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ADOPTEES' EDUCATIONAL ACHIEVEMENTS

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Abstract

This study analyses educational achievement at age 20 for 3,180 non-kin adoptees and at age 25 for 1,559 non-kin adoptees in Denmark by comparing them to non-adoptees. The study also analyses whether there are within-group differences in the educational achievement of non-kin adoptees according to country of origin. The results suggest that the relatively small gap between non-kin adoptees' and non-adoptees' educational achievements widens between ages 20 and 25. Moreover, the results show some differences in educational outcomes among non-kin adoptees with different countries of origin.

Introduction

In the Danish birth cohorts born between 1989 and 1994, 3,180 children (0.75 percent) were adopted in Denmark by parents to whom the children did not have any prior kinship or other relationship ties, i.e. the children were non-kin adoptees. The majority of the children (92.5 percent) were born outside of Denmark (international adoptees), whilst the remainder of the non-kin adoptees were born in Denmark (domestic adoptees).

There exists a large body of research on adopted children and their educational outcomes (Dalen, 2001; Dalen and Rygvold, 2008; Lindblad et al., 2003; Van IJzendoorn and Juffer, 2005; Vinnerljung et al., 2010; Vinnerljung and Hjern, 2011). However, very few studies measure outcomes at the same age for all sample members (e.g. Vinnerljung et al., 2010; Vinnerljung and

Hjern, 2011), which is problematic because it is plausible that adoptees' educational outcomes progress differently, based on various factors, such as their age at adoption. In general, a number of studies have shown adoption age to be a contributing factor to several of adoptees' developmental outcomes (Behle and Pinquart, 2016; Dalen, 2001; Odenstad et al., 2008; van den Dries et al., 2009; Vinnerljung and Hjern, 2011). Nevertheless, few studies examining educational outcomes differentiate between the adoptees' countries of origin; rather, they categorize adoptees as either domestic or international, and/or according to their continents of origin. In terms of domestic adoptees, it is also relevant to differentiate between adoption type.

Domestic adoptees' adoption type is important, because adoption type indicates substantial differences in the domestic adoptees' situations both before and after adoption. Typically, kinship and step-parent adoptees have not been exposed to certain adverse pre-adoption factors, such as out-of-home placement in an orphanage, poverty, neglect and/or prenatal exposure to alcohol or drugs. In contrast, after adoption, most non-kin adoptees grow up with parents who have relatively stronger socioeconomic backgrounds than the parents/caregivers of kinship and step-parent adoptees (Henze-Pedersen and Olsen, 2017). For kinship and step-parent adoptees, the adoption process itself entails fewer traumas – if any – as many of them do not experience changes in their caregivers and/or home environments. Hence, the variation in precision in these important measures for adoption research may explain previous studies' contradictory results on adoptees' educational achievements.

This study addresses these shortcomings and thus provides more precise knowledge about non-kin adoptees' educational achievements. The study is based on a national cohort sample including all non-kin adoptees born in 1989–1994 in Denmark (N=3.180) and their non-adopted peers (N=418,272). I first analyse whether non-kin adoptees have finished high school, completed vocational training and/or are enrolled in (any type of) education at age 20 at the same rate as non-

adoptees. Second, limiting the analysis to non-kin adoptees, I determine whether differences in their educational status at age 20 are associated with their countries of origin. Third, for the non-kin adoptees born from 1989–1991 (N=1,559), I also examine if their educational attainment (having earned a degree beyond that of compulsory school) at age 25 is on par with non-adoptees born in the same years. Fourth, among the non-kin adoptees born from 1989–1991, I examine whether differences in their educational attainment at age 25 are associated with their countries of origin.

Does country of origin matter for the educational outcomes of adoptees?

