Heterogeneous effects of parental separation on the educational outcomes of children

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Introduction:

Divorce and partnership dissolution are highly stratified phenomena with disadvantaged social groups being not only more likely to experience union dissolution, but also more vulnerable to facing adverse consequences thereof. With respect to children, the previous literature finds that children who do not live with both biological parents tend to fare worse across several dimensions compared to children who do (cf. Amato 2010; Härkönen et al. 2017; McLanahan et al. 2013). As a result, parental separation may be one pathway through which inequalities are transmitted over generations.

This study contributes to the literature by raising the question: for whom does parental separation matter the most? In order to do this, we identify heterogeneities in the educational consequences of parental separation, specifically focusing on differences in the effects along educational background, gender, and ethnicity[1]. We examine the grade performance of children at the end of compulsory schooling (9th grade) and their subsequent educational transitions to upper secondary education[2].

Previous studies have shown that the effects of divorce on children's educational performance differ across educational backgrounds (Bernardi and Boertien 2016; Grätz 2015). Specifically, Grätz (2015) finds that children of highly educated parents experience smaller penalties from parental separation on GPA and upper track secondary school attendance as compared to children whose parents have lower levels of education using German data. These results fall in line with predictions from the compensatory class hypothesis which stipulates that highly educated families are able to compensate for the penalties of parental separation more effectively. In contrast, Bernardi and Boertien (2016) examine the heterogeneous effects of parental separation on tertiary school completion using the British Cohort Study 1970 and find that the children of highly educated parents face the largest penalties. The contradicting results from these two studies highlights the needs to examine the effects of divorce across several contexts.

Other studies have examined the extent to which there are gender differences amongst children in the exposure to parental separation. In most cases the results indicate that there are modest to no differences between boys and girls, but the contexts in which this is examined may matter (Amato and James 2010; Härkönen et al. 2017).

Data and Methods:

The data for this study comes from Swedish registers containing detailed socio-economic, demographic, and education information on the entire Swedish population born between 1973 and 1995, as well as their parents born outside the main sampling window, with coverage from 1968 until 2011. Information about each individual is merged between administrative registers using unique identification numbers assigned to each individual. Using the Multigeneration register, we are able to link individuals to their parents, thus allowing us to identify siblings.

[1] Analyses on heterogeneities across ethnic groups will be added by the time of the conference.
[2] The current abstract only includes the analysis for 9th grade GPA, but the transitions to upper secondary school will be added by the time of the conference.

Our dependent variable is a child's grade point average (GPA) at age 16, which was obtained from the educational register and is available between 1989 and 2011 (corresponding to birth cohorts 1973 to 1995). The GPA has been standardized by graduating cohort to account for the well-documented differences in cognitive performance across cohorts, changes in grading schemes, and student composition differences. As a result, the scores reflect performance relative to the entire national graduating cohort for a given year.

Our main explanatory variable is age at which a child experienced a parental separation prior to the age of 16. In order to define this variable, we identified the year in which biological parents were no longer residing in the same dwelling unit. Thus, we are able to identify differences between siblings in the age at which a separation occurred. In the present analysis, this age restriction was imposed in order to measure exposure to parental separation prior to a child completing the 9^{th} grade at the age of 16.

The educational background of the parents is identified as the highest level of completed education in the parental unit. This has been categorized into compulsory, upper secondary, and tertiary levels. Alternative specifications were tested and all yielded qualitatively similar results.

All of the analyses were conducted using sibling-fixed effects models. When considering the educational outcomes of children, parental separation is endogenous to unobservable family-level characteristics. Thus, the sibling-fixed effects approach us to account for all factors shared by biological siblings in order to disentangle a less-biased relationship between divorce and children's educational outcomes. Furthermore, this approach will rely on within family variation in the child's age at the time of the divorce allowing us to more precisely measure the exposure, as well as thoroughly examine critical ages. The design of this study follows that of Sigle-Rushton et al (2014).

Results:

Table 1 presents the results from the analyses on heterogeneities in the effects of separation across parental education. Model 1 presents the results from the pooled analysis. Here, the results indicate that there is an age gradient in the effects. Specifically, children exposed to a parental separation earlier in their childhood tend to perform slightly better in terms of GPA at age 16 relative to the reference category (age 10), whereas children exposed to separation after the age of 10 display a penalty in their educational performance. It is important to note, however, that although these estimates are statistically significant they are rather small in magnitude. For example, children who are exposed to a parental separation at the age of 14 face a penalty of 4.3 percent of a standard deviation relative to the reference group.

Since the pooled analysis (model 1) may mask heterogeneities across educational groups, we examine differences in the effects across educational background. Model 2 presents the results from model that includes interactions between highest level of parental education and all covariates included in the model. This was done to test for model fit. The results from the model indicate no statistically significant difference between educational groups in the effect of parental divorce on the educational performance of children. Although the results indicate that the effects do not vary and there is no improvement in the model fit, we proceeded to stratify the analysis by parents' highest level of education.

Models 3, 4, and 5 present the results corresponding to the models stratified by compulsory, upper secondary, and tertiary education, respectively. Although the analysis from model 2 show no statistically significant differences by parents' highest level education, the subsequent analyses

indicate that the effect is concentrated amongst the children with parents with upper secondary education. As stated above, however, the magnitude of these effects are not substantively significant.

Finally, table 2 presents the results from the models estimating gender differences in educational outcomes. Again, the results indicate that there are no statistically significant differences in the effects of parental divorce on the educational performance of boys and girls.

Based on the preliminary results from this study, there seems to be a modest effect of parental separation on the educational performance of children at age 16. In addition, there is no indication that the average effects differ across educational groups or gender. The next steps of the analysis will look at transitions to upper secondary education, and educational tracks (academic versus vocational tracks). In addition, we will add analyses looking at ethnic differences in the effects of parental divorce on children's educational outcomes.

