non-cognitive attributes across the school years. Similarly, using child reports, Asian immigrant children achieve higher scores than children of non-Asian immigrants on the Hyperactivity and Conduct sub-scales but equally on other sub-scales and the overall non-cognitive scale. However, we found no discernable ethnic differences in non-cognitive skills among third generation immigrants, suggesting that these differences diminish across generations. This indicative evidence of diminishing ethnic differences across generations suggests that the initial disparities in non-cognitive skills we observe are likely to be more culturally driven rather than occur through more fundamental biological or temperamental determinants.

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<sup>23</sup> Appendix Table A11 reports decomposition results when mothers' reports of their children's non-cognitive skills are used. The results demonstrate little sensitivity in the role of maternal parenting styles in explaining the observed Asian-Native gap in non-cognitive skills. Following the Australian Bureau of Statistics (ABS)' classification of cultural and ethnic groups (ABS 2016), we also experimented excluding Middle East countries from Asian countries and found the results (unreported for brevity) largely unchanged, suggesting that (i) immigrants originating from Middle East countries only represent a small share of Australian immigrants (see Appendix Table A1), and (ii) children of immigrants originating from these countries are not very different from those of other Asian immigrants.



Adopting a cumulative value-added regression model and an Oaxaca-Blinder decomposition method, this paper has explored sources of these differences. Our decomposition results show differences in initial child non-cognitive skills and parenting styles between children of Australian-born parents and children of Asian immigrants are the most important factors explaining the ethnic non-cognitive skill gap. Moreover, while the contribution of previous non-cognitive skills varies by type of non-cognitive traits and children's ages, the contribution of parenting styles to the total gap is always negative and statistically significant for almost all non-cognitive skills and ages. Our results suggest that ethnic differences in children's time allocations also make quantitatively meaningful contributions to the reduction in nativity non-cognitive skill gaps. By contrast, ethnicity disparities in other characteristics of the child or characteristics of the household explain very little of the nativity non-cognitive skill gap.

The results presented in this paper may have several potentially important methodological and policy implications. For example, results from this paper highlight that studies using non-cognitive skills reported by various types of informants could result in very different conclusions about ethnicity differences in non-cognitive skills. Additionally, our finding of higher scores in the non-cognitive skills of children of Asian immigrants, at least from teachers' perspectives, when viewed with the Asian immigrant children's better academic performance found in the literature (Nguyen *et al.* 2019a) helps to confirm their perceived role as a "model minority" group. Furthermore, our results suggest that policies aiming at promoting warmer or more effective parenting styles or increasing children's time spent on physically active activities could foster non-cognitive skill development for all children.

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Table 1: Summary statistics by ethnicity

Variables	Native parent children	Non-Asian immigrant children	Asian immigrant children	Non-Asian - Native (= (3) - (2))	Asian - Native (= (4) - (2))
(1)	(2)	(3)	(4)	(5)	(6)
Male	0.51	0.50	0.52	-0.02***	0.00
Child age (years)	7.76	7.87	7.68	0.11**	-0.08
Aboriginal	0.04	0.01	0.00	-0.03***	-0.04***
Birth weight (grams)	3444.07	3426.98	3255.97	-17.09***	-188.1***
Breastfed at 3 or 6 months	0.72	0.76	0.75	0.05***	0.04***
Mother age (years)	38.20	39.96	39.27	1.75***	1.07***
Mother has a certificate	0.31	0.28	0.22	-0.03***	-0.08***
Mother has an advanced diploma	0.10	0.12	0.11	0.02***	0.01
Mother has bachelor degree	0.18	0.20	0.22	0.02***	0.04***
Mother has graduate diploma	0.08	0.09	0.07	0.01***	0.00
Mother has postgraduate degree	0.07	0.10	0.12	0.02***	0.04***
Mother's weekly working hours	19.34	19.27	16.87	-0.07	-2.47***
Living with both parents	0.83	0.85	0.90	0.01***	0.07***
Home owner	0.76	0.75	0.77	-0.01***	0.01*
Household yearly income (\$100,000)	1.05	1.14	0.89	0.08***	-0.16***
Household size	4.51	4.50	4.64	-0.02	0.12***
Number of siblings	1.52	1.47	1.45	-0.05***	-0.07***
Mother warm parenting <sup>(a)</sup>	0.02	0.07	-0.26	0.05***	-0.28***
Mother discipline parenting <sup>(a)</sup>	0.06	0.00	-0.24	-0.06***	-0.29***
Father warm parenting <sup>(a)</sup>	-0.01	0.08	-0.11	0.09***	-0.09***
Father discipline parenting <sup>(a)</sup>	0.04	-0.01	-0.26	-0.04***	-0.29***

Notes: Tests are performed on the significance of the difference between the sample mean for each group. Statistics are reported for the pooled sample of B- and K-cohort children who have valid parental country of birth in any wave. The symbol \*denotes significance at the 10% level, \*\*at the 5% level, and \*\*\*at the 1% level.

Table 2: Contributions to the Asian-Native gap in non-cognitive skills

Measure	Pro-sociality					Hyperactivity				
	6/7	8/9	10/11	12/13	14/15	6/7	8/9	10/11	12/13	14/15
Age	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<b><i>Estimated total gap</i></b>	-0.25**	-0.06	-0.01	0.13	0.38**	0.45***	0.68***	0.87***	0.60***	0.62***
<b><i>Characteristic part</i></b>										
Child	0.01 [-4%]	0.02 [-33%]	0.00 [0%]	0.03 [23%]	-0.03 [-8%]	-0.03 [-7%]	0.01 [1%]	-0.01 [-1%]	0.02 [3%]	0.03 [5%]
Household	0.00 [0%]	0.06** [-100%]	0.00 [0%]	0.01 [8%]	0.06 [16%]	0.03 [7%]	0.08*** [12%]	0.02 [2%]	0.07** [12%]	0.08** [13%]
Others	-0.02 [8%]	0.05 [-83%]	0.02 [-200%]	0.07 [54%]	0.15* [39%]	-0.15** [-33%]	0.00 [0%]	0.10** [11%]	0.06 [10%]	0.11 [18%]
Initial	-0.12*** [48%]	-0.10*** [167%]	0.02 [-200%]	-0.01 [-8%]	-0.09 [-24%]	-0.03 [-7%]	0.26*** [38%]	0.35*** [40%]	0.34*** [57%]	0.22** [35%]
Parenting styles	-0.10*** [40%]	-0.10*** [167%]	-0.11*** [1100%]	-0.10*** [-77%]	-0.11*** [-29%]	-0.08*** [-18%]	-0.12*** [-18%]	-0.12*** [-14%]	-0.08*** [-13%]	-0.14*** [-23%]
<i>Total</i>	-0.23*** [92%]	-0.07 [117%]	-0.07 [700%]	-0.00 [0%]	-0.02 [-5%]	-0.26** [-58%]	0.24** [35%]	0.34*** [39%]	0.41*** [68%]	0.31** [50%]
<b><i>Return part</i></b>										
<i>Total</i>	-0.02 [8%]	0.02 [-33%]	0.05 [-500%]	0.13 [100%]	0.41** [108%]	0.70*** [156%]	0.44*** [65%]	0.53*** [61%]	0.19 [32%]	0.31 [50%]

Notes: Estimates from model (1) and non-cognitive skills reported by teachers are used. Grouped variables: Child: gender, age, Aboriginal status, birth weight, breastfed at birth; Household: mother's characteristics (age, completed qualification, working hours), household size, number of siblings, living with both biological parents, living in an owned home, household income; Others: states, urban, local socio-economic background variables, and survey quarters; Initial: Lag of respective non-cognitive score; Parenting styles: Current and lagged maternal parenting styles. Standard errors (not reported for brevity) are obtained using 500 bootstrap replications. Percent of the total gap is reported in squared brackets. Total figures may not add up to 100% due to rounding. The symbol \*denotes significance at the 10% level, \*\*at the 5% level, and \*\*\*at the 1% level.

Table 2: Contributions to the Asian-Native gap in non-cognitive skills (cont.)