There are differences between the countries of origin of adoptees that are of importance, such as GDP, the quality of their health and social services and their general living conditions, which might affect the health of the mother and thus the child in utero (Dickens, 2009; Miller, 2005). Moreover, different countries also differ in their adoption procedures, particular in the quality of the care environments where the children reside before their adoption (Miller, 2005; Odenstad et al., 2008). Many adoption scholars have used South Korea as an example because the reasons behind adoption and the adoption procedures there have held a special position in international adoption. Many of the children given up for adoption in South Korea are born out of wedlock, which, when compared with other reasons for adoption, such as psychiatric illnesses, poverty, alcohol or drug abuse, is likely to be less consequential for the child, all things being equal. Moreover, most South Korean children live in foster care before their adoption (Bergquist et al., 2007; Miller, 2005). In contrast, nearly all Romanian orphans live in institutions prior to their adoption, and in the time period relevant to this study (1989–1994), the state of those institutions was indescribably poor. Furthermore, the general living conditions and health in the Romanian population were in many aspects more deprived than many other sending countries (Miller, 2005).

Thus, it seems reasonable to assume that there are important differences in both the quantity and gravity of the risk factors experienced before adoption that vary according to country of origin.

Country of origin can be considered a proxy for pre-adoption deprivation, whilst adoption age is not only a proxy for the duration of the child's exposure to the deprivation, but also their ability to form a close relationship with their adoptive parents (e.g. Behle and Pinquart, 2016; Cohen, 2006; Dekker et al., 2016; Odenstad et al., 2008; van den Dries et al., 2009).

Although some studies do consider the geographic origins of adoptees, their categorizations either depend on differentiating between international and domestic adoptees, continents or single out one country of origin (such as South Korea, China, etc.) and compare it to the origins of the remaining adoptees in the sample (e.g. Dalen, 2001; Dalen and Rygvold, 2008; Dekker et al., 2016; Hjern et al., 2002; van den Dries et al., 2009).[1] Such crude categories yield less precise knowledge about geographic origin as a proxy for pre-adoption adversity, and which subgroups of adoptees may need additional educational support.

Research questions

The purpose of the present study is to provide more precise knowledge about non-kin adoptees' educational achievements (completion of youth education[2] and/or being enrolled in an educational institution at age 20, and having earned at least one qualification beyond compulsory education by age 25) by analysing the following four research questions:

1. Are non-kin adoptees as likely as non-adoptees to have completed youth education and/or be enrolled in an educational institution at age 20?

[1] An exception is (Vinnerljung and Hjern, 2011) that analyses domestic non-kin adoptees that have been in out-of-home care before adoption.
[2] Youth education in a Danish context refers to high school, vocational training, and similar types of education.

2. Among the non-kin adoptees, is the likelihood of completing youth education and/or being enrolled in an educational institution at age 20 associated with their countries of origin?
3. Are non-kin adoptees as likely as non-adoptees to have earned at least one qualification beyond compulsory education by age 25?
4. Among the non-kin adoptees, is the likelihood of having earned a qualification beyond completing compulsory education by age 25 associated with their countries of origin?

Methods

Data

The analyses use Danish register data on all non-kin adoptees – both domestic and international – from the birth cohorts of 1989–1994 (N=3,180) and their non-adopted peers (N=418,272). Hence, I disregard kinship adoptees and adoption by step-parents (N=1,803), and adoptions for which information about adoption type is missing from the registers (N=67). This leaves an analytical sample of 421,452.[3] An overview of the data appears in Table 1.

Table 1. Persons from the 1989–1994 birth cohorts, by adoption status and adoption type: Observations and percentages

	Kinship or step-parent adoptees		Non-kin adoptees		Missing information on adoption type		Non-adoptees		Total
	Obs	%	Obs	%	Obs	%	Obs.	%	Obs.
1989	393	0.57	514	0.75	14	0.02	67,560	98.66	68,481
1990	393	0.56	516	0.74	11	0.02	69,104	98.69	70,024
1991	312	0.45	529	0.76	15	0.02	68,774	98.77	69,630
1992	269	0.37	505	0.70	11	0.02	71,062	98.91	71,847
1993	232	0.33	560	0.80	8	0.01	69,571	98.86	70,371
1994	204	0.28	556	0.76	8	0.01	72,201	98.95	72,969
Total	1,803	0.43	3,180	0.75	67	0.02	418,272	98.81	423,322

Note: $Chi^2(15) = 132,11$. $P < 0,0001$.

