Intergenerational Transmission of Educational Attainment in Adoptive Families in the Netherlands

Lotte Scheeren, Marjolijn Das, and Aart C. Liefbroer

Abstract: In this article, we aimed to improve our understanding of intergenerational transmission by examining the effect of family background, i.e. parent's education and income, on the educational attainment of their foreign-born adopted children. A large-scale register database is used, which contains information on the adoption status, educational level in secondary school and parental characteristics of all 15-year old children living in the Netherlands in the years 2011-2013 (N=436,720). We found that parental education is not consistently associated with the educational attainment of their foreign-born adoptees, while it is associated with biological children's education. Moreover, parental income, on the other hand, affected both adopted and biological children. Hence, the results indicate that educational attainment at age 15 is mainly driven by genes and financial capital.

Keywords: *intergenerational transmission, educational attainment, foreign-born adopted children*

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1. Introduction

For decades, scholars have examined the effect of family background on the achievements of children (Blau & Duncan, 1967; Haveman & Wolfe, 1995). In general, these studies found a strong correlation between the educational attainment of children and the educational attainment and income of their parents. Different mechanisms have been suggested to underlie this strong intergenerational transmission. First, parents may influence their children's educational attainment via the transmission of cultural capital (e.g. the transfer of knowledge or the examples they set for appropriate behaviour) (Bourdieu, 1973). Second, parents' financial capital can influence the academic achievement of their children (Becker & Tomes, 1986). Higher-income parents have more resources to invest in their children, which can be beneficial for children's school performance. And a third possible cause is hereditary factors; since cognitive abilities and IQ are partially inherited abilities, the similarity between parents and children can be the outcome of genetic transmission (Anger & Heineck, 2010; Leibowitz, 1974). However, it is difficult to disentangle these three mechanisms, since the indicators are strongly related.

To separate the underlying mechanisms and especially improve our understanding of the role of genetic factors in intergenerational transmission of education and income, three different research strategies have been applied in recent studies (Holmlund, Lindahl & Plug, 2011). First, some studies use twins. For instance, they compared monozygotic and dizygotic twins, since the difference in similarity can be attributed to genetic influence (Behrman, Rosenzweig & Taubman, 1994), or they studied identical twins who were reared apart, as differences between them can be attributed to environmental influences (Bouchard, Lykken, McGue, Segal, & Tellegen, 1990; Jensen, 1970). Second, some studies utilize adopted children. As genetic transmission is absent between adoptive parents and adopted children, genetic factors cannot cause the observed correlation between parental and child's education and occupation (Björklund, Lindahl & Plug, 2006; Liu & Zeng, 2009; Plug & Vijverberg, 2003). And third, some studies investigate intergenerational effects with the use of instrumental variables, such as educational reforms (Black, Devereux & Salvanes, 2005; McNally & Maurin, 2008; Oreopoulos, Page & Stevens, 2006).

This paper focuses on the adoption strategy. Earlier studies on intergenerational transmission of education and income within adoptive families in general still observed a

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statistically significant correlation between the educational and income levels of adoptive parents and the education and income of their adopted children (e.g., Björklund et al., 2006; Björklund, Jäntti & Solon, 2007; Liu & Zeng, 2009; Plug & Vijverberg, 2003; Sacerdote, 2007). These studies thereby demonstrated the importance of family environment (e.g. parents schooling, income) on children's schooling and income, even when there is no genetic relation. However, these studies also demonstrated the importance of genetics, since the intergenerational effect was weaker for adoptive families than for families with biologically related children.

Previous research investigating intergenerational transmission within adoptive families has, however, also left a number of questions unanswered. First, almost all previous studies included mostly nationally adopted children (e.g., Björklund et al., 2007; Plug, 2004). Native-born adoptees might, however, not be randomly assigned to their adoptive parents. First, national adoptions might include children adopted by relatives. Moreover, adoption agencies can use corresponding abilities or characteristics of the natural and adoptive parents as a matching strategy to connect nationally adopted children to their adoptive parents (Scarr & Weinberg, 1994). Investigating native-born adoptees might, therefore, result in an overestimation of the environmental effect. To control for the impact of selective placement, some previous research included, besides information about the adoptive parents, also information about the biological parents (Björklund et al., 2006; Björklund et al., 2007). Another strategy is investigating internationally adopted children. Foreign-born adoptees are much less likely to be genetically related to the adoptive parents and there is also generally no or only little information about their biological parents, therefore selective placement is almost impossible (Holmlund et al., 2011). Since information about biological parents of adopted children is usually only available for nationally adopted children, and since the number of nationally adopted children nowadays is very low (Sprangers, De Jong & Van Zee, 2006), in this study we focus on internationally adopted children. Furthermore, the few studies that investigated foreign-born adopted children, provided inconsistent results (Björklund & Richardson, 2001; Haegeland, Kirkeboen, Raaum & Salvanes, 2010; Holmlund et al., 2011; Sacerdote, 2007). Whereas Sacerdote (2007) showed that parental education strongly affected the educational attainment of foreign-born adoptees in the United States, much smaller effects are found in studies implemented in Norway and Sweden (Björklund & Richardson, 2001; Haegeland et al., 2010; Holmlund et al., 2011). Haegeland et al (2010) even found only a small significant effect of mother's education on foreign-born adoptees'

education and Björklund and Richardson (2001) found no significant effect of both father's and mother's education. Hence, a first aim of this study is to examine intergenerational transmission of education between parents and their adoptive non-native born children.

Second, earlier studies focused on adoptees born between 1962 and 1979 (e.g., Björklund & Richardson, 2001; Björklund et al., 2006; Plug, 2004; Plug & Vijverberg, 2005; Sacerdote, 2007). Hence, the respondents were already adults at the time of the interview and, thus, went to school years ago. However, in the past decades, school systems, average educational levels, openness of societies and gender equality have all changed (Erikson & Rudolphi, 2010; Peter & Horn, 2005), potentially leading to a change in the effect of parental education and income on their children's educational attainment as well. Haegeland et al. (2010) started using more recent birth cohorts, however, we need more studies investigating intergenerational effects with the use of recent birth cohorts to see whether the effects really changed over time. Therefore, a second aim of this study is to investigate the effect of parental characteristics on their adopted child's educational attainment in more recent birth cohorts.