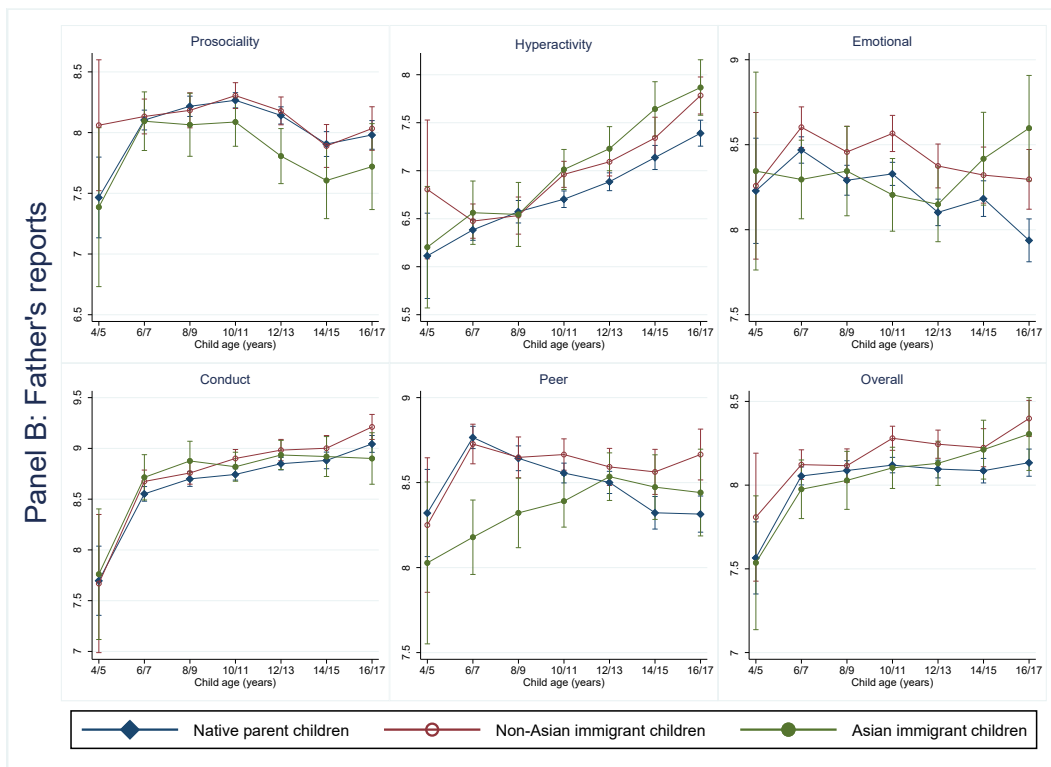
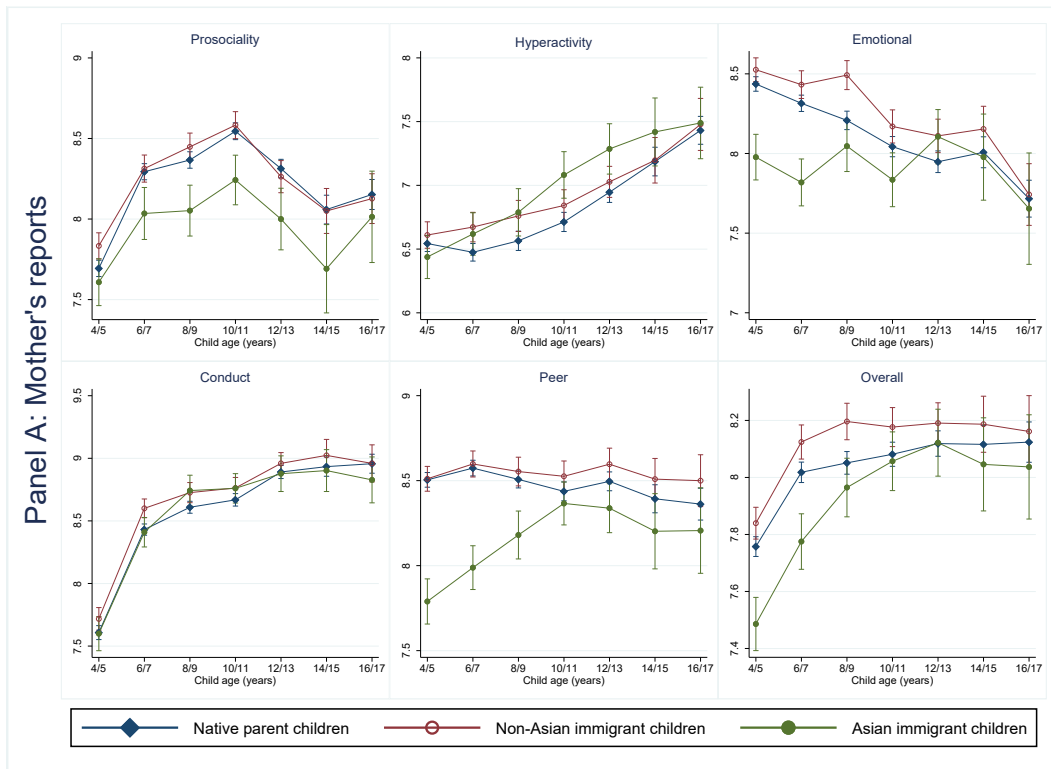
Measure	Emotional					Conduct				
	6/7	8/9	10/11	12/13	14/15	6/7	8/9	10/11	12/13	14/15
Age	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
<b><i>Estimated total gap</i></b>	0.23**	0.47***	0.27***	0.24**	0.36***	0.23***	0.30***	0.35***	0.29***	0.17
<b><i>Characteristic part</i></b>										
Child	-0.04** [-17%]	0.00 [0%]	-0.01 [-4%]	-0.02 [-8%]	-0.05** [-14%]	-0.01 [-4%]	0.01 [3%]	0.02 [6%]	0.02 [7%]	0.01 [6%]
Household	-0.02 [-9%]	0.00 [0%]	-0.00 [0%]	-0.01 [-4%]	0.03 [8%]	0.00 [0%]	0.04** [13%]	0.04** [11%]	0.04** [14%]	0.03 [18%]
Others	0.07* [30%]	-0.03 [-6%]	0.02 [7%]	0.07* [29%]	0.03 [8%]	-0.04 [-17%]	0.01 [3%]	0.00 [0%]	0.05* [17%]	0.06 [35%]
Initial	-0.01 [-4%]	0.05* [11%]	0.14*** [52%]	0.07** [29%]	0.06 [17%]	0.03 [13%]	0.08** [27%]	0.15*** [43%]	0.09*** [31%]	0.10*** [59%]
Parenting styles	-0.03** [-13%]	-0.01 [-2%]	-0.03** [-11%]	-0.03** [-13%]	-0.08*** [-22%]	-0.07*** [-30%]	-0.06*** [-20%]	-0.05*** [-14%]	-0.05*** [-17%]	-0.09*** [-53%]
<i>Total</i>	-0.03 [-13%]	0.02 [4%]	0.12** [44%]	0.08 [33%]	-0.01 [-3%]	-0.08* [-35%]	0.08 [27%]	0.15*** [43%]	0.14*** [48%]	0.11 [65%]
<b><i>Return part</i></b>										
<i>Total</i>	0.26** [113%]	0.46*** [98%]	0.14 [52%]	0.15 [63%]	0.37*** [103%]	0.31*** [135%]	0.22*** [73%]	0.20*** [57%]	0.15** [52%]	0.06 [35%]

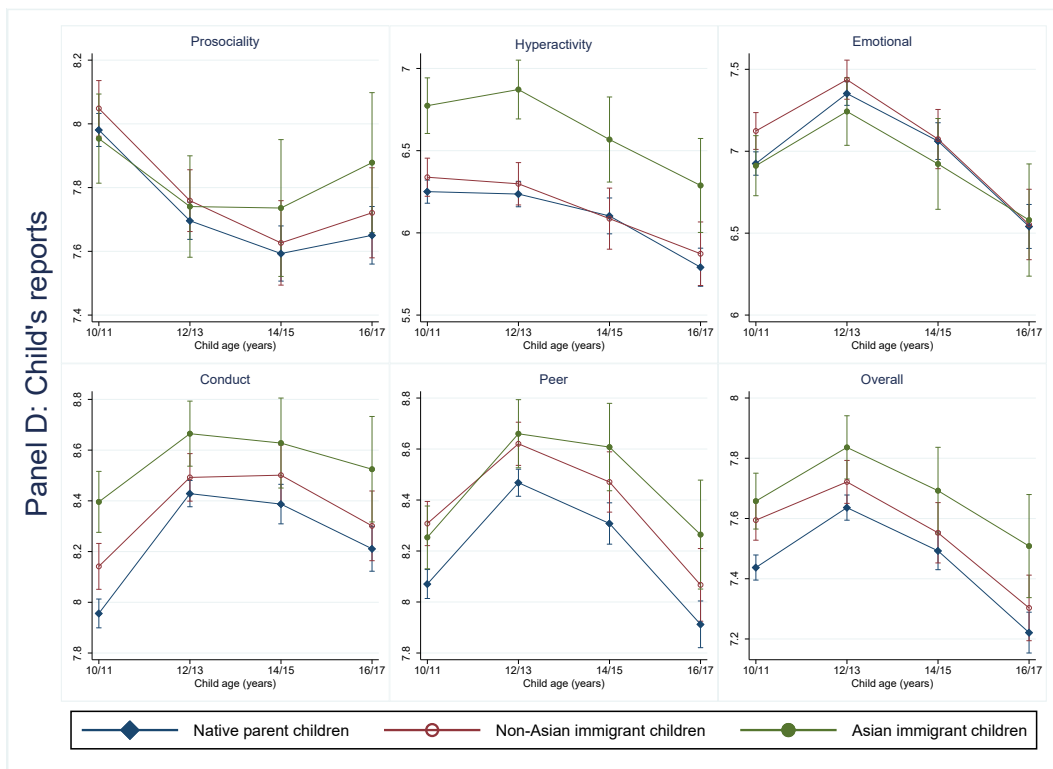
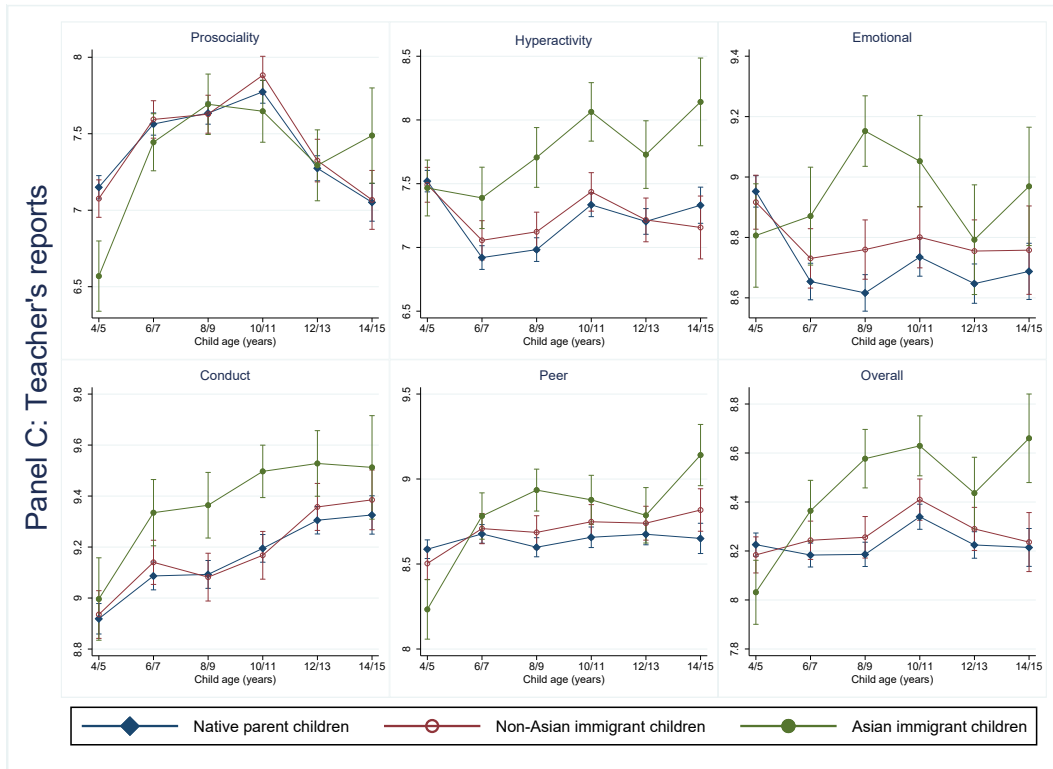