[3] 57 of the strange adoptees do not have birthday registrations in our data, for them we can only identify birth year – in all 4.42 of the whole sample have unknown birthdates – as I use birthdays to construct the time range in which the psychiatric disorders can occur, but also some of

However, for the analyses of educational attainment at age 25, the analytic sample is limited to the birth cohorts of 1989–1991, resulting in a sample consisting of 1,559 non-kin adoptees and 205,438 non-adoptees.

Information about adoptions is extracted from the adoption register, which is made available to researchers via Statistics Denmark. The adoption register contains detailed information about adoption type, age at adoption, country of origin, date of adoption and parents' age at adoption, among other things, from 1989 onwards. The pre-1989 data does not include exact information about these adoption characteristics, although they allow for an identification of adoption status. Therefore, the oldest birth cohort included in the analyses is that of 1989. Because the first part of the analyses presented in this paper investigates the likelihood of having completed youth education and/or being enrolled in education at age 20, it includes data on all six birth cohorts. However, as I only have educational information that goes up to and includes 2016, the analyses of educational level at age 25 are limited to the 1989–1991 cohorts. Apart from data on adoption and education, the analyses also include information from other register sources pertaining to the sociodemographic background variables of the analytical sample.

Educational outcomes at ages 20 and 25

The National Educational Register contains information on the highest educational level attained by a person as of a given date (e.g. compulsory school, vocational training, bachelor's degree, etc.). Moreover, the register provides information about a person's enrolment in education as of a given date. Using this information, I construct two dichotomized educational measures: i) educational status at age 20, and ii) educational attainment at age 25.

Educational status at age 20 is constructed by combining information regarding the highest educational level and enrolment at age 20, with the aim of constructing a measure that indicates

whether a person at age 20 is on an educational track, and thereby determine their potential to pursue further education and be able to self-support later in adulthood. More precisely, educational status at age 20 measures whether a person has either completed youth education (high school, vocational training, and similar types of education) and/or is enrolled in any type of education. This includes information on enrolment in, for example, youth education or compulsory education – the measure is sensitive to persons who have not finished those levels of education at the same time as their peers, and have instead caught up later.

In contrast, at 25, the educational measure of educational attainment is more restricted. Here I only use information about the highest educational level at age 25, constructing a dichotomous variable measuring whether a person has attained a higher degree than compulsory schooling. At this age, there may still be persons that will finish their compulsory education at a later point. However, by age 25, most individuals ought to have finished compulsory schooling, and to have not done by then is a strong indication of not only a lack of education, but also of their future educational and labour market potential.

Therefore, both measures provide important information on the non-kin adoptees' status in the educational system and thus their future opportunities

Independent variables: Non-kin adoption status and country of origin

A dichotomous measure for non-kin adoptees was constructed using information from the adoption register on adoption type. I analyse the six most frequent countries of origin for non-kin adoptees born in 1989–1994, and a seventh group consisting of the rest of the non-kin adoptees from other countries, or for whom the country information is missing. Because I am investigating whether country of origin matters using regression analyses with many control variables, it is necessary to have enough individuals in each country category to be able to identify statistically

significant associations with educational outcomes. Therefore, the country categories include at least 100 individuals.

In the analyses, 'country of origin' contains the seven following categories: South Korea (n=630), Columbia (n=581), India (n=412), Denmark (n=238), Sri Lanka (n=173), Romania (n=137) and other countries or missing information (n=921). The distributions of the educational outcomes and for the independent and confounding variables for non-kin adoptees, adoptees and adoptees by country are presented in Table 2.