Third, earlier studies were conducted in a very limited number of countries, i.e. mainly in Sweden and the United States. Given that the strength of intergenerational transmission between biological parents and children is known to vary across countries (Blanden, 2013; Solon, 2002), it could be argued that context matters as well for the study of transmission between adoptive parents and children. Societies with high inequality generally have lower social mobility, indicating that in these countries the family environment has a stronger influence on children's outcomes than in societies with low inequality (Blanden, 2013). Therefore, a first aim of this study is to test the strength of transmission among adoptive parents and children in a new context, i.e. the Netherlands. In the Netherlands the inequality is relatively low compared to the US, but relatively high compared to Sweden (OECD, 2011). Hence, ceteris paribus, it could be expected that intergenerational non-genetic transmission in the Netherlands is stronger than in Sweden, but weaker than in the US. In summary, this study examines the effect of family background, in particular of parental education and income, on the educational attainment of foreign-born adoptees in the Netherlands. By focusing on internationally adopted children who were born between 1995 and 1998, we are able to investigate the parental effect on a recent cohort of school-aged children. Our central research question is: To what extent is the educational attainment of foreign-born adopted children at age 15 related to the educational attainment and

income of the adoptive parents in the Netherlands, and how does this compare to the parental effect on educational attainment of non-adopted children?

To answer this question, a large-scale register database is used, which contains information on the adoption status and educational level in secondary school of all 15-year old children living in the Netherlands in the years 2011-13, and on characteristics of the (adoptive) parents, such as educational attainment and income.

This paper continues as follows. Section 2 provides the institutional setting of international adoptions in the Netherlands. In section 3 the underlying mechanisms and theoretical expectations are discussed. Our data and measures are presented in section 4. Section 5 reports our results and presents a number of sensitivity tests. Finally, section 6 discusses our main findings, concludes and suggests directions for future research.

2. International adoptions in the Netherlands

Even though adoption already became a legal option in several western countries as early as the 19th century, it was legalized in the Netherlands only in 1956 (Hoksbergen, 2002). Thus, the Netherlands was one of the last countries in Europe to legalize adoption. Although the new law offered the opportunity to adopt both nationally and internationally, in the 1950s and 1960s it mainly concerned national adoptions. However, since the 1970s there has been a tremendous growth in international adoptions, especially because the number of children given up for adoption within the Netherlands decreased as a result of the introduction of the birth control pill and the 'National Assistance Act', which made it possible for young single mothers to raise their children themselves (Sprangers et al., 2006). Since 1956, more than 55,000 children have been adopted in the Netherlands of whom 39,000 of foreign-born origin (De Winter, Eilbracht & Sprangers, 2010).

Although the first internationally adopted children were predominantly born in other European countries, such as Greece and Austria, since the seventies, the number of children adopted from European countries decreased. From that time onwards, internationally adopted children were mainly born in Asia – initially mainly in South Korea and later mostly in China – and South America, especially in Colombia (Sprangers et al., 2006). Also in this period, the proportion of adopted girls increased. Especially between 1995 and 2005, more girls than boys

were adopted (Sprangers & Vissers, 2012). Moreover, the mean adoption age of the children remained quite stable over time, on average between the 2 and 3 years of age.

Dutch parents who want to adopt a foreign child must follow specific procedures and meet certain conditions. First, when parents submit the request for adoption, they both have to be below 42 years of age and the difference between the oldest parent and the adoption child cannot be more than 40 years. Parents also have to live in the Netherlands, have to hand in a medical certificate and a certificate of good conduct (Sprangers et al., 2006). Subsequently, parents have to attend several mandatory information and preparation sessions, especially to help them to make a conscious decision about whether to adopt or not. Moreover, the council of child protection examines the living conditions of the household, to make sure the adopted child is placed into a safe environment. Finally, there are also costs involved in the adoption process, ranging from €7,500 to over €35,000.

Due to the strictness of the adoption procedure, parents with adopted children differ from parents with biological children in the Netherlands on several characteristics. In general, parents who adopt a child have first tried to have their own biological children. Hence, when they have their first child, adoptive parents are generally older and married for a longer period of time compared to biological parents (Hoksbergen 1991). Also, due to, inter alia, the high adoption costs, adoptive parents are generally higher educated and have a higher household income than parents with biological children (Verhulst & Versluis-den Bieman, 1989).

3. Theory

3.1 Effect of family background

In the literature, three main explanations are suggested for the association between parents' socioeconomic status (SES) and children's educational attainment within families with biological children (e.g. Becker & Tomes, 1986; Solon, 2004). Some of these explanations also lead one to expect an association between parental SES and children's educational attainment within families with adopted children, whereas others do not.

First, children's educational attainment can be influenced by parents via the transmission of cultural capital (Bourdieu, 1973). Cultural capital can be seen as the entity of attitudes, preferences, knowledge, skills, behaviours, goods and credentials, which are connected to a specific status (Lamont & Lareau, 1988). Parents will try to transmit their attained cultural capital

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to their children. Hence, children with parents who have high status cultural capital are likely also to gain this high status cultural capital, which will, subsequently, help them to achieve a higher level of educational attainment. Due to this high status cultural capital, children know, for instance, how to behave properly according to high status culture in specific situations (Lareau, 2011). Hence, the knowledge, skills and aspirations parents with high status cultural capital transmit to their children and the examples they set for work effort and how to behave in school will help their children gain high levels of educational attainment. It is likely that not only biological children profit from parents' cultural capital, but that this is also true for adopted children. As we use parental education as a proxy for cultural capital (Bourdieu, 1973; Jonsson, 1987), we hypothesize:

Hypothesis 1: *The higher the educational attainment of parents of biological and adopted children, the higher the children's educational attainment.*

Another explanation for the association between parental SES and children's educational attainment, besides the transmission of cultural capital, is the family's financial capital (Becker & Tomes, 1986; Leibowitz, 1974). Families with higher financial capital, have more (economic) resources to invest in their children, which can aid their children's school performance. For instance, they are better able to pay for homework assistance or tutoring when this is needed (Becker & Tomes, 1986; Boudon, 1974). Besides this direct effect of economic resources on children's educational attainment, financial capital also indirectly affects children's educational performance as it provides physical and social resources that can positively influence achievement. For instance, parents with more financial capital generally live in better neighbourhoods, providing a potential network of friends with high status cultural capital regardless of the parent's cultural capital. Also, children of wealthier parents are more likely to have, for example, their own room or their own laptop, which can help them with studying or doing their homework properly. Hence, we expect that children with higher-income parents are more likely to attain a higher level of education, which is also referred to as the economic capital hypothesis (Boudon, 1974). Again, it is likely that this reasoning applies to both biological and adopted children. Therefore, we hypothesize:

Hypothesis 2: *The higher the income of parents of biological and adopted children, the higher the children's educational attainment.*

And third, the association between family background and children's educational attainment can be caused by genetic transmission (Leibowitz, 1974). As parents pass their genes on to their biological children, parents and children have partly equal genetically based traits that may hinder or foster educational attainment and economic success. Children's IQ and cognitive abilities are both examples of partially inherited abilities (Anger & Heineck, 2010; Plomin & Petrill, 1997; Plomin & Spinath, 2004). Hence, the association between parental education and income and children's educational attainment can partially be explained by equal genetic predisposition.