Table 2: Contributions to the Asian-Native gap in non-cognitive skills (cont.)

Measure	Peer					Overall				
	6/7	8/9	10/11	12/13	14/15	6/7	8/9	10/11	12/13	14/15
Age	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
<b><i>Estimated total gap</i></b>	0.14	0.26***	0.25***	0.13	0.49***	0.15**	0.33***	0.34***	0.30***	0.38***
<b><i>Characteristic part</i></b>										
Child	-0.04** [-29%]	0.01 [4%]	0.01 [4%]	-0.01 [-8%]	-0.01 [-2%]	-0.02 [-13%]	0.01 [3%]	0.00 [0%]	0.01 [3%]	-0.01 [-3%]
Household	-0.01 [-7%]	0.02 [8%]	-0.01 [-4%]	-0.02 [-15%]	0.03 [6%]	0.01 [7%]	0.04** [12%]	0.01 [3%]	0.02 [7%]	0.04* [11%]
Others	-0.03 [-21%]	0.08** [31%]	0.00 [0%]	0.02 [15%]	0.06 [12%]	-0.03 [-20%]	0.02 [6%]	0.02 [6%]	0.05 [17%]	0.08* [21%]
Initial	-0.05* [-36%]	0.03 [12%]	0.12*** [48%]	0.03 [23%]	0.04 [8%]	-0.06 [-40%]	0.06 [18%]	0.18*** [53%]	0.11*** [37%]	0.09 [24%]
Parenting styles	-0.05*** [-36%]	-0.04*** [-15%]	-0.02* [-8%]	-0.03** [-23%]	-0.06** [-12%]	-0.06*** [-40%]	-0.05*** [-15%]	-0.06*** [-18%]	-0.05*** [-17%]	-0.09*** [-24%]
<i>Total</i>	-0.17*** [-121%]	0.10* [38%]	0.10* [40%]	-0.01 [-8%]	0.05 [10%]	-0.16*** [-107%]	0.08 [24%]	0.16*** [47%]	0.13** [43%]	0.10 [26%]
<b><i>Return part</i></b>										
<i>Total</i>	0.31*** [221%]	0.16* [62%]	0.15* [60%]	0.14 [108%]	0.44*** [90%]	0.32*** [213%]	0.25*** [76%]	0.19*** [56%]	0.16** [53%]	0.28*** [74%]

Figure 1: Evolution of raw ethnic non-cognitive gaps – by informants





Notes: This figure reports estimated raw non-cognitive skill estimates (95 % CIs) by children's ages and ethnic background. Results are from an OLS regression of each non-cognitive skill on children's age, nativity and an interaction between children's age and nativity. Observations are weighted using population weights.

## **Appendix for online publication**

Appendix Table A1: Non-cognitive skill measures

Scale	Components
Pro-sociality	Considerate of other people's feelings Readily shared with children Helpful if someone is hurt etc. Kind to younger children Often volunteered to help
Hyperactivity <sup>(a)</sup>	Not been able to stay still Constantly fidgeting etc Easily distracted Stopped to think before acting <sup>(a)</sup>
Emotional <sup>(a)</sup>	Has a good attention span <sup>(a)</sup> Complained of headaches etc. Often seemed worried Often been unhappy or tearful Nervous or easily lose confidence
Conduct <sup>(a)</sup>	Had many fears Temper Obeys requests <sup>(a)</sup> Often fights/bullies children Often lies or cheats Steals
Peer <sup>(a)</sup>	Has been solitary Has at least one good friend <sup>(a)</sup> Liked by other children <sup>(a)</sup> Picked on/bullied by children Gets on better with adults

Notes: This table describes components of non-cognitive skill measures used in the paper. We use responses (1 Not true; 2 Somewhat true; 3 Certainly true) to the question "Please tick one box for each of the following statements to best describe the study child's behaviour over the past six months:". <sup>(a)</sup> indicates that reversed responses are used to calculate the corresponding sub-scale or the overall non-cognitive scale.

Appendix Table A2: Composition of parents' countries of birth by ethnic grouping

Asian immigrant children			Non-Asian immigrant children		
Mother COB and father COB	Count	Freq	Mother COB and father COB	Count	Freq
China China	462	9.8	Australia United Kingdom	2119	18.1
India India	379	8.0	United Kingdom Australia	1421	12.1
Viet Nam Viet Nam	368	7.8	Australia New Zealand	947	8.1
Lebanon Lebanon	202	4.3	New Zealand Australia	787	6.7
Philippines Australia	176	3.7	United Kingdom United Kingdom	721	6.1
Sri Lanka Sri Lanka	161	3.4	New Zealand New Zealand	316	2.7
Philippines Philippines	158	3.3	Papua New Guinea Australia	181	1.5
Australia Lebanon	130	2.7	Germany Australia	167	1.4
Iraq Iraq	129	2.7	South Africa South Africa	154	1.3
Australia Malaysia	99	2.1	Canada Australia	150	1.3
Malaysia Australia	86	1.8	Australia South Africa	135	1.2
Malaysia Malaysia	86	1.8	United States of America Australia	126	1.1
Pakistan Pakistan	82	1.7	United Kingdom New Zealand	124	1.1
China Australia	81	1.7	Australia United States of America	120	1.0
Bangladesh Bangladesh	69	1.5	Australia Canada	110	0.9
Sri Lanka Australia	69	1.5	Australia Ireland	109	0.9
Turkey Turkey	68	1.4	Australia Germany	105	0.9
Australia India	66	1.4	Australia Italy	98	0.8
Lebanon Australia	57	1.2	Australia Netherlands	96	0.8
Afghanistan Afghanistan	50	1.1	South Africa Australia	93	0.8
Indonesia Indonesia	48	1.0	Australia Papua New Guinea	89	0.8
Singapore Australia	48	1.0	Fiji Fiji	85	0.7
Viet Nam Australia	46	1.0	New Zealand United Kingdom	80	0.7
Thailand Australia	45	1.0	Australia France	77	0.7
Japan Australia	44	0.9	Samoa Samoa	77	0.7
Australia Philippines	43	0.9	Ireland Australia	73	0.6
Australia Israel	42	0.9	Switzerland Australia	63	0.5
India Australia	42	0.9	Australia Malta	60	0.5
Philippines United Kingdom	40	0.8	Netherlands Australia	59	0.5
East Timor East Timor	37	0.8	Italy Australia	53	0.5
Others	1317	27.8	Others	2934	25.0
Total	4730	100	Total	11729	100

Notes: This table reports the composition (in terms of the number of observations and frequency (freq.) of parents' country of birth (COB). Statistics are reported for the sample of B- and K-cohort children who have valid parental country of birth in any wave.