Table 2. Percentages and means of model outcomes and covariates for non-kin adoptees, adoptees (total) and adoptees by country of origin

	Non-adoptees	Non-kin adoptees (Total)	Colombia	South Korea	India	Denmark	Sri Lanka	Romania	Other countries or missing country information
Finished youth education and/or enrolment in education at age 20	73.87	70.85	68.48	80.69	71.69	65.38	69.88	66.39	67.24
More than compulsory school at age 25	82.63	73.74	73.25	85.71	77.78	69.67	73.87	48.72	63.49
Boy	51.24	48.96	63.555	47.291	17.876	56.190	50.000	59.016	52.064
Birth year									
1989	99.24	0.76	18.133	19.540	19.171	18.571	18.675	9.016	10.321
1990	99.26	0.74	20.287	17.077	12.953	19.524	21.084	8.197	14.794
1991	99.24	0.76	15.081	17.241	13.731	13.810	24.096	11.475	17.431
1992	99.29	0.71	17.415	14.450	11.399	18.571	16.265	22.951	16.972
1993	99.20	0.80	15.260	14.286	20.984	14.762	14.458	21.311	19.954
1994	99.24	0.76	13.824	17.406	21.762	14.762	5.422	27.049	20.528
Mean age at adoption	Not relevant	1.700	1.305	0.292	1.723	1.110	0.480	3.115	2,586
Out-of-home placement	4.088	6.331	6.822	3.448	3.627	5.238	4.819	12.295	9.289
Parents cohabiting	59.572	76.728	75.045	76.190	79.016	77.143	71.687	81.148	77.408
Mother's age at adoption	28.774	34.604	33.738	35.573	34.453	33.933	34.380	34.033	34.830
Mother's educational level									

Compulsory school or less	29.499	17.659	9.336	22.332	23.316	18.571	12.048	21.311	17.546
High school or vocational training	45.384	32.683	39.677	29.721	33.679	7.143	24.699	0.34.426	30.046
Short- or medium-term further education	21.436	40.726	40.575	42.693	33.938	40.000	55.422	35.246	40.596
Long-term further education	3.681	08.932	10.413	5.255	9.067	4.286	7.831	9.016	11.812
Mother's income: lowest income quintile	16.441	10.678	9.874	12.479	11.658	8.095	12.651	10.656	8.257
Mother's psychiatric diagnosis	9.855	5.647	5.745	4.598	7.254	6.667	3.012	8.197	5.505
Father's age at adoption	31.384	36.180	35.199	37.110	36.378	35.314	36.295	35.844	36.302
Father's educational level									
Compulsory school or less	25.632	12.389	9.515	12.808	15.544	11.429	9.639	15.574	12.844
High school or vocational training	52.384	44.901	42.190	48.768	47.150	43.810	27.711	49.180	45.872
Short- or medium-term further education	14.621	26.146	27.828	21.346	23.575	34.762	39.759	25.410	25.000
Long-term further education	7.362	16.564	20.467	17.077	13.731	10.000	22.892	09.836	16.284
Father's income: lowest income quintile	18.892	13.039	14.004	10.509	13.472	19.048	15.060	11.475	14.106
Father's psychiatric diagnosis[1]	7.977	4.620							

1. Percentage of individuals with a father with a psychiatric diagnosis is not reported by country of origin categories, due to small numbers in some cells. All researchers using Statistic Denmarks data must comply with rules to ensure data security, which among other things include that desciptives about few persons are not to be made public.

Confounding variables

I include the following confounders in the two comparative regression analyses of non-kin adoptees and adoptees,: birth year, gender, non-Danish origin (whether a person has immigrant status or at least one parent with immigrant status – note that international adoptees are registered as having Danish nationality), out-of-home placement (at least once after birth/adoption and prior to

18th birthday), parents' cohabiting status, mother's educational level (compulsory school or less, high school or vocational training, short- or medium-term further education, long-term further education), mother's low-income status (income in the lowest income quintile), mother's mental health (mother registered in the psychiatric register), father's educational level, father's low-income status and father's mental health. The last four measures of paternal characteristics are coded similarly to the same measures used for mothers.

I include all of the abovementioned confounders in the regression analyses of non-kin adoptees only except the variable non-Danish origin, because all international non-kin adoptees are categorized as being of Danish nationality upon their arrival in Denmark.

Statistical analyses

A chi^2 test of independence is initially performed for the educational outcomes of the adoptees and non-adoptees, and also for within-group differences between the adoptees by country of origin. I use logistic regression models to analyse the educational outcomes at ages 20 and 25, adjusting for sociodemographic confounders, and in the analyses limited to adoptees only, I also include adoption characteristics. In all analyses, dummies of birth cohorts are included to control for possible cohort effects.