The association between parents' educational attainment and income and the child's educational attainment might, thus, be partially due to genetic transmission and partially due to actual cultural and economic transmission. Since adopted children are not genetically related to their adoptive parents, the intergenerational effect in adoptive families cannot be due to genetic transmission and thus can only be attributed to "nurture". Hence, in the presence of genetic transmission we expect the intergenerational effect to be higher for biologically related children than for adopted children. Therefore we hypothesize:

Hypothesis 3: *The effect of parents' educational attainment and income on children's educational attainment will be smaller for adopted children than for biological children.*

3.2 Effect of adoption

The educational attainment of adopted children will not only be influenced by family background characteristics, but most likely by characteristics related to the adoption itself as well (Björklund & Richardson, 2001). Hence, it is important to include adoption characteristics in the model that might impede or facilitate the educational attainment of internationally adopted children.

Before adopted children arrive in their new adoptive home, they often have encountered multiple negative experiences. Some of these, such as separation from the biological mother, are encountered by all adopted children. Other negative experiences are more likely to be encountered by children who were adopted at a later age, e.g. several separations from caretakers

and the experience of institutionalization, which increases the likelihood that children have been exposed to deprivation with respect to attention, stimulation, nutrition and medical care (Juffer & IJzendoorn, 2005). This can lead to several problems later in life, such as difficulties in establishing secure attachment, behavioural problems, and delayed development, putting adopted children at an elevated risk of maladjustment (Verhulst, Althaus & Versluis-den Bieman,1990) and possibly hindering their educational performance. The earlier an adopted child is placed in the adoptive home, the less likely a child has prolonged suffered from several of these potentially negative experiences (Bohman, 1970; Verhulst, Althaus & Versluis-den Bieman,1990). Moreover, internationally adopted children that were adopted at a later age will have more difficulties in coping with changes in language, culture and environment, making it harder for them to integrate in their new country and possibly impeding their educational performance. Hence, we expect the age at which adoption occurred to negatively affect the educational attainment of the adopted child.

Besides the age at adoption, the country of birth might also affect an adopted child's educational attainment (Björklund & Richardson, 2001; Juffer, 2008). If the child is adopted from a very poor country, there is a higher likelihood that the child has not received sufficient care preceding the adoption, both prenatally and postnatally, e.g. as a results of institutionalization after birth. Also, in a poor country the likelihood is higher that a child is given up for adoption due to poverty. Having poor biological parents may mean that the child lacked adequate prenatal and postnatal care or suffered from malnutrition during pregnancy. In contrast, in a country like China children were often given up for adoption due to the one-child policy and not due to poverty (Juffer, 2008), therefore these children may have received sufficient prenatal, postnatal and medical care and thus have a lower likelihood to have had several negative experiences. Hence, the deprivation in the country of birth influences the likelihood a child has had several negative experiences and lacked sufficient prenatal and postnatal care, which can, subsequently, hinder a child's educational attainment.

4. Data and Methods

4.1 Data and study population
The data used in this study are retrieved from the System of Social statistical Datasets (SSD) of Statistics Netherlands (Bakker, Van Rooijen & Van Toor, 2014). The SSD combines a vast

number of administrative registers, among which the population register (containing personal characteristics, marital status, family relationships, household structure), tax registers (e.g. income), and educational registers (educational level, enrolment in education). Most registers are longitudinal and cover the complete Dutch population, making these data exceptionally well suited for research on intergenerational transmission.

Information on adoption status is based on data from the Dutch Immigration and Naturalisation Service (INS), which provide migration motives of non-Dutch immigrants. These data are combined with additional information from the Dutch population register on the country of birth and, especially, the date of birth versus the date at which the parent-child relationship was legally recognised. For non-adopted children, the date of legal recognition is the birth date but for adopted children, the legal parent-child relationship is established only after birth. The data include only those adoptions where neither parent is the biological parent, thus excluding adoptions by stepparents (Sprangers et al., 2010). Data on adoption are available from 1995 onwards.

We selected three complete birth cohorts of adopted and non-adopted children born between the 1st of October 1995 (the first year in which adopted children can be distinguished in the data) and 1st of October 1998 (the last birth cohort for which data on enrolment in secondary school at age 15 were available, in 2013). The initial sample contained 589,726 15-year old children living in the Netherlands in the years 2011-2013, of whom 2,689 adopted children. 4.1% of the adopted children were born in the Netherlands. These cases were excluded from the sample, since we cannot be sure that these children are not biologically related to their adoptive parents (e.g. adopted by nephews, nieces, second cousins) or otherwise matched to their adoptive parents due to corresponding abilities between natural and adoptive parents. Moreover, children were removed from the sample when they did not live with their adoptive or biological parents anymore or when one of their parents died or emigrated, as these children are specific cases since these events can influence the children's educational attainment. Also, children whose parents were born before 1956 are excluded, as we have no information on the educational attainment of these parents. This resulted in a research population of 504,279 non-adopted children and 2,142 internationally adopted children. An additional 69,701 cases were dropped from the analyses due to missing data on the dependent or one or more of the independent variables. Hence we have 436,720 children left, of whom 434,928 non-adopted and 1,792 internationally adopted children.

4.2 Dependent variable

In this study, the *educational attainment of the child* is operationalized as the child's level of enrolment in secondary school at age fifteen. Data are derived from educational registers maintained by the Ministry of Education, Culture and Science. At this age, children can be enrolled in four levels of education that prepare for low, mid-level, higher vocational, and university education respectively. Subsequently, these levels are converted into scores on the ISLED-scale (the International Standard Level of Education) (Schröder & Ganzeboom, 2013), as follows: lower vocational education (=29.34), lower general secondary education (=45.27), higher general secondary education (=62.30) and pre-university education (=71.92). The ISLED-scale is chosen, since it converts ordinal data into a well-validated continuous variable with a range of 0-100 that is easy to interpret. Moreover, the ISLED-scale is a highly comparative measure cross-nationally, which increases comparability and replicability for future research.

The level of enrolment in secondary school at age fifteen is a suitable measurement point, since in the third year of secondary school, when children are 14-15, Dutch school levels have differentiated to prepare for specific types and levels of diplomas. Moreover, previous Dutch research showed that in the Netherlands track assignment is strongly associated with the later educational career (Tolsma & Wolbers, 2010), as well as other later-life outcomes, such as final educational attainment and labour market outcomes (Borghans, Diris, Smits & De Vries, 2012).