Appendix Table A3: Correlation of non-cognitive measures

	Pro-sociality - M	Pro-sociality - F	Pro-sociality - T	Pro-sociality - C	Hyperactivity - M	Hyperactivity - F	Hyperactivity - T	Hyperactivity - C	Emotional - M	Emotional - F	Emotional - T	Emotional - C	Conduct - M	Conduct - F	Conduct - T	Conduct - C	Peer - M	Peer - F	Peer - T	Peer - C	Overall - M	Overall - F	Overall - T	Overall - C
Pro-sociality - M	1																							
Pro-sociality - F	0.48	1																						
Pro-sociality - T	0.29	0.26	1																					
Pro-sociality - C	0.27	0.23	0.25	1																				
Hyperactivity - M	0.33	0.23	0.29	0.16	1																			
Hyperactivity - F	0.23	0.33	0.26	0.13	0.63	1																		
Hyperactivity - T	0.21	0.2	0.55	0.2	0.47	0.44	1																	
Hyperactivity - C	0.16	0.15	0.25	0.24	0.38	0.34	0.36	1																
Emotional - M	0.15	0.14	0.09	0.07	0.28	0.18	0.09	0.15	1															
Emotional - F	0.14	0.17	0.07	0.07	0.17	0.31	0.07	0.12	0.52	1														
Emotional - T	0.08	0.08	0.18	0.07	0.15	0.14	0.24	0.13	0.29	0.26	1													
Emotional - C	0.05	0.06	0.06		0.13	0.1	0.08	0.37	0.37	0.31	0.24	1												
Conduct - M	0.43	0.32	0.26	0.14	0.49	0.39	0.28	0.23	0.3	0.2	0.1	0.15	1											
Conduct - F	0.3	0.44	0.22	0.12	0.38	0.5	0.29	0.21	0.21	0.34	0.13	0.14	0.57	1										
Conduct - T	0.21	0.18	0.55	0.16	0.33	0.31	0.58	0.25	0.08	0.08	0.23	0.11	0.36	0.33	1									
Conduct - C	0.22	0.21	0.28	0.27	0.35	0.31	0.35	0.5	0.18	0.14	0.17	0.37	0.4	0.36	0.36	1								
Peer - M	0.28	0.21	0.22	0.13	0.31	0.22	0.22	0.15	0.42	0.27	0.24	0.25	0.33	0.23	0.23	0.24	1							
Peer - F	0.2	0.27	0.2	0.13	0.23	0.29	0.19	0.12	0.28	0.39	0.23	0.2	0.22	0.31	0.22	0.19	0.55	1						
Peer - T	0.16	0.15	0.42	0.11	0.23	0.22	0.34	0.15	0.18	0.16	0.43	0.18	0.2	0.18	0.4	0.22	0.39	0.37	1					
Peer - C	0.11	0.1	0.17	0.18	0.2	0.17	0.18	0.26	0.25	0.21	0.25	0.44	0.21	0.17	0.23	0.39	0.44	0.37	0.36	1				
Overall - M	0.63	0.39	0.34	0.22	0.75	0.51	0.39	0.32	0.63	0.39	0.25	0.27	0.73	0.48	0.36	0.4	0.66	0.43	0.34	0.35	1			
Overall - F	0.39	0.64	0.3	0.2	0.51	0.76	0.37	0.28	0.39	0.64	0.24	0.23	0.49	0.73	0.33	0.35	0.42	0.64	0.31	0.29	0.65	1		
Overall - T	0.27	0.25	0.78	0.23	0.43	0.4	0.81	0.33	0.19	0.17	0.54	0.17	0.33	0.32	0.75	0.38	0.35	0.33	0.68	0.31	0.47	0.44	1	
Overall - C	0.23	0.22	0.29	0.47	0.37	0.32	0.35	0.75	0.32	0.26	0.26	0.7	0.33	0.29	0.32	0.74	0.35	0.29	0.29	0.66	0.46	0.4	0.42	1

Notes: Only correlation with statistical significance level of 1 % is listed. M, F, T and C denotes that the informant is the Mother, Father, Teacher and Child, respectively.

Appendix Table A4: Loading factors of maternal parenting styles – K cohort

Variable	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5		Wave 6	
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
Display physical affection	<i>0.58</i>	<i>0.25</i>	<i>0.71</i>	<i>0.30</i>	<i>0.73</i>	<i>0.31</i>	<i>0.73</i>	<i>0.32</i>	<i>0.75</i>	<i>0.29</i>	<i>0.74</i>	<i>0.31</i>
Hug study child	<i>0.62</i>	<i>0.32</i>	<i>0.66</i>	<i>0.29</i>	<i>0.67</i>	<i>0.30</i>	<i>0.70</i>	<i>0.31</i>	<i>0.72</i>	<i>0.29</i>	<i>0.70</i>	<i>0.31</i>
Express happiness to study child	<i>0.69</i>	<i>0.29</i>	<i>0.72</i>	0.22	<i>0.74</i>	<i>0.27</i>	<i>0.74</i>	<i>0.27</i>	<i>0.73</i>	<i>0.26</i>	<i>0.73</i>	<i>0.32</i>
Warm encounters with study child	<i>0.67</i>	<i>0.31</i>	<i>0.75</i>	<i>0.28</i>	<i>0.77</i>	<i>0.29</i>	<i>0.77</i>	<i>0.29</i>	<i>0.77</i>	<i>0.27</i>	<i>0.77</i>	<i>0.29</i>
Enjoy doing things with study child	<i>0.68</i>	0.23	<i>0.71</i>	0.20	<i>0.76</i>	0.20	<i>0.75</i>	0.20	<i>0.75</i>	0.17	<i>0.74</i>	0.23
Close when happy or upset	<i>0.68</i>	0.22	<i>0.73</i>	0.21	<i>0.75</i>	0.20	<i>0.74</i>	0.19	<i>0.75</i>	0.15	<i>0.75</i>	0.18
Explains correction	<i>0.55</i>	0.13	<i>0.50</i>	0.14	<i>0.46</i>	0.20	<i>0.45</i>	<i>0.30</i>	<i>0.32</i>	<i>0.55</i>	0.23	<i>0.63</i>
Reasons when misbehaves	<i>0.55</i>	0.18	<i>0.53</i>	0.19	<i>0.50</i>	0.19	<i>0.49</i>	<i>0.32</i>	<i>0.38</i>	<i>0.53</i>	<i>0.28</i>	<i>0.62</i>
Make sure completes requests	<i>0.37</i>	-0.20	<i>0.31</i>	-0.17	<i>0.30</i>	-0.19	<i>0.27</i>	-0.14	0.23	0.12	0.21	0.09
Punish study child	0.20	<i>-0.34</i>	0.18	<i>-0.31</i>	0.19	<i>-0.35</i>	0.21	<i>-0.27</i>	0.21	0.01	0.19	0.05
Study child gets away unpunished	<i>-0.32</i>	<i>0.67</i>	<i>-0.32</i>	<i>0.69</i>	<i>-0.35</i>	<i>0.66</i>	<i>-0.38</i>	<i>0.64</i>	<i>-0.46</i>	<i>0.50</i>	<i>-0.49</i>	<i>0.50</i>
Study child gets out of punishment	<i>-0.29</i>	<i>0.68</i>	<i>-0.28</i>	<i>0.68</i>	<i>-0.32</i>	<i>0.67</i>	<i>-0.35</i>	<i>0.62</i>	<i>-0.36</i>	<i>0.51</i>	<i>-0.43</i>	<i>0.47</i>
Study child ignores punishment	<i>-0.41</i>	<i>0.64</i>	<i>-0.33</i>	<i>0.69</i>	<i>-0.40</i>	<i>0.66</i>	<i>-0.45</i>	<i>0.63</i>	<i>-0.50</i>	<i>0.54</i>	<i>-0.54</i>	<i>0.53</i>
Praise behaviour	<i>0.50</i>	0.03	<i>0.53</i>	0.05	<i>0.59</i>	-0.02	<i>0.59</i>	-0.06	<i>0.62</i>	-0.12	<i>0.65</i>	-0.14
Disapprove of behaviour	<i>-0.38</i>	<i>0.35</i>	<i>-0.40</i>	<i>0.42</i>	<i>-0.50</i>	<i>0.29</i>	<i>-0.49</i>	<i>0.35</i>	<i>-0.51</i>	<i>0.46</i>	<i>-0.54</i>	<i>0.46</i>
Angry when punishing	<i>-0.34</i>	<i>0.30</i>	<i>-0.34</i>	<i>0.37</i>	<i>-0.34</i>	<i>0.33</i>	<i>-0.40</i>	<i>0.39</i>	<i>-0.39</i>	<i>0.47</i>	<i>-0.42</i>	<i>0.44</i>
Have problems managing	<i>-0.45</i>	<i>0.46</i>	<i>-0.41</i>	<i>0.56</i>	<i>-0.45</i>	<i>0.51</i>	<i>-0.49</i>	<i>0.52</i>	<i>-0.55</i>	<i>0.53</i>	<i>-0.56</i>	<i>0.52</i>

Notes: Factor 1 represents index of warmth parenting style while factor 2 corresponds to index of effective discipline parenting style. Factor loadings with an absolute value greater than 0.25 are in bold italic.



Appendix Table A5: Correlation structure of parenting styles

	Mother warmth	Mother effective discipline	Mother warmth - lag	Mother effective discipline - lag	Father warmth	Father effective discipline	Father warmth - lag	Father effective discipline - lag
Mother warmth	1***							
Mother effective discipline		1***						
Mother warmth - lag	0.68***	0.02***	1***					
Mother effective discipline - lag	0.06***	0.58***		1***				
Father warmth	0.32***	0.09***	0.28***	0.08***	1***			
Father effective discipline	0.09***	0.31***	0.08***	0.27***		1***		
Father warmth - lag	0.3***	0.06***	0.32***	0.09***	0.69***	-0.02**	1***	
Father effective discipline - lag	0.08***	0.28***	0.09***	0.31***	0.02**	0.56***		1***

**Notes:** Only correlation with statistical significance level of 10 % or higher is listed. The symbol \*denotes significance at the 10% level, \*\*at the 5% level, and \*\*\*at the 1% level.