Results

Educational status at age 20

Comparing the educational status of non-kin adoptees and non-adoptees at age 20 shows that 70.4 percent of the adoptees have either finished youth education and/or are enrolled in education, whilst this applies to 73.1 percent of the non-adoptees ($chi^2(1)=11.79$ $p=0.001$). Thus, there is an overall bivariate significance, yet the difference between adoptees and non-adoptees is small

enough that it converts into an odds ratio (OR) of 0.874, suggesting that non-kin adoptees are approximately 1.1 times less likely to have either finished youth education and/or be enrolled in education at age 20. Including a range of individual and parental background control variables in a logistic regression changes this OR considerably. Table 3 shows that all things being equal, non-kin adoptees are 2 times less likely to have either finished youth education and/or be enrolled in education at age 20 when compared to their non-adopted peers. So these results illustrate that the relatively stronger socioeconomic parental background of the non-kin adoptees (see Table 2) is of importance, because holding that constant decreases non-kin adoptees' likelihood of having finished youth education and/or being enrolled in education at age 20.

Table 3. Logistic regression model of educational status at age 2: Non-kin adoptees and non-adoptees. Odds ratios (OR)

	Model 1 OR	(95% CI)
Finished youth education and/or enrolled in education		
Non-kin adoptees	0.511***	[0.466,0.562]
Cohort (Ref: 1989)		
1990	1.142***	[1.111,1.175]
1991	1.308***	[1.271,1.345]
1992	1.412***	[1.373,1.453]
1993	1.471***	[1.429,1.513]
1994	1.548***	[1.504,1.592]
Boy	0.462***	[0.454,0.469]
Out-of-home placement	0.376***	[0.361,0.392]
Parents cohabiting	1.373***	[1.349,1.397]
Non-Danish origin	1.236**	[1.068,1.430]
Mother's age at birth/adoption	1.011***	[1.009,1.014]
Mother's education		
Ref: Compulsory school or less		
High school or vocational training	1.664***	[1.633,1.696]
Short- or medium-term further education	2.531***	[2.462,2.601]
Long-term further education	4.009***	[3.715,4.327]
Mother in lowest income quintile	1.020	[0.998,1.044]
Mother's psychiatric contact	0.866***	[0.843,0.890]
Father's age at birth/adoption	0.999	[0.997,1.001]
Father's education		
Ref: Compulsory school or less		
High school or vocational training	1.352***	[1.326,1.378]
Short- or medium-term further education	2.358***	[2.284,2.435]
Long-term further education	3.679***	[3.489,3.880]
Father in lowest income quintile	0.939***	[0.920,0.959]
Father's psychiatric contact	0.881***	[0.855,0.908]
Observations	335,601	
Pseudo R^2	0.107	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Nonetheless, examining non-kin adoptees without differentiating between countries of origin might distort the within-group heterogeneity in educational status. Limiting the analyses to non-kin adoptees only, Table 4 shows the results of a logistic regression analysis of educational status within the group of non-kin adoptees by countries of origin. South Korea is used as the reference category because the hypothesis is that, given their less adverse pre-adoption point of departure, South Korean adoptees will perform better in the educational system than other non-kin adoptees. Indeed, Table 4 shows that adoptees from South Korea have a significantly greater likelihood of having finished youth education and/or being enrolled in education at age 20 than adoptees from all other countries (except Romania), when controlled for adoption age, individual and parental characteristics. That Romanian adoptees do not differ from South Korean adoptees in their likelihood of having finished youth education and/or being enrolled in education at age 20 is an unexpected result – both theoretically and being mindful of the results listed in Table 2.

Table 2 shows that 66 percent of the Romanian adoptees finished youth education and/or were enrolled in education at age 20, whilst 81 percent of the South Korean adoptees had that status. Table 2 also shows that Romanian adoptees were more often boys (59.02 vs. 47.29 percent), much older when adopted (mean age 3.12 vs. 0.29) and also that a considerably larger percentage had also experienced out-of-home placement during their childhood (12.30 vs. 3.45 percent). These are three factors that – all things being equal – reduce the likelihood of having finished youth education and/or enrolment in education at age 20. Holding these factors and socioeconomic parental background factors constant, the likelihood of having finished youth education and/or being enrolled in education at age 20 for South Korean adoptees and Romanian adoptees are not significantly different. Still, adoptees from Romania – in contrasts to adoptees from South Korea – do not significantly differ from the rest of the non-kin adoptees, regardless of country of origin.