4.3 Independent variables

Father's and *mother's educational attainment*: Information on educational attainment of adults is extracted from the CRIHO, the central register of enrollment in higher education. This register is available from 1986 onwards and contains information on diploma's in higher education. Information on non-tertiary education, like secondary vocational education, is not integrally available in registers for adults, but only for very young cohorts graduating after 2003. Therefore, we could not distinguish between low and midlevel education. However, we could differentiate higher education in two detailed levels. So, parents are classified in (1) low/midlevel education, (2) completed higher vocational education and (3) completed university education. Since the register only contained information on diploma's from 1986 onwards, we may underestimate the level of tertiary education of old parents. Parents who graduated before 1986, as well as parents

who studied abroad, will be incorrectly classified as not having a high education. To deal with this problem, we excluded parents who were born before 1956. Explorative analyses showed that the percentage of highly educated parents was lower among cohorts born before 1956, but stable among cohorts born from 1956 onwards. Furthermore, we conducted robustness tests (see Results section) to deal with any remaining underestimation of educational level among relatively older cohorts.

Yearly household income: This variable measures the yearly income of the household in which the child lives at age 15. The household's income is equilized, i.e. corrected for differences in composition and size of the household, so that different households' socio-economic situations can be directly compared. Moreover, after equilization, income is classified into percentiles based on the equilized income distribution of the complete Dutch population. Percentiles are used in order to avoid analytical problems with outliers. Also, the use of percentiles gives direct insight in the relative socio-economic position of families with adopted children, compared to that of other Dutch households. Hence, the yearly household income in percentiles is a continuous variable ranging from 0 to 99.

Adoption status: This variable is a dummy variable indicating whether a child is adopted (=1) or not (=0).

4.4 Control variables

We controlled for *father and mother's year of birth* (both centered)*,* child's *gender* (0=male, 1=female), the *family structure* (whether the child lives with both biological/adoptive parents at age 15; 0=intact, 1=not intact), the *number of children* present in the household and the *observation year* (we constructed dummy variables for each of the birth cohorts, and use 2013 as the reference category).

As we discussed above, adoption characteristics can influence adoptees' educational attainment. Therefore, in the analyses we also controlled for the *adoption age*, a continuous variable measuring the age at which the child was placed with the adoptive parents, ranging from 0–12. Moreover, we controlled for the *country of adoption*, for which we created 7 dummy variables: 'China', 'Colombia', 'Haiti', 'Ethiopia', 'India', 'South-Korea' and 'Taiwan'. These seven countries were chosen, as the majority of the children in our research population were

adopted from these countries, with a minimum of 100 children. As a reference category we have the dummy variable 'Other', including the children that were adopted from another country than from the seven countries listed above. Table 1 presents the descriptive statistics of all variables.

4.5 Descriptive statistics

In our research population of 436,720 15-year old children, 1,792 children are adopted (0.4%). The largest group of these, 31.1%, is adopted from China. Colombia is the second largest adoptive country. Moreover, Table 1 shows that on average children are adopted quite young. 81.2% are adopted at age two or earlier. Only 3.6% are older than five when they enter the Netherlands for adoption. 62.3% of the adopted children is female. This bias is mainly due to the Chinese adopted children, who are almost exclusively girls.

On average, the level of enrolment in secondary school of non-adopted fifteen-year-olds is higher than that of adopted children. For instance, 22.3% of the non-adopted is enrolled in pre-university education, as opposed to 15.9% of the adopted children. Also, 26.7% are enrolled in the lowest level of secondary education, while among adopted children this is 33.4%.

Moreover, adopted children live in relatively good social and socio-economic circumstances. First, parents of adopted children are more often highly educated: 16.4% of mothers of adopted children have a high vocational or university education, as opposed to 11.9% of mothers of non-adopted, and a similar pattern can be seen for fathers (16.0% versus 13.4%). Second, adopted children generally live in households with a higher household income. Furthermore, adopted children live in smaller families; 77.1% live with one or no sibling as opposed to 64.7% in general, and adopted children more often live with both legal parents (89.0% versus 80.5%) as opposed to living in single parent households or stepfamilies.

[Insert Table 1 about here]

4.6 Method

We test the hypotheses using general linear models since our dependent variable, the educational attainment of the child on an ISLED-scale, is a continuous variable. First, separate OLS regression models are estimated for biological and adopted children. Next, we perform the analysis on the whole group. By including interactions between parental characteristics and being

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biologically related or not, we examine whether the differences between the two groups are significant. Furthermore, we perform several sensitivity analyses to investigate whether the results stay robust under different conditions. These are presented in the final part of the result section.

5. Results

To test the first two hypotheses about the positive influence of parental educational attainment and parental income on children's educational attainment at age 15 among parents of biological and adopted children, separate OLS regression models were estimated for biological and adopted children. The results of these analyses are presented in Table 2. The results for biological children are presented on the left-hand side of the table, and those for adopted children on the right-hand side. We will first discuss the results for biological children, followed by those for adopted children.

[Insert Table 2 about here]

For biological children, a statistically significant positive gradient of parental education is observed. This is true for both father's and mother's educational attainment. If the father has attained lower tertiary education, the child's educational attainment at age 15 is 5.1 points higher than if the father has attained less than tertiary education, and the difference is even 7.9 points if the father has attained higher tertiary education. The differences for mother's educational attainment are about the same size (6.2 and 8.7 points respectively). Thus, Hypothesis 1 is confirmed for biological children. We also observe a positive effect of household income, with a one percentile point increase in household income leading to a .12 point increase in the child's educational attainment at age 15. Thus, biological children whose parents' household income is at the 75th percentile of the household income distribution have – on average – a 6 points higher level of education at age 15 than children whose parents' household income is at the 25th percentile of the household income distribution. Therefore, Hypothesis 2 is also confirmed for biological children.

We will also briefly discuss the effects of the other variables in the model. The later the birth year of the parents, and thus the younger they are, the lower their children's educational

attainment at age 15 is, and the statistically significant effect for the quadratic term of birth year even indicates that this effect is strongest among very young parents. If parents are not living together when the child is 15 years of age, the educational attainment of the child is 1.8 points lower than if parents live together. No effect of the number of siblings is apparent. Boys perform a bit worse in school than girls -about 2 points. Finally, the average level of enrolment is a bit higher in 2013 than in 2012 and 2011. Together, these variables explain 16.3 per cent of the variance in children's educational attainment scores at age 15.