Appendix Table A6: Determinants of non-cognitive skills from pooled samples

Variables	Pro-sociality	Hyperactivity	Emotional	Conduct	Peer	Overall
	(1)	(2)	(3)	(4)	(5)	(6)
Asian immigrant children	0.09	0.45***	0.27***	0.19***	0.22***	0.23***
Male	-0.83***	-0.92***	0.05*	-0.30***	-0.17***	-0.39***
Child age	-0.01	-0.00	0.00	-0.00	-0.00	-0.00
Aboriginal	-0.16	-0.32***	-0.02	-0.24***	-0.04	-0.14**
Birth weight	-0.00	0.00	0.00***	-0.00	0.00	0.00
Breastfed at early childhood	0.04	0.03	0.05	0.03	0.00	0.03
Mother's age	0.10***	0.05*	0.02	0.03	0.06***	0.05***
Mother age squared	-0.00***	-0.00	-0.00	-0.00	-0.00***	-0.00***
Mother with certificate	-0.06	-0.03	-0.00	-0.03	-0.04	-0.03
Mother with advanced diploma <sup>(a)</sup>	-0.04	0.06	0.02	-0.01	0.01	0.01
Mother with bachelor <sup>(a)</sup>	0.04	0.13**	0.03	0.02	0.05	0.05*
Mother with graduate diploma <sup>(a)</sup>	-0.05	0.06	0.02	0.02	-0.07	0.00
Mother with postgraduate degree <sup>(a)</sup>	0.02	0.20***	0.02	0.08**	-0.07	0.06
Mother's weekly working hours	-0.00	-0.00	0.00***	-0.00	0.00**	0.00
Household size	-0.00	-0.01	-0.04	-0.01	-0.05*	-0.02
Number of siblings	0.04	0.02	0.10***	0.01	0.11***	0.05*
Living with both parents	0.27***	0.32***	0.24***	0.19***	0.18***	0.21***
Home owner	0.05	0.07	0.08**	0.09***	0.18***	0.08***
HH yearly income	0.01	0.01	0.03*	-0.02	0.01	0.01
Mother warm parenting	0.17***	0.19***	0.05**	0.09***	0.08***	0.11***
Mother effective parenting	0.19***	0.23***	0.09***	0.13***	0.09***	0.13***
Mother warm parenting - lag	0.04*	-0.02	-0.01	0.01	-0.00	-0.00
Mother effective parenting - lag	0.04*	0.03	0.00	0.01	0.00	0.01
Lag of non-cognitive skill	0.30***	0.49***	0.29***	0.40***	0.35***	0.48***
Observations	15,859	15,921	15,894	15,904	15,876	15,815
R-squared	0.21	0.38	0.11	0.28	0.17	0.36

Notes: Estimates for each non-cognitive scale are obtained from a separate regression using model (1) and a pooled sample of two cohorts of children of Asian immigrants and Australian born parents and all waves. Other variables include local socio-economic background variables, state/territory dummies, cohort dummy, wave dummies, and survey quarter dummies. <sup>(a)</sup> denotes no qualification as the base group. Robust standard errors are not reported for brevity. The symbol \*denotes significance at the 10% level, \*\*at the 5% level, and \*\*\*at the 1% level.

Appendix Table A7: Robustness check - Contributions of children's time allocations to the Asian-Native gap in non-cognitive skills

	Pro-sociality		Hyperactivity		Emotional		Conduct		Peer		Overall	
	Age 6/7	Age 8/9	Age 6/7	Age 8/9	Age 6/7	Age 8/9	Age 6/7	Age 8/9	Age 6/7	Age 8/9	Age 6/7	Age 8/9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<b><i>Estimated total gap</i></b>	-0.66*	-0.01	0.25	0.74***	0.45**	0.62***	0.30	0.45***	-0.05	0.29**	0.04	0.41***
<b><i>Characteristic part</i></b>												
Child	-0.09	-0.08	-0.16	-0.02	-0.03	-0.03	-0.05	-0.06**	-0.07	-0.02	-0.08	-0.04*
	[14%]	[800%]	[-64%]	[-3%]	[-7%]	[-5%]	[-17%]	[-13%]	[140%]	[-7%]	[-200%]	[-10%]
Household	-0.12	0.04	-0.02	-0.01	-0.07	-0.05	-0.05	-0.01	0.04	-0.03	-0.03	-0.01
	[18%]	[-400%]	[-8%]	[-1%]	[-16%]	[-8%]	[-17%]	[-2%]	[-80%]	[-10%]	[-75%]	[-2%]
Others	-0.01	0.08	-0.17	0.07	0.10	-0.13	-0.09	0.01	-0.06	0.02	-0.05	0.01
	[2%]	[-800%]	[-68%]	[9%]	[22%]	[-21%]	[-30%]	[2%]	[120%]	[7%]	[-125%]	[2%]
Initial	-0.00	-0.12*	-0.02	0.33***	-0.09	0.13***	0.06	0.16***	-0.02	0.09*	-0.03	0.14***
	[0%]	[1200%]	[-8%]	[45%]	[-20%]	[21%]	[20%]	[36%]	[40%]	[31%]	[-75%]	[34%]
Parenting styles	-0.13	-0.12**	-0.18	-0.18***	-0.05	-0.06	-0.12	-0.06**	-0.09	-0.07*	-0.11	-0.08**
	[20%]	[1200%]	[-72%]	[-24%]	[-11%]	[-10%]	[-40%]	[-13%]	[180%]	[-24%]	[-275%]	[-20%]
Time allocations	-0.04	-0.13*	0.02	0.00	0.01	-0.05	0.01	-0.09**	0.06	-0.14***	0.02	-0.07*
	[6%]	[1300%]	[8%]	[0%]	[2%]	[-8%]	[3%]	[-20%]	[-120%]	[-48%]	[50%]	[-17%]
<i>Total</i>	-0.39	-0.33**	-0.53	0.19	-0.14	-0.18	-0.23	-0.06	-0.14	-0.14	-0.28	-0.06
	[59%]	[3300%]	[-212%]	[26%]	[-31%]	[-29%]	[-77%]	[-13%]	[280%]	[-48%]	[-700%]	[-15%]
<b><i>Return part</i></b>												
<i>Total</i>	-0.26	0.32	0.78*	0.55**	0.58**	0.80***	0.53***	0.50***	0.09	0.43***	0.33	0.47***
	[39%]	[-3200%]	[312%]	[74%]	[129%]	[129%]	[177%]	[111%]	[-180%]	[148%]	[825%]	[115%]

Notes: Estimates from model (1) and non-cognitive skills reported by teachers are used. Grouped variables: Child: gender, age, Aboriginal status, birth weight, breastfed at birth; Household: mother's characteristics (age, completed qualification, working hours), household size, number of siblings, living with both biological parents, living in an owned home, household income; Others: states, urban, local socio-economic background variables, and survey quarters; Initial: Lag of respective non-cognitive score; Parenting styles: Current and lagged maternal parenting styles. Time allocations: Current and lagged time allocations among various grouped activities. Standard errors (not reported for brevity) are obtained using 500 bootstrap replications. Percent of the total gap is reported in squared brackets. Total figures may not add up to 100% due to rounding. The symbol \*denotes significance at the 10% level, \*\*at the 5% level, and \*\*\*at the 1% level.

Appendix Table A8: Children's time allocations

Child ages	Activity	Native parent children	Asian immigrant children	Asian-Native (= (4)-(3))
(1)	(2)	(3)	(4)	(5)
4/5	Bed	3.15	3.13	-0.02
	Personal care	1.14	1.17	0.04
	School	0.54	0.50	-0.04
	Education	0.87	1.00	0.13
	Active	1.04	0.96	-0.08
	Chore	0.00	0.00	0.00
	Media	0.71	0.67	-0.04
	Travel	0.49	0.50	0.01
6/7	Bed	3.02	2.90	-0.12**
	Personal care	1.69	1.73	0.04
	School	1.13	1.04	-0.10
	Education	0.36	0.51	0.15***
	Active	0.73	0.66	-0.07
	Chore	0.10	0.07	-0.03**
	Media	0.56	0.63	0.07*
	Travel	0.34	0.34	0.00
8/9	Bed	2.96	2.95	-0.01
	Personal care	1.55	1.62	0.07
	School	1.03	1.05	0.02
	Education	0.37	0.62	0.25***
	Active	0.82	0.56	-0.26***
	Chore	0.12	0.07	-0.05***
	Media	0.69	0.64	-0.04
	Travel	0.35	0.36	0.00

Notes: Time use variables are measured in days per week. The weekly time use measure is derived using time use measures from a weekday (multiplied by 5) and a weekend day (multiplied by 2). Statistics are reported for the estimation sample of model (1) as described in the text. Tests are performed on the significance of the difference between the sample mean for each group. The symbol \*denotes significance at the 10% level, \*\*at the 5% level, and \*\*\*at the 1% level.