Table 4. Logistic regression model of educational status at age 20: Non-kin adoptees by country of origin. Odds ratios (OR)

		Model 2 OR	95% CI
Country of origin (Ref: South Korea)			
	Colombia	0.620**	[0.464,0.827]
	India	0.568***	[0.409,0.790]
	Denmark	0.487***	[0.339,0.699]
	Sri Lanka	0.544**	[0.366,0.809]
	Romania	0.694	[0.422,1.140]
	Other country or missing information	0.633**	[0.474,0.847]
Adoption age >=2		0.724**	[0.591,0.888]
Cohort (Ref: 1989)			
	1990	1.033	[0.775,1.376]
	1991	1.418*	[1.056,1.904]
	1992	1.274	[0.952,1.703]
	1993	1.225	[0.917,1.637]
	1994	1.651**	[1.224,2.227]
Boy		0.622***	[0.523,0.740]
Out-of-home placement		0.204***	[0.145,0.288]
Parents cohabiting		1.305**	[1.071,1.591]
Mother's age at birth/adoption		0.979	[0.952,1.006]
Mother's education			
	Ref: Compulsory school or less		
	High school or vocational training	1.110	[0.864,1.426]
	Short- or medium-term further education	1.070	[0.824,1.388]
	Long-term further education	0.960	[0.652,1.415]
Mother in lowest income quintile		1.080	[0.820,1.422]
Mother's psychiatric contact		0.953	[0.659,1.376]
Father's age at birth/adoption		1.019	[0.993,1.046]
Father's education			
	Ref: Compulsory school or less		
	High school or vocational training	1.117	[0.859,1.451]
	Short- or medium-term further education	1.431*	[1.058,1.935]
	Long-term further education	1.414*	[1.000,2.000]
Father in lowest income quintile		1.006	[0.787,1.286]
Father's psychiatric contact		0.983	[0.659,1.467]
Observations		2,906	
Pseudo R^2		0.066	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

A Wald test confirms that country of origin as a categorical variable is significant ($chi^2(6)=22.19$; p=0.001), thus country of origin matters for educational attainment, but the pivotal difference is between South Korean adoptees and the rest of the non-kin adoptees. Table 4 also

demonstrates that age matters, and that being adopted after age 2 reduces the adoptee's likelihood of having finished youth education and/or being enrolled in education at age 20 (OR=0.72). Thus, the results in Table 4 are in line with other studies on educational or related outcomes. Age at adoption and geographical origin *matter* (Odenstad et al., 2008; Vinnerljung et al., 2010), but the present analyses show more precisely that when analysing educational outcomes at age 20, dividing non-kin adoptees into South Korean and non-South Korean categories is a valid approach, and in this case it does not distort the heterogeneity of their educational status.

Educational attainment at age 25: Birth cohorts 1989–1991

Having completed their youth education and/or being enrolled in (any) education at age 20 is a good indication of future educational attainment. However, being enrolled in education does not necessarily imply the attainment of a degree, because some individuals will drop out before completion. Thus, even though the difference between non-kin adoptees' and non-adoptees' educational status at age 20 is not conspicuous (Table 2), investigating young adults' educational attainment at age 25 might yield different results.

Table 5 shows the results of a logistic regression of having attained a degree higher than compulsory school for non-kin adoptees and non-adoptees. Non-kin adoptees are more than three times less likely to have earned a degree higher than compulsory school when compared to their non-adopted peers, all things being equal.