The results for adopted children are presented on the right-hand side of Table 2. No statistically significant effect is observed for father's or mother's educational attainment, with one exception; the effect of father's university education comes close to statistical significance (p=.07). Given that we formulated a directional hypothesis, a one-sided significance test would be appropriate, leading us to decide that this effect indeed is in line with Hypothesis 1. Overall, though, the evidence that is in line with Hypothesis 1 is very limited for adoptive children. Sensitivity analyses suggest that the effect of father's university education is only present in Chinese adopted children; see below. The effect of household income is in line with Hypothesis 2. A one-percentile point increase in household income is associated with a .08 increase in the child's educational attainment at age 15. Thus, adopted children whose parents' household income is at the 75th percentile of the household income distribution have – on average – a 4 points higher level of education than children whose parents' household income is at the 25th percentile of the household income distribution.

Among adopted children, no effect of the year in which parents are born is evident, so the parents' age does not matter for the child's educational attainment at age 15. The effect of family structure is borderline significant (p=0.051) with children from intact families performing better than children from families in which the parents do not live together. There is no effect of the number of siblings. As among biological children, boys perform worse than girls. Finally, attainment scores in 2012 are a bit lower than in 2013. In all, these variables explain 6.4 per cent of the variance in educational attainment scores at age 15, which is considerably less than for biological children.

Next, we turn to testing Hypothesis 3 that states that the effect of parents' educational attainment and income on children's educational attainment is smaller for adopted children than for biological children. To test this hypothesis, data for biological and adopted children are

pooled and we add interaction variables between adoption status (whether the child is adopted) on the one hand, and parental education and household income on the other hand. Results are presented in Table 3.

[Insert Table 3 about here]

Given that biological children are the reference category, the main effects for parental education and household income in this model reflect the effect for biological children. Indeed, these replicate the effects reported in Table 2. The interaction effects show whether the effects for adopted children differ from those of biological children. The interaction effects for parental education show that the effects for adopted children are smaller than those for biological children. This confirms Hypothesis 3. The same is true for the effect of household income. Again the effect is smaller for adopted children than for biological children. Thus both types of effects are smaller. In addition, based on the separate analysis for adopted children, we know that the effect of parental education for adopted children is not just smaller than that for biological children, but actually hardly statistically significant at all. The other effects in Table 3 largely duplicate those for biological children in Table 2.

In the direct comparison between biological and adopted children, only variables that were available for both sets of children were included. However, for adopted children, information on age at adoption and on country of origin was available as well. In the next step of the analysis, we repeat the analysis for adopted children, but include these variables as well to see whether they affect the results. The estimates based on this OLS regression are presented in Table 4.

[Insert Table 4 about here]

A comparison of Table 4 and the right-hand part of Table 2 shows only a small change in the effects of parental education and income. After controlling for age at adoption and country of origin, the effect of parental education is now completely statistically nonsignificant. The effect of household income remains statistically significant. Interestingly, age at adoption and country of origin are strongly related to educational outcomes and explain a lot of the variance in

educational outcomes of adoption children. There is a clear negative effect of age at adoption: the older the age at adoption, the lower the educational attainment at age 15. A one-year increase in age at adoption leads to a drop in the educational attainment score by 1.1 point. There are large differences in educational attainment by country of origin: Children from China perform best (15.0 points better than children from 'other' countries), followed by children from South-Korea and Taiwan (10.4 and 8.5 points better than children from 'other' countries, respectively). Interestingly, the difference between boys and girls in this model is statistically nonsignificant, suggesting that the difference observed in Table 2 results from the overrepresentation of girls from China. Thus, it is country of origin rather than gender that explains this effect. In all, these variables explain 23.0 per cent of the variance in educational attainment scores of adopted children.

Finally, we perform a number of sensitivity analyses (full results available from the authors). The main aim of these analyses is to examine whether our general analysis of intergenerational transmission might have underestimated the effects of parental education and household income among adopted children. Many adopted children suffer from types of deprivation, either pre-natal, perinatal or postnatal, and it might be that the influence of the adoptive family's background is weaker the more deprivation children have experienced. First, one can assume that deprivation is stronger if children are adopted at a relatively late age. Therefore, we examine whether the effects of parental education and household income among adopted children depend on the age of adoption, by adding interaction terms between parental education and household income on the one hand, and age at adoption on the other hand, to the model presented in Table 4. None of the interaction terms are statistically significant, suggesting that the findings do not depend on age at adoption. In addition, we restrict the sample of adopted children to those adopted before they turned 1, assuming that these children have experienced relatively little postnatal deprivation and were able to receive the full impact of the adoptive parents' education (Holmlund et al., 2011). Again, no changes in effects are observed, suggesting that the results hold both for children that are adopted at a very young age and those adopted at a somewhat older age. Second, it could be argued that Chinese children suffered less from pre-natal deprivation than children from poor countries, since Chinese children in the 1990's were generally not put up for adoption for reasons of poverty, but because of the single-child policy (Juffer, 2008) and the health system in China is of relatively high quality. Therefore, we rerun our

model on children born in China only. The effect of household income remains unchanged. However, the effect of the father having a higher tertiary education becomes statistically significant (b=5.28, *p*=.02), indicating that there may be a role of parental education on Chinese adopted children's educational attainment. This role appears to be small though: only the father's education is significant, not the mother's, and only university education, not lower tertiary education, is associated with higher educational attainment of the Chinese children.

6. Conclusion

In this article, we investigated the effect of family background, i.e. parents' education and income, on the educational attainment of their adopted children. By looking at intergenerational transmission within adoptive families, we investigated whether parents' characteristics influence their children's schooling even if there is no genetic relation. By comparing intergenerational effects within adoptive families with intergenerational effects within families with biological children, we aimed at improving our understanding about the underlying mechanisms of intergenerational transmission and particularly examined the importance of genetic factors. We tested our hypotheses with the use of a large-scale register database, including information on all 15-year old children, and their parents, living in the Netherlands in the years 2011-2013.

Our results showed that parents' education mainly influences their children's education when they are genetically related, but not if children are adopted. Moreover, we found that parents' income affects the educational attainment of biological as well as adopted children. The effect of parent's income on children's schooling is larger for biological children than for adoptees, though. Thus, overall the outcomes indicate the importance of genetic transmission and parents' financial capital, both nature and nurture components, for the educational attainment of children at the age of 15. At first sight, our outcomes provide little evidence for the (non-genetic) transmission of cultural capital as measured by parents' educational level, with the exception of some very limited evidence for Chinese children. This should, however, not lead us to conclude there is no transmission of cultural capital at all, as we will argue below.