Appendix Table A9: Robustness check - Determinants of non-cognitive scores with inclusion of children's time allocations

Variables	Pro-sociality		Hyperactivity		Emotional		Conduct		Peer		Overall	
	Age 6/7	Age 8/9	Age 6/7	Age 8/9	Age 6/7	Age 8/9	Age 6/7	Age 8/9	Age 6/7	Age 8/9	Age 6/7	Age 8/9
Asian immigrant children	-0.26	0.32	0.78*	0.55**	0.58**	0.80***	0.53***	0.50***	0.09	0.43***	0.33*	0.47***
Personal care	-0.03	-0.06	0.09	-0.09	0.07	-0.14*	-0.03	-0.02	0.00	-0.11*	0.02	-0.09*
School	0.06	0.13	-0.35*	0.09	-0.21	0.17*	-0.11	-0.05	0.01	0.07	-0.11	0.09
Education	0.20	-0.15	0.43	0.11	-0.11	-0.05	0.31**	-0.02	0.35*	-0.17	0.21	-0.02
Active	0.14	0.23*	0.08	0.23**	-0.00	0.19*	0.06	0.12	-0.14	0.27***	0.00	0.20***
Chore	-0.69	0.73	-1.18	0.29	0.61	0.27	-0.96	0.19	-0.13	0.13	-0.50	0.28
Media	0.03	-0.35*	-0.15	0.11	0.24	0.02	0.18	-0.19	0.08	-0.06	0.07	-0.05
Travel	0.28	0.50**	-0.09	-0.13	-0.06	-0.11	-0.13	-0.23	-0.07	-0.17	-0.02	-0.01
Personal care - lag	-0.04	0.02	0.16	0.05	-0.08	0.07	-0.15	0.01	-0.08	-0.09	-0.03	0.02
School - lag	0.08	0.06	0.15	0.05	0.09	0.09	0.04	0.17**	-0.18	0.24***	0.05	0.11
Education - lag	-0.07	-0.11	-0.12	0.11	0.00	0.12	-0.06	-0.26**	0.01	-0.02	-0.04	-0.04
Active - lag	-0.03	0.07	0.14	-0.21	-0.01	-0.15	0.04	-0.01	-0.00	-0.01	0.03	-0.08
Media - lag	0.08	0.18	0.04	0.34*	-0.05	0.05	-0.10	0.15	-0.27	0.05	-0.06	0.13
Travel - lag	-0.02	-0.17	0.08	0.24	-0.13	0.23	0.09	0.02	0.06	0.05	0.04	0.06
Mother warmth	0.21**	0.15*	0.32**	0.21**	-0.03	0.19***	0.11	0.06	0.11	0.12*	0.14**	0.14***
Mother effective discipline	0.56***	0.14*	0.37***	0.24***	0.15	0.08	0.25***	0.09*	0.12	0.20***	0.28***	0.14***
Mother warmth - lag	-0.15	0.06	-0.25*	-0.02	0.03	-0.10	-0.01	0.01	-0.03	-0.08	-0.09	-0.04
Mother effective discipline - lag	-0.02	-0.06	0.14	0.08	0.11	-0.04	0.08	0.02	0.09	-0.06	0.07	-0.03
Lag scores	0.28***	0.34***	0.52***	0.56***	0.21***	0.23***	0.34***	0.41***	0.30***	0.37***	0.40***	0.50***
Observations	659	1,075	660	1,075	658	1,074	658	1,075	657	1,071	654	1,070
R-squared	0.29	0.26	0.42	0.45	0.11	0.15	0.30	0.29	0.21	0.24	0.38	0.39

Notes: Estimates for each subject-level are obtained from a separate regression using model (1). Time use variables are measured in days per week (bed time is the base group). Other variables include child characteristics, household characteristics, local socio-economic background variables, state/territory dummies, and survey quarters. Robust standard errors are not reported for brevity. The symbol \*denotes significance at the 10% level, \*\*at the 5% level, and \*\*\*at the 1% level.

Appendix Table A10: Robustness check - Contributions of fathers' parenting styles

Measure	Pro-sociality					Hyperactivity				
	6/7	8/9	10/11	12/13	14/15	6/7	8/9	10/11	12/13	14/15
Age	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<b>Estimated total gap</b>	-0.31**	-0.15	-0.11	-0.17	0.03	0.29	0.48**	0.69***	0.31*	0.38
<b>Characteristic part</b>										
Child	-0.04	-0.02	0.02	0.02	0.01	-0.06	-0.04	0.02	0.02	0.06
	[13%]	[13%]	[-18%]	[-12%]	[33%]	[-21%]	[-8%]	[3%]	[6%]	[16%]
Household	-0.01	-0.03	-0.06	-0.01	-0.00	0.01	-0.03	-0.04	0.04	0.03
	[3%]	[20%]	[55%]	[6%]	[0%]	[3%]	[-6%]	[-6%]	[13%]	[8%]
Others	0.01	0.09	0.02	0.11	0.12	-0.07	0.05	0.10*	0.04	0.09
	[-3%]	[-60%]	[-18%]	[-65%]	[400%]	[-24%]	[10%]	[14%]	[13%]	[24%]
Initial	-0.13***	-0.10*	-0.03	-0.03	-0.20**	-0.01	0.16	0.29***	0.24***	0.04
	[42%]	[67%]	[27%]	[18%]	[-667%]	[-3%]	[33%]	[42%]	[77%]	[11%]
Father's parenting styles	-0.02	-0.09***	-0.03	-0.01	-0.07	-0.02	-0.05**	-0.06**	-0.05**	-0.05
	[6%]	[60%]	[27%]	[6%]	[-233%]	[-7%]	[-10%]	[-9%]	[-16%]	[-13%]
Mother's parenting styles	-0.09***	-0.10***	-0.13***	-0.13***	-0.03	-0.05	-0.13***	-0.09***	-0.07*	-0.14**
	[29%]	[67%]	[118%]	[76%]	[-100%]	[-17%]	[-27%]	[-13%]	[-23%]	[-37%]
<i>Total</i>	-0.28***	-0.25**	-0.21**	-0.05	-0.17	-0.20	-0.04	0.21*	0.22	0.03
	[90%]	[167%]	[191%]	[29%]	[-567%]	[-69%]	[-8%]	[30%]	[71%]	[8%]
<b>Return part</b>										
<i>Total</i>	-0.03	0.10	0.09	-0.12	0.20	0.49***	0.52***	0.48***	0.10	0.35
	[10%]	[-67%]	[-82%]	[71%]	[667%]	[169%]	[108%]	[70%]	[32%]	[92%]

Notes: Estimates from model (1) and non-cognitive skills reported by teachers are used. Grouped variables: Father's parenting styles: Current and lagged paternal parenting styles; Mother's parenting styles: Current and lagged maternal parenting styles. N/A indicates "Not Applicable" due to division by zero. Other notes: see Table 2.

Appendix Table A10: Robustness check - Contributions of fathers' parenting styles (cont.)

Measure	Emotional					Conduct				
	6/7	8/9	10/11	12/13	14/15	6/7	8/9	10/11	12/13	14/15
Age	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
<b><i>Estimated total gap</i></b>	0.11	0.40***	0.15	-0.00	0.20	0.15	0.25***	0.24***	0.12	0.06
<b><i>Characteristic part</i></b>										
Child	-0.04	-0.01	-0.02	-0.01	-0.08**	-0.02	-0.04*	0.03**	0.02	0.02
	[-36%]	[-3%]	[-13%]	N/A	[-40%]	[-13%]	[-16%]	[13%]	[17%]	[33%]
Household	-0.04	-0.09**	-0.07**	-0.00	0.01	0.00	-0.01	0.01	0.01	0.02
	[-36%]	[-23%]	[-47%]	N/A	[5%]	[0%]	[-4%]	[4%]	[8%]	[33%]
Others	0.04	-0.01	0.06	0.06	-0.04	0.01	0.05	-0.00	0.02	0.02
	[36%]	[-3%]	[40%]	N/A	[-20%]	[7%]	[20%]	[0%]	[17%]	[33%]
Initial	-0.00	0.07*	0.10**	0.02	-0.00	0.02	0.04	0.10***	0.02	0.03
	[0%]	[18%]	[67%]	N/A	[0%]	[13%]	[16%]	[42%]	[17%]	[50%]
Father's parenting styles	-0.02	-0.06**	-0.03*	0.01	-0.04	-0.01	-0.06***	-0.02	-0.03**	-0.04*
	[-18%]	[-15%]	[-20%]	N/A	[-20%]	[-7%]	[-24%]	[-8%]	[-25%]	[-67%]
Mother's parenting styles	0.00	-0.02	-0.04	-0.08***	-0.01	-0.06***	-0.04*	-0.04**	-0.05**	-0.04
	[0%]	[-5%]	[-27%]	N/A	[-5%]	[-40%]	[-16%]	[-17%]	[-42%]	[-67%]
<i>Total</i>	-0.05	-0.12	-0.00	-0.00	-0.15	-0.05	-0.05	0.07	-0.01	-0.00
	[-45%]	[-30%]	[0%]	N/A	[-75%]	[-33%]	[-20%]	[29%]	[-8%]	[0%]
<b><i>Return part</i></b>										
<i>Total</i>	0.17	0.53***	0.15	-0.00	0.36**	0.20*	0.30***	0.17**	0.13	0.06
	[155%]	[133%]	[100%]	N/A	[180%]	[133%]	[120%]	[71%]	[108%]	[100%]

Appendix Table A10: Robustness check - Contributions of fathers' parenting styles (cont.)