Even though I am analysing a different measure by only comparing non-kin adoptees' likelihood of actual attainment, and not enrolment, the results in Table 5 indicate that the educational gap between non-kin adoptees and non-adoptees widens over time – this also applies to South Korean adoptees, as solely comparing them to the non-adoptees results in a significant OR (=0.69), even though the prevalence is higher among the South Korean adoptees when compared to the non-

adoptees (85.71 and 82.63 percent, respectively). Again, this suggests that the relatively stronger socioeconomic backgrounds of non-kin adoptees' parents make a difference to their educational outcomes.

Table 5. Logistic regression model of educational attainment at age 25: Non-kin adoptees and non-adoptees. Odds ratios (OR)

		Model C	
		OR	95% CI
More than compulsory school at age 25			
Non-kin adoptees		0.306***	[0.267,0.352]
Cohort (Ref: 1989)			
	1990	1.078***	[1.042,1.115]
	1991	1.156***	[1.117,1.196]
Boy		0.688***	[0.669,0.707]
Out-of-home placement		0.219***	[0.206,0.233]
Parents cohabiting		1.786***	[1.734,1.840]
Non-Danish origin		1.176	[0.930,1.487]
Mother's age at birth/adoption		1.018***	[1.014,1.022]
Mother's education			
	Ref: Compulsory school or less		
	High school or vocational training	1.966***	[1.907,2.028]
	Short- or medium-term further education	2.744***	[2.614,2.879]
	Long-term further education	3.552***	[3.101,4.070]
Mother in lowest income quintile		0.871***	[0.840,0.903]
Mother's psychiatric contact		0.799***	[0.765,0.835]
Father's age at birth/adoption		0.995**	[0.992,0.999]
Father's education			
	Ref: Compulsory school or less		
	High school or vocational training	1.572***	[1.525,1.621]
	Short- or medium-term further education	2.385***	[2.255,2.523]
	Long-term further education	3.115***	[2.839,3.417]
Mother in lowest income quintile		0.915***	[0.885,0.947]
Mother's psychiatric contact		0.780***	[0.745,0.818]
Observations		162,949	
Pseudo R^2		0.138	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Analysing whether there is the same heterogeneity within the group of non-kin adoptees at age 25 for educational attainment (as there was at age 20 for educational status), a Wald test shows that country of origin as a categorical variable is significant ($chi^2(6)=21.76$; p=0.001). However, Table 6 reveals a different picture than Table 5. Even though the ORs suggest that South Korean adoptees are more likely to have attained a degree higher than compulsory school when compared

to the other non-kin adoptees, South Korean adoptees are not significantly more likely to have done so than either Columbian or Indian adoptees. Romanian adoptees are now the ones being relatively least likely to have a degree higher than compulsory school when compared to the South Koreans, with an OR of 0.21. This contrast with the results presented in Table 5 might be explained by the differences in the two measures at ages 20 and 25, where Romanian adoptees may be enrolled at age 20, but do not finish that education, or that their enrolment at age 20 is in compulsory school.

Table 6. Logistic regression model of educational status at age 20: Non-kin adoptees by country of origin. Odds ratios (OR)

	Model 2 OR	95% CI
Country of origin (Ref: South Korea)		
Colombia	0.648	[0.417,1.006]
India	0.711	[0.418,1.210]
Denmark	0.514*	[0.296,0.892]
Sri Lanka	0.471*	[0.264,0.842]
Romania	0.210***	[0.0920,0.481]
Other country or missing information	0.446***	[0.282,0.705]
Adoption age >=2	0.668*	[0.489,0.912]
Cohort (Ref: 1989)		
1990	0.962	[0.703,1.317]
1991	1.378	[0.994,1.910]
Boy	0.749*	[0.573,0.979]
Out-of-home placement	0.107***	[0.0613,0.185]
Parents cohabiting	1.242	[0.916,1.684]
Mother's age at birth/adoption	1.003	[0.960,1.048]
Mother's education		
2	0.813	[0.558,1.185]
3	0.976	[0.657,1.451]
4	0.749	[0.404,1.391]
Mother in lowest income quintile	1.003	[0.657,1.533]
Mother's psychiatric contact	0.938	[0.567,1.550]
Father's age at birth/adoption	1.007	[0.968,1.047]
Father's education		
1		
2	1.319	[0.875,1.990]
3	1.383	[0.855,2.238]
4	1.500	[0.853,2.636]
Father in lowest income quintile	0.664*	[0.468,0.943]
Father's psychiatric contact	0.653	[0.372,1.146]
Observations	1424	
Pseudo R^2	0.117	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Further analysis shows that Romanian adoptees are consistently less likely than all the other non-kin adoptees (excepting adoptees from Sri Lanka) to have a higher degree than compulsory school at age 25 (ORs 2.1-4.7). Hence, at age 25, there *is* heterogeneity within the group of non-kin adoptees in their likelihood of having attained a higher degree than compulsory school, with Romanian and Korean adoptees featuring at each end of the continuum. Furthermore, Table 6 also confirms that adoption at age 2 or older decreases the likelihood of having a degree higher than compulsory school.