Previous research on adopted children's schooling generally demonstrated non-genetic transmission: an effect of parents' income and education (e.g. Björklund et al., 2006; Plug & Vijverberg, 2003). One possible reason for the discrepancy in outcomes with our study, is that almost all previous studies examined intergenerational transmission within families with

nationally adopted children. This could lead to an overestimation of the effect of parental background. Adoptive parents may either be genetically related to the adoptee, or adoptive families may be matched to the biological mother on socio-economic characteristics by the adoption agency (Scarr & Weinberg, 1994). In this study, we investigated only foreign-born adoptees, which strongly decreases the likelihood of these types of matching, and makes the overestimation of the effect of non-genetic transmission unlikely. A study on Korean adoptees in the United States on the other hand did show an effect of the adoptive parents' education (Sacerdote, 2007). This fits with the idea outlined in the Introduction that non-genetic intergenerational transmission could be stronger in a rather non-egalitarian country like the US than in more egalitarian countries such as the Netherlands or Scandinavian countries. One could speculate that cultural transmission of parents' education might be relatively more important in less egalitarian countries and genes relatively more important in more egalitarian countries Our study does not allow us to directly compare non-genetic intergenerational transmission in the Netherlands with that in the (more egalitarian) Scandinavian countries. In order to get a clearer insight in the effect of context and social policies on the non-genetic transmission of inequality, more standardised research in different countries is needed.

A second possible explanation for the discrepancy in outcomes is that previous research mainly investigated adult adoptees, born in the 1960's -1980's, whereas we studied a cohort born in the second half of the 1990's, entering adolescence very recently. Western societies have gone through substantial changes in recent decades, and intergenerational mobility slightly increased in more recent birth cohorts (Esping-Andersen & Wagner, 2012). The effect of parental characteristics on children's educational outcomes may have decreased accordingly.

Our study uses integral register data of all adopted and non-adopted 15-year olds and their families in the Netherlands. This has some major advantages. Register data do not suffer from selectivity due to non-response, and small subpopulations (such as adoptive families) can be studied without any problems of sample size. However, our study also suffers from limitations that are related to the use of register data. First, due to the fact that digital population registers were introduced in the Netherlands in 1995, we could only identify whether children were adopted from 1995 onwards, limiting our research to 15-year olds. As indicated above, investigating 15-year olds has the advantage of reflecting the current situation in society, but it also has a disadvantage when trying to measure non-genetic intergenerational transmission.

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These children are at the peak of adolescence, and it is possible that especially adopted children are coping with issues of identity and are less susceptible to parental influences at age 15 than at later ages, when they are more comfortable with their roots and identity. For a more complete picture, these children should be followed into adulthood. It could be that adopted children with highly educated parents are better able to 'catch up' later in life with respect to socio-economic status than those with lowly educated parents.

A second limitation of the data is the fact that parental education is divided in only three categories: low or midlevel education, completed higher professional education and completed university. Although we do believe that the distinction between having parents that have achieved some type of tertiary education (including higher professional education and university) and having parents that have not achieved any form of tertiary education is an important one, we would have preferred a more detailed measure of parental schooling. Specifically the category 'low or midlevel education' comprises a heterogeneous group, including very lowly educated people and people who completed secondary vocational education. It is possible that we did not capture the whole effect of parents' schooling on their children's schooling, due to the imperfect measure of parents' educational attainment. Hence, we might underestimate the effect of parents' education. We did however find a clear effect of our measure of both the father's and the mother's education on their biological children, and no effect on adopted children. Therefore we feel safe to conclude that there is at least a strong genetic factor in the transmission of educational attainment. Interestingly, we also found that the influence of parents' income was significantly larger for biological children than for adopted children. As our measure of parental schooling is imperfect, and since income and education are positively correlated, the income measure possibly contains some of the effect that the parental education measure could not capture.

Parental income was related to educational attainment of adopted children. This might point to the importance of family finances in school success (own room, computer, extra tutoring) but could also, in part, be a more indirect effect. Perhaps parental income is correlated with unobserved qualities or characteristics of parents; the idea that parents who earn more money, on average also have better parenting skills (Plug & Vijverberg, 2005). In that case, the observed effect of income is overestimated and the effect of cultural capital underestimated, due to the positive correlation with the unobserved childrearing endowment of the parents (Holmlund et al.,

2011). Register data are unable to capture those more subjective traits such as 'parenting skills', or actual cultural capital beyond its obvious proxy educational level.

Related to this point, lower educated parents that adopt a child might be a specific group compared to lower educated parents with biological children. Adoption procedures tend to select for potential parents who have some money –adoption can be expensive- and favourable parenting characteristics. The group of 'low/midlevel educated' parents is heterogeneous, and it might well be that low/midlevel educated parents with adopted children are, on average, still higher educated than their counterparts with biological children. Also, lower educated adoptive parents may have above average parenting skills. In sum, although there appears to be hardly any cultural transmission via educational level of parents, some of it may be obscured by the heterogeneousness of the groups that are involved and more importantly, there may be cultural transmission via other mechanisms, not captured by educational level, such as parenting skills, and tastes and values conducive to enhanced school performance.

There is one other issue that should be addressed in studies on intergenerational transmission that use adopted children. Adoptees, especially those born in poor countries, were often born and raised in adverse circumstances with higher risks of illnesses and nutritional and emotional deprivation (Juffer & IJzendoorn, 2005). It could be argued that such early traumatic experiences may disturb the bonding with the adoptive parents, and therefore also disturb intergenerational transmission. We addressed this issue by repeating our analyses to only foreign-born children that were adopted before their first birthday, i.e. adoptees with a relatively low risk of experiencing strong deprivation. The outcomes were the same as those for our full sample of adoptive children, indicating that negative experiences do not substantially disturb the intergenerational effect, and that any resulting underestimation of cultural transmission will likely be small.

We conclude that intergenerational association in educational attainment is mediated by genetic transmission and the household's income. Parents' education had almost no influence on children's education at all when they were genetically unrelated, indicating no clear support for the transmission of cultural capital at this age. Perhaps the transmission of cultural capital becomes more important at a later age or for other outcomes, such as norms and values or health behaviour. Moreover, we found that adoption characteristics, i.e. adoption age and adoption country, strongly influences adopted children's educational attainment.

References

Anger, S. & Heineck, G. (2010). Do Smart Parents Raise Smart Children? The Intergenerational Transmission of Cognitive Abilities. *Journal of Population Economics*, 23(3), 1255-1282.

Bakker, B.F.M., van Rooijen, J. & van Toor, L (2014). The System of social statistical datasets of Statistics Netherlands: An integral approach to the production of register-based social statistics. *Statistical Journal of the IAOS*, 30, 411–424.

Becker, G.S. & Tomes, N. (1986). Human Capital and the Rise and Fall of Families. *Journal of Labor Economics,* 4, 1-39.

Behrman, J.R., Rosenzweig, M.R. & Taubman, P. (1994). Endowments and the Allocation of Schooling in the Family and in the Marriage Market: The Twins Experiment. *Journal of Political Economy*, 102(6), 1131-1174.