Measure	Peer					Overall				
	6/7	8/9	10/11	12/13	14/15	6/7	8/9	10/11	12/13	14/15
Age	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
<b><i>Estimated total gap</i></b>	0.09	0.23**	0.15	-0.10	0.29*	0.06	0.24**	0.23**	0.05	0.18
<b><i>Characteristic part</i></b>										
Child	-0.01 [-11%]	-0.00 [0%]	0.03* [20%]	0.00 [0%]	-0.01 [-3%]	-0.03 [-50%]	-0.02 [-8%]	0.02 [9%]	0.01 [20%]	-0.00 [0%]
Household	-0.03 [-33%]	-0.03 [-13%]	-0.01 [-7%]	-0.03 [30%]	0.02 [7%]	-0.01 [-17%]	-0.04 [-17%]	-0.03 [-13%]	0.00 [0%]	0.02 [11%]
Others	-0.01 [-11%]	0.08* [35%]	0.00 [0%]	0.07 [-70%]	0.17** [59%]	0.00 [0%]	0.05 [21%]	0.03 [13%]	0.05 [100%]	0.07 [39%]
Initial	-0.02 [-22%]	0.03 [13%]	0.07 [47%]	-0.00 [0%]	-0.06 [-21%]	-0.04 [-67%]	0.04 [17%]	0.11** [48%]	0.05 [100%]	-0.04 [-22%]
Father's parenting styles	-0.02 [-22%]	-0.03* [-13%]	-0.03* [-20%]	0.01 [-10%]	-0.03 [-10%]	-0.01 [-17%]	-0.05*** [-21%]	-0.03** [-13%]	-0.01 [-20%]	-0.04** [-22%]
Mother's parenting styles	-0.03 [-33%]	-0.02 [-9%]	-0.00 [0%]	-0.05* [50%]	-0.01 [-3%]	-0.04** [-67%]	-0.05** [-21%]	-0.05*** [-22%]	-0.07*** [-140%]	-0.05 [-28%]
<b><i>Total</i></b>	-0.11 [-122%]	0.03 [13%]	0.06 [40%]	0.00 [0%]	0.07 [24%]	-0.14* [-233%]	-0.07 [-29%]	0.05 [22%]	0.03 [60%]	-0.04 [-22%]
<b><i>Return part</i></b>										
<b><i>Total</i></b>	0.20* [222%]	0.20* [87%]	0.09 [60%]	-0.11 [110%]	0.22 [76%]	0.20** [333%]	0.31*** [129%]	0.18** [78%]	0.02 [40%]	0.22* [122%]



Appendix Table A11: Robustness check - Mothers' evaluations of children's non-cognitive skills

Measure	Pro-sociality					Hyperactivity				
	6/7	8/9	10/11	12/13	14/15	6/7	8/9	10/11	12/13	14/15
Age	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<b><i>Estimated total gap</i></b>	-0.18**	-0.26***	-0.26***	-0.25***	-0.27**	0.16*	0.16	0.24**	0.36***	0.30**
<b><i>Characteristic part</i></b>										
Child	0.01 [-6%]	-0.02 [8%]	-0.01 [4%]	-0.00 [0%]	0.02 [-7%]	-0.01 [-6%]	-0.02 [-13%]	-0.00 [0%]	-0.01 [-3%]	-0.01 [-3%]
Household	0.02 [-11%]	-0.01 [4%]	-0.03** [12%]	-0.00 [0%]	0.00 [0%]	0.02 [13%]	0.01 [6%]	0.01 [4%]	0.02 [6%]	-0.01 [-3%]
Others	0.03 [-17%]	0.05 [-19%]	0.03 [-12%]	0.02 [-8%]	0.03 [-11%]	-0.01 [-6%]	-0.00 [0%]	0.01 [4%]	0.04 [11%]	0.08* [27%]
Initial	-0.03 [17%]	-0.12*** [46%]	-0.19*** [73%]	-0.16*** [64%]	-0.11* [41%]	-0.08 [-50%]	0.08 [50%]	0.10 [42%]	0.21*** [58%]	0.30*** [100%]
Parenting styles	-0.17*** [94%]	-0.12*** [46%]	-0.10*** [38%]	-0.14*** [56%]	-0.15*** [56%]	-0.18*** [-113%]	-0.11*** [-69%]	-0.13*** [-54%]	-0.09*** [-25%]	-0.13*** [-43%]
<i>Total</i>	-0.14** [78%]	-0.22*** [85%]	-0.30*** [115%]	-0.29*** [116%]	-0.21** [78%]	-0.26*** [-163%]	-0.06 [-38%]	0.00 [0%]	0.17* [47%]	0.23** [77%]
<b><i>Return part</i></b>										
<i>Total</i>	-0.04 [22%]	-0.04 [15%]	0.04 [-15%]	0.04 [-16%]	-0.06 [22%]	0.42*** [263%]	0.22** [138%]	0.24*** [100%]	0.19** [53%]	0.06 [20%]

Notes: Estimates from model (1) and non-cognitive skills reported by mothers are used. Other notes: see Table 2.

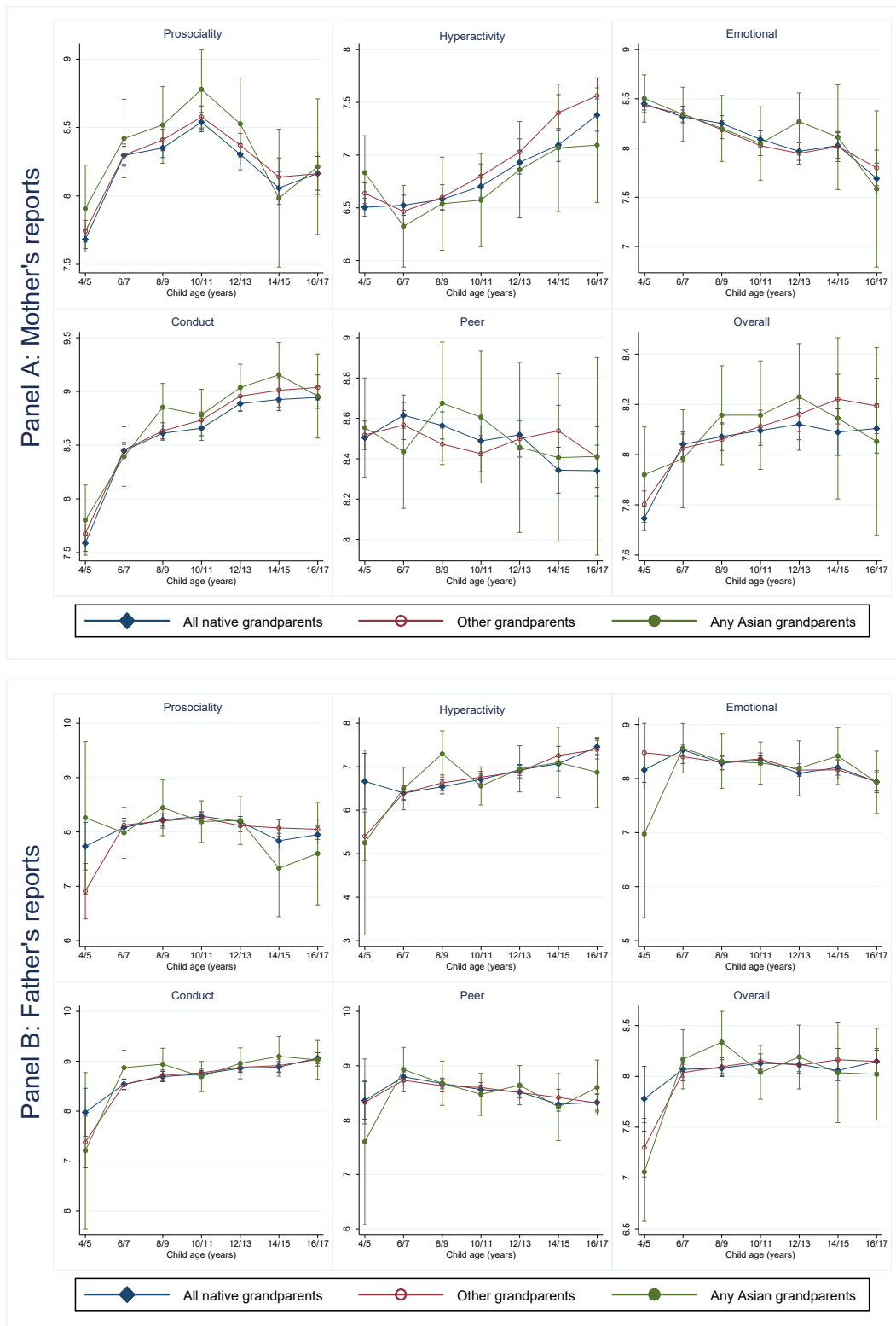
Appendix Table A11: Robustness check - Mothers' evaluations of children's non-cognitive skills (cont.)