Discussion and conclusion

This study has examined the educational achievements of non-kin adoptees in Denmark by not only comparing them to non-adoptees, but also by analysing whether within-group differences exist according to country of origin. The likelihood of having completed youth education and/or being enrolled in education at age 20, and the likelihood of having attained a degree higher than compulsory school is lower for non-kin adoptees than non-adoptees – and the OR at age 25 is conspicuously larger. Even though the ORs in the two estimations cannot be directly compared, these results still indicate that the educational gap between non-kin adoptees and non-adoptees widens over time.

Contrary to expectations, heterogeneity in the likelihood of having completed youth education and/or being enrolled in education at age 20 within the group of non-kin adoptees is mainly between South Korean adoptees and the rest of the non-kin adoptees, regardless of country of origin, which is very much in line with previous findings (Dalen, 2001; Odenstad et al., 2008; Vinnerljung et al., 2010). South Korean adoptees are the only group of non-kin adoptees that do not significantly differ in their likelihood of having completed youth education and/or being enrolled in education at age 20, compared to non-adoptees. Furthermore, within the group of non-kin adoptees

they also stand out from all the others, with the exception of the Romanian adoptees. This finding is in contrast to similar analyses of non-kin adoptees' mental health at age 20 in Denmark where the analyses have shown that South Korean adoptees had a higher likelihood of psychiatric contacts and a range of psychiatric disorders when compared to non-adoptees (like the rest of the non-kin adoptees) (Olsen, 2017).

Moreover, the results on mental health showed more heterogeneity within the group of non-kin adoptees, with South Korean adoptees at one end of the risk continuum of mental health problems in adoptees and Romanian and Danish adoptees on the other. However, these results are not necessarily theoretically juxtaposed, because early adversity may impact mental health and educational outcomes differently. Many psychiatric diagnoses are fully independent of cognitive skills, so despite a person being treated for the psychiatric illness in question, there is no reason to believe that their educational outcomes will be affected. Nonetheless, before being diagnosed, and insofar as untreated psychiatric illness goes, the psychiatric condition will in most cases affect a person's educational progress, regardless of their cognitive abilities.

In contrast to the Danish results on the mental health of adoptees at age 20, the present results on educational status at age 20 support the evidence found in earlier studies on educational outcomes, even though those studies used more basic categories of geographical origin. However, analysing educational attainment at age 25 yields somewhat different results. First, non-kin adoptees are more than three times less likely to have a degree higher than compulsory school when compared to their non-adopted peers; and second, the results among non-kin adoptees show more heterogeneity in their likelihood of having attained a degree higher than compulsory school. Romanian and South Korean adoptees are at each end of the continuum of the likelihood of having attained a degree higher than compulsory school by age 25, but the dividing line is not between South Korean and the remaining non-kin adoptees, as South Korean adoptees are not significantly

different from Columbian and Indian adoptees, and Romanian adoptees are not significantly different from Sri Lankan adoptees.

Hence, these results show the importance of using more precise measurements of non-kin adoptees' geographical origin in studies on adoptees' educational outcomes, as there is noticeable heterogeneity in their likelihood of educational attainment at age 25 according to their countries of origin – this also applies when controlled for age at adoption and other background characteristics. Thus, future studies of non-kin adoptees should aim to use more precise measures of geographical origin, as ignoring these might yield misleading results.

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