Björklund, A. & Richardson, K. (2001). The Educational Attainment of Adopted Children Born Abroad: Swedish Evidence. Mimeo, University of Stockholm.

Björklund, A., Lindahl, M. & Plug, E. (2006). "The Origins of Intergenerational Associations: Lessons from Swedish Adoption Data." *Quarterly Journal of Economics,* 121, 999-1028.

Björklund, A., Jäntti, M. & Solon, G. (2007). Nature and nurture in the intergenerational transmission of socioeconomic status: evidence from Swedish children and their biological and rearing parents. IZA Discussion Paper Series, No. 2665.

Black, S.E., Devereux, P.J. & Salvanes, K.G. (2005). Why the Apple Doesn't Fall Far: Understanding Intergenerational Transmission of Human Capital. *American Economic Review*, 95(1), 437-49.

Blanden, J. (2013). Cross-national rankings of intergenerational mobility: a comparison of approaches from economics and sociology. *Journal of Economic Surveys*, 27(1), 38-73.

Blau , P.M. & Duncan, O.D. (1967). *The American Occupational Structure*. New York: Wiley.

Bohman, M. (1970). *Adopted Children and their Families*. Stockholm: Proprius.

Borghans, L., Diris, R., Smits, W., & de Vries, J. (2012). *The Impact of Early Tracking on Later-life Outcomes: An Instrumental Variable Approach*. Discussion Paper. 7, 143.

Bouchard, T.J. Jr., Lykken, D.T., McGue, M., Segal, N.L. & Tellegen, A. (1990) Sources of human psychological differences: the Minnesota study of twins reared apart. *Science,* 250(4978), 223–228.

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Boudon, R. (1974). *Education, Opportunity, and Social Inequality*. New York: John Wiley & Sons.

Bourdieu, P. (1973). Cultural Reproduction and Social Reproduction. Pp. 71-112 in *Knowledge, Education and Cultural Change*, edited by R. Brown. London: Tavistock.

De Winter, J., Eilbracht, A. & Sprangers, A. (2010). Sinds 1956 meer dan 55 Duizend Kinderen Geadopteerd. Den Haag: Centraal Bureau voor de Statistiek. Retrieved from: http://www.cbs.nl/nl-NL/menu/themas/veiligheid-recht/publicaties/artikelen/archief/2010/2010-3262-wm.htm.

Erikson, R. & Rudolphi, F. (2010). Change in Selection to Upper Secondary School – Primary and Secondary Effects in Sweden. *European Sociological Review*, 26(3), 291-305.

Esping-Andersen, G. & Wagner, S. Asymmetries in the opportunity structure. Intergenerational mobility trends in Europe. *Research in Social Stratification and Mobility*, 30(4), 473-487.

Haegeland, T., Kirkeboen, L., Raaum, O. & Salvanes, K.G. (2010). Why Children of College Graduates Outperform their Schoolmates: A Study of Cousins and Adoptees. IZA Discussion Paper Series, No. 5369.

Haveman, R. & Wolfe, B. (1995). The Determinants of Children's Attainments: A Review of Methods and Findings. *Journal of Economic Literature,* 33, 1829–78.

Hoksbergen, R.A.C. (1991). Waarom adopteren mensen een kind? In René Hoksbergen & Hans Walenkamp (red.), *Kind van andere ouders, theorie en praktijk van adoptie* (pp. 67-83). Houten: Bohn Stafleu Van Loghum.

Holmlund, H., Lindahl, M. & Plug, E. (2011). The Causal Effect of Parents' Schooling on Children's Schooling: A Comparison of Estimation Methods. *Journal of Economic Literature*, 49 (3), 615-651.

Jensen, A.R. (1970). IQ's of identical twins reared apart. *Behavior Genetics*, 1(2), 133-148.

Jonsson, J.O. (1987). Class Origin, Cultural Origin and Educational attainment. *European Sociological Review,* 3, 229 – 242.

Juffer, F. (2008). De ontwikkeling van interlandelijk geadopteerden: een overzicht van onderzoek. *Justitiele verkenningen*, 34(7), 38-53.

Juffer, F. & Van IJzendoorn, M.H. (2005). Behavior problems and mental health referrals of international adoptees: A meta-analysis. *The Journal of the American Medical Association*, 293(20), 2501-2515.

Lamont, M. & Lareau, A. (1988). Cultural Capital: Allusions, Gaps and Glissandos in Recent Theoretical Developments. *Sociological Theory*, 6, 153-168.

Lareau, A. (2011). *Unequal Childhoods. Class, Race, and Family Life, 2nd edition*. Berkeley, Cal.: University of California Press.

Liu, H. & Zeng, J. (2009), "Genetic ability and intergenerational earnings mobility", *Journal of Population Economics,* 22, 75-95.

Leibowitz, A. (1974). Home Investments in Children. *Journal of Political Economy*, 82(2), 111-131.

McNally, S. & Maurin, E. (2008). Vive la Revolution! Long-term Educational Returns of 1968 to the Angry Students. *Journal of Labor Economics*, 26(1), 1-33.

OECD (2011). *Causes of Growing Income Inequality in OECD Countries*. OECD Publishing: Paris.

Oreopoulos, P., Page, M.E. & Stevens, A.H. (2006). The Intergenerational Effects of Compulsory Schooling. *Journal of Labor Economics*, 24(4), 729-60.

Peter, K. & Horn, L. (2005). *Gender differences in participation and completion of undergraduate education and how they have changed over time* (NCES 2005–169). U.S. Department of Education, National Center for Education Statistics. U.S. Government Printing Office, Washington, DC.

Plomin, R. & Petrill, S.A. (1997). Genetics and Intelligence: What's new? *Intelligence*, 24, 53-77.

Plomin, R. & Spinath, F.M. (2004). Intelligence: Genetics, Genes, and Genomics. *Journal of Personality and Social Psychology,* 86(1), 112-129.

Plug, E. (2004). Estimating the Effect of Mother's Schooling on Children's Schooling Using a Sample of Adoptees. *American Economic Review,* 94, 358-368.

Plug, E. & Vijverberg, W. (2003). Schooling, Family Background, and Adoption: Is It Nature or Is It Nurture? *Journal of Political Economy*, 111(3), 611-641.

Plug, E. & Vijverberg, W. (2005). Does Family Income Matter for Schooling Outcomes? Using Adoptees as a Natural Experiment. *Economic Journal,* 115, 879-906

Sacerdote, B. (2007). How Large Are the Effects from Changes in Family Environment? A Study of Korean American Adoptees. *Quarterly Journal of Economics,* 122, 119-157.

Scarr, S. & Weinberg, R.A. (1994). Educational and Occupational Achievements of Brothers and

Sisters in Adoptive in Biological Related Families. *Behavior Genetics*, 24(4), 301-325.