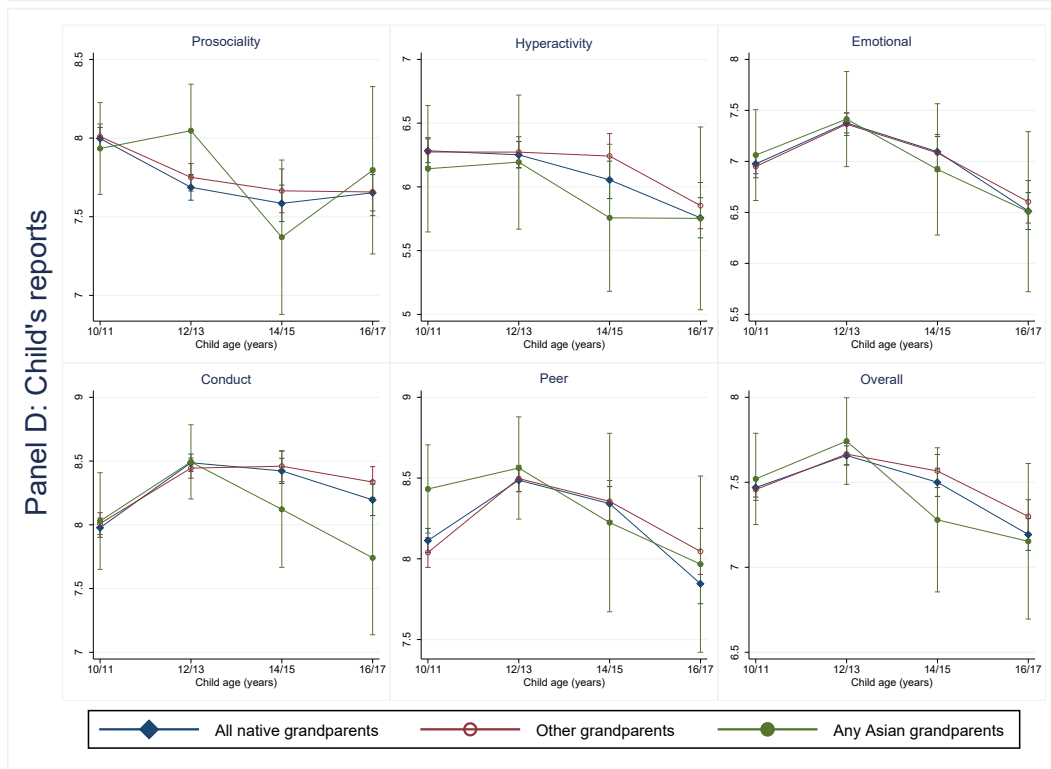
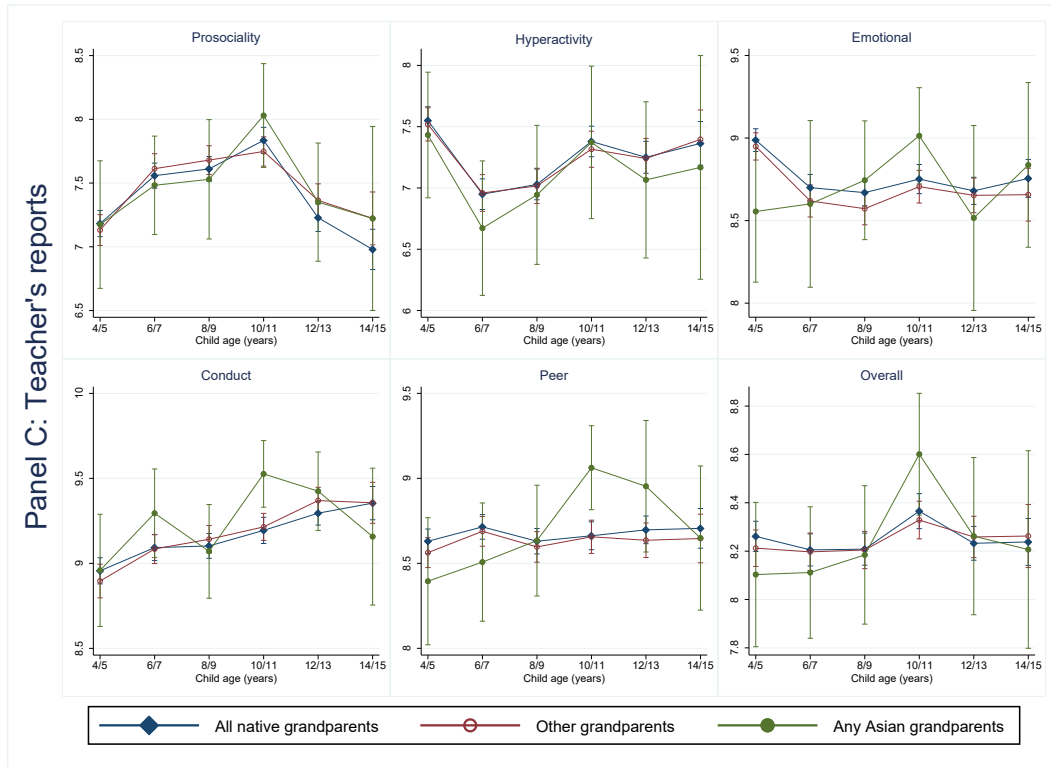
Measure	Emotional					Conduct				
	6/7	8/9	10/11	12/13	14/15	6/7	8/9	10/11	12/13	14/15
Age	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
<i>Estimated total gap</i>	-0.25***	-0.02	-0.17*	0.11	0.02	0.05	0.18***	0.07	0.03	-0.02
<i>Characteristic part</i>										
Child	-0.01	0.01	-0.01	0.00	-0.03	-0.00	0.01	-0.01	0.01	-0.01
	[4%]	[-50%]	[6%]	[0%]	[-150%]	[0%]	[6%]	[-14%]	[33%]	[50%]
Household	-0.01	-0.03	0.03	-0.04**	0.02	0.03***	0.01	0.03**	0.00	0.03**
	[4%]	[150%]	[-18%]	[-36%]	[100%]	[60%]	[6%]	[43%]	[0%]	[-150%]
Others	0.07**	-0.07**	0.00	0.04	0.02	0.06**	0.03	0.05**	0.05**	0.06**
	[-28%]	[350%]	[0%]	[36%]	[100%]	[120%]	[17%]	[71%]	[167%]	[-300%]
Initial	-0.17***	-0.15***	-0.04	-0.06	0.00	-0.01	0.02	0.10***	0.02	0.01
	[68%]	[750%]	[24%]	[-55%]	[0%]	[-20%]	[11%]	[143%]	[67%]	[-50%]
Parenting styles	-0.13***	-0.08***	-0.08***	-0.08***	-0.09***	-0.21***	-0.14***	-0.14***	-0.13***	-0.16***
	[52%]	[400%]	[47%]	[-73%]	[-450%]	[-420%]	[-78%]	[-200%]	[-433%]	[800%]
<i>Total</i>	-0.25***	-0.31***	-0.09	-0.14**	-0.09	-0.13***	-0.08	0.04	-0.05	-0.06
	[100%]	[1550%]	[53%]	[-127%]	[-450%]	[-260%]	[-44%]	[57%]	[-167%]	[300%]
<i>Return part</i>										
<i>Total</i>	-0.01	0.30***	-0.08	0.25***	0.10	0.18***	0.26***	0.04	0.08	0.05
	[4%]	[-1500%]	[47%]	[227%]	[500%]	[360%]	[144%]	[57%]	[267%]	[-250%]

Appendix Table A11: Robustness check - Mothers' evaluations of children's non-cognitive skills (cont.)

Measure	Peer					Overall				
	6/7	8/9	10/11	12/13	14/15	6/7	8/9	10/11	12/13	14/15
Age	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
<i>Estimated total gap</i>	-0.44***	-0.25***	-0.07	-0.13*	-0.13	-0.13***	-0.04	-0.04	0.03	-0.02
<i>Characteristic part</i>										
Child	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	0.00	-0.01
	[0%]	[0%]	[0%]	[0%]	[0%]	[0%]	[0%]	[0%]	[0%]	[50%]
Household	0.03*	0.01	0.02	-0.01	0.01	0.02*	-0.00	0.01	-0.01	0.01
	[-7%]	[-4%]	[-29%]	[8%]	[-8%]	[-15%]	[0%]	[-25%]	[-33%]	[-50%]
Others	0.03	0.03	-0.01	0.01	0.08*	0.03*	0.00	0.01	0.02	0.05**
	[-7%]	[-12%]	[14%]	[-8%]	[-62%]	[-23%]	[0%]	[-25%]	[67%]	[-250%]
Initial	-0.29***	-0.25***	-0.18***	-0.04	-0.06	-0.14***	-0.11***	-0.06	-0.02	0.03
	[66%]	[100%]	[257%]	[31%]	[46%]	[108%]	[275%]	[150%]	[-67%]	[-150%]
Parenting styles	-0.10***	-0.06***	-0.05***	-0.06***	-0.07***	-0.13***	-0.07***	-0.07***	-0.08***	-0.10***
	[23%]	[24%]	[71%]	[46%]	[54%]	[100%]	[175%]	[175%]	[-267%]	[500%]
<i>Total</i>	-0.34***	-0.28***	-0.23***	-0.11*	-0.04	-0.22***	-0.19***	-0.11**	-0.08	-0.02
	[77%]	[112%]	[329%]	[85%]	[31%]	[169%]	[475%]	[275%]	[-267%]	[100%]
<i>Return part</i>										
<i>Total</i>	-0.10	0.03	0.16**	-0.02	-0.09	0.09**	0.15***	0.07	0.10**	-0.01
	[23%]	[-12%]	[-229%]	[15%]	[69%]	[-69%]	[-375%]	[-175%]	[333%]	[50%]

Appendix Figure A1: Robustness check – Relative non-cognitive development of third-generation Asian immigrant children





Notes: This figure reports estimated raw non-cognitive skill estimates (95 % CIs) by children's ages and ethnic background. Results are from an OLS regression of each non-cognitive skill on children's age, nativity and an interaction between children's age and nativity. Observations are weighted using population weights.