Schröder, H. & Ganzeboom, H.B.G. (2013). Measuring and Modelling Level of Education
in European Societies. *European Sociological Review*, 30(1), 119-136.

Solon, G. (2002). Cross-Country Differences in Intergenerational Earnings Mobility. *The Journal
of Economic Perspectives*, 16(3), 59-66.

Solon, G. (2004). A Model of Intergenerational Mobility Variation over Time and Place, in
Miles Corak, ed., *Generational Income Mobility in North America and Europe*.
Cambridge: Cambridge University Press, 38-47.

Sprangers, A., De Jong, J. & De Zee, M. (2006). Halve eeuw adopties in Nederland. *Demos,
Bulletin over Bevolkingen Samenleving*, 22(10), 97-101.

Sprangers, A. & Vissers, W. (2012). *Aantal adopties sinds jaren zestig niet meer zo laag*.
Den Haag: Centraal Bureau voor de Statistiek. Retrieved from: http://www.cbs.nl/nl-
NL/menu/themas/veiligheid-recht/publicaties/artikelen/archief/2012/2012-3637-wm.htm.

Tolsma, J. & M. Wolbers (2010). *Naar een open samenleving? Recente ontwikkelingen in
sociale stijging en daling in Nederland*. Den Haag: Raad voor Maatschappelijke
Ontwikkeling.

Verhulst, F.C., Althaus, M. & Versluisden Bieman, H.J.M. (1990). Problem behaviour in
international adoptees: II. Age at Placement. *Journal of the American Academy of Child
and Adolescent Psychiatry,* 29(1), 104-111.

Verhulst, F.C. & Versluis-den Bieman, H.J.M. (1989). *Buitenlandse adoptiekinderen;
vaardigheden en probleemgedrag.* Assen: Van Gorcum.

Table 1. Descriptive statistics of dependent, independent and control variables.

	Biological children (N=434,928)		Adopted children (N = 1,792)		
	Mean	(SD)	Mean	(SD)	Range
Educational level	50.933	(16.182)	48.079	(16.003)	29.34 – 71.92
Father's educational attainment					
Low/midlevel	.866		.840		0/1
High vocational	.081		.092		0/1
University	.053		.068		0/1
Mother's educational attainment					
Low/midlevel	.881		.836		0/1
High vocational	.078		.105		0/1
University	.042		.059		0/1
Household income, in percentiles	53.670	(26.765)	60.320	(25.288)	0 – 99
Adoption age	-		1.400	(1.773)	0 – 11
Adoption country					
China	-		.311		0/1
Colombia	-		.180		0/1
Ethiopia	-		.057		0/1
Haiti	-		.057		0/1
India	-		.064		0/1
South-Korea	-		.065		0/1
Taiwan	-		.062		0/1
Other	-		.266		0/1
Father's birth year [a]	1964.560	(4.171)	1960.730	(3.436)	1956 – 1986
Mother's birth year [a]	1966.810	(4.195)	1962.390	(3.710)	1956 – 1985
Gender (female)	.500		.620		0/1
Family structure (not intact)	.196		.110		0/1
Number of children	2.370	(.977)	2.130	(.800)	1 – 18
Observation year					
2011	.278		.239		0/1
2012	.347		.335		0/1
2013	.375		.426		0/1

[a] These variables are mean centered in the analysis.

Table 2   Unstandardized regression coefficients from an OLS regression on educational attainment at age 15, by type of children

	Biological children			Adopted children		
	b		se	b		se
Intercept	44.55	**	.10	45.25	**	1.69
Father's educational attainment						
High vocational	5.10	**	.09	.05		1.32
University	7.87	**	.11	2.82	†	1.53
Mother's educational attainment						
High vocational	6.18	**	.09	1.65		1.25
University	8.66	**	.12	-1.56		1.63
Household income, in percentiles	.12	**	.00	.08	**	.02
Family structure (not intact)	-1.79	**	.06	.06		1.23
Number of children	-.04	†	.02	-.43		.48
Father's birth year	-.16	**	.01	-.14		.20
Father's birth year squared	-.01	**	.00	-.03		.03
Mother's birth year	-.31	**	.01	-.26		.21
Mother's birth year squared	-.01	**	.00	.01		.02
Gender (male)	-1.95	**	.05	-5.11	**	.78
Observation year						
2011	-.36	**	.06	-1.36		.96
2012	-.30	**	.05	-1.83	*	.85
R^2	.163			.064		
N	434,928			1,792		

† $p<.10$, * $p<.05$, ** $p<.01$

Table 3   Unstandardized regression coefficients from an OLS regression on educational attainment at
age 15, combined for biological and adopted children

	b		se
Intercept	44.56	**	.10
Father's educational attainment			
High vocational	5.10	**	.09
University	7.87	**	.11
High vocational * adopted	-4.97	**	1.25
University * adopted	-4.73	**	1.46
Mother's educational attainment			
High vocational	6.18	**	.09
University	8.66	**	.12
High vocational * adopted	-4.74	**	1.12
University * adopted	-9.66	**	1.55
Household income, in percentiles	.12	**	.00
Household income * adopted	-.05	**	.01
Family structure (not intact)	-1.78	**	.06
Number of children	-.04	†	.02
Father's birth year	-.16	**	.01
Father's birth year squared	-.01	**	.00
Mother's birth year	-.31	**	.01
Mother's birth year squared	-.01	**	.00
Gender (male)	-1.97	**	.05
Observation year			
2011	-.37	**	.06
2012	-.31	**	.05
Adoption status (adopted)	-1.81	*	.91
R^2		.16	
N		437,720	

† p<.10, * p<.05, ** p<.01

Table 4   Unstandardized regression coefficients from an OLS regression on educational attainment at age 15, adopted children only

	b		se
Intercept	39.00	**	1.76
Father's educational attainment			
High vocational	.10		1.20
University	2.11		1.40
Mother's educational attainment			
High vocational	2.08	†	1.14
University	-.67		1.49
Household income, in percentiles	.08	**	.01
Family structure (not intact)	.90		1.13
Number of children	.11		.44
Father's birth year	.07		.19
Father's birth year squared	-.03		.02
Mother's birth year	.03		.19
Mother's birth year squared	.02		.02
Gender (male)	.01		.79
Observation year			
2011	.00		.88
2012	-.79		.78
Adoption age	-1.07	**	.22
Adoption country			
China	15.04	**	1.08
Colombia	1.02		1.10
Ethiopia	2.16		1.60
Haiti	-1.40		1.62
India	-1.31		1.55
South-Korea	10.40	**	1.57
Taiwan	8.51	**	1.59
R^2		.23	
N		1,792	

† $p<.10$, * $p<.05$, ** $p<.01$