Table 1. SES differences in the effects of parental separation on children's educational performance (GPA standardized by birth cohort) at age 16 for birth cohorts 1973-1995. All models estimated using family FE.

			Highest parental education		
	Model 1	**Model 2** Fully interacted	**Model 3** Compulsory	**Model 4** Upper Secondary	**Model 5** Tertiary
Child's age at separation					
0	0.015	0.023	-0.004	0.023	0.011
	(0.009)	(0.013)	(0.038)	(0.013)	(0.014)
1	0.036***	0.049***	0.045	0.049***	0.016
	(0.010)	(0.014)	(0.041)	(0.014)	(0.016)
2	0.034***	0.044***	0.021	0.044***	0.027
	(0.009)	(0.013)	(0.039)	(0.013)	(0.014)
3	0.031***	0.042***	0.020	0.042***	0.021
	(0.009)	(0.013)	(0.039)	(0.013)	(0.013)
4	0.035***	0.052***	0.041	0.052***	0.012
	(0.009)	(0.012)	(0.038)	(0.012)	(0.013)
5	0.039***	0.049***	0.016	0.049***	0.032**
	(0.008)	(0.012)	(0.037)	(0.012)	(0.012)
6	0.034***	0.047***	0.034	0.047***	0.019
	(0.008)	(0.012)	(0.037)	(0.012)	(0.012)
7	0.030***	0.040***	0.028	0.040***	0.020
	(0.008)	(0.011)	(0.037)	(0.012)	(0.012)
8	0.011	0.021	0.019	0.021	-0.001
	(0.008)	(0.011)	(0.037)	(0.012)	(0.011)
9	0.009	0.012	-0.006	0.012	0.006
	(0.008)	(0.012)	(0.038)	(0.012)	(0.012)
10	Ref.	Ref.	Ref.	Ref.	Ref.
11	-0.017	-0.002	-0.010	-0.002	-0.032**
	(0.009)	(0.012)	(0.040)	(0.013)	(0.012)
12	-0.034***	-0.042***	-0.076	-0.042***	-0.021
	(0.009)	(0.012)	(0.041)	(0.013)	(0.012)
13	-0.035***	-0.055***	-0.053	-0.055***	-0.012
	(0.009)	(0.013)	(0.042)	(0.013)	(0.013)
14	-0.043***	-0.046**	-0.065	-0.046**	-0.035*
	(0.010)	(0.014)	(0.045)	(0.015)	(0.014)
15	-0.029**	-0.030*	0.022	-0.030*	-0.033*
	(0.010)	(0.015)	(0.046)	(0.015)	(0.015)
Sex					
Male	Ref.	Ref.	Ref.	Ref.	Ref.
Female	0.334***	0.331***	0.327***	0.331***	0.340***
	(0.003)	(0.004)	(0.012)	(0.004)	(0.004)
Birth Order					
1	Ref.	Ref.	Ref.	Ref.	Ref.
2	-0.115***	-0.122***	-0.082***	-0.122***	-0.113***
	(0.003)	(0.004)	(0.011)	(0.004)	(0.004)
3	-0.178***	-0.192***	-0.086***	-0.192***	-0.175***
	(0.005)	(0.007)	(0.020)	(0.007)	(0.008)
4+	-0.229***	-0.245***	-0.186***	-0.245***	-0.212***
	(0.009)	(0.013)	(0.033)	(0.013)	(0.015)
Parent's highest education * Child's age at separation					

(Ref: Upper secondary)	
Compulsory schooling	
0	-0.027
	(0.037)
1	-0.005
	(0.040)
2	-0.023
	(0.038)
3	-0.022
	(0.037)
4	-0.011
	(0.036)
5	-0.033
	(0.036)
6	-0.013
	(0.036)
7	-0.013
	(0.036)
8	-0.002
	(0.035)
9	-0.019
	(0.037)
10	Ref.
11	-0.008
	(0.039)
12	-0.034
	(0.039)
13	0.001
	(0.040)
14	-0.018
	(0.043)
15	0.052
	(0.045)
Tertiary education	
0	-0.012
	(0.019)
1	-0.034
	(0.021)
2	-0.017
	(0.020)
3	-0.022
	(0.019)
4	-0.040*
	(0.018)
5	-0.017
	(0.018)
6	-0.028
	(0.017)
7	-0.021
	(0.017)
8	-0.022
	(0.016)
9	-0.006

		(0.017)			
10		Ref.			
11		-0.030			
		(0.018)			
12		0.021			
		(0.018)			
13		0.043*			
		(0.019)			
14		0.011			
		(0.020)			
15		-0.003			
		(0.022)			
Constant	-0.355***	-0.356***	-1.170***	-1.084***	-0.399***
	(0.006)	(0.006)	(0.248)	(0.099)	(0.121)
N	830,214	830,214	61,221	435,838	333,155
BIC	864263.9	864532.5	-	-	-

Standard errors in parentheses

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

Model 3 includes interactions between highest completed education of parents and all covariates

Models 4, 5, and 6 are stratified based on highest achieved education of the parents

Table 2. Gender differences in the effects of parental separation on children's educational performance (GPA standardized by birth cohort) at age 16 for birth cohorts 1973-1995. All models estimated using family FE.

	Model 6
Child's age at separation	
0	0.026*
	(0.012)
1	0.045***
	(0.013)
2	0.042***
	(0.012)
3	0.042***
	(0.012)
4	0.040***
	(0.012)
5	0.041***
	(0.012)
6	0.033**
	(0.011)
7	0.016
	(0.011)
8	0.009
	(0.011)
9	-0.006
	(0.012)
10	Ref.
11	-0.026*
	(0.012)
12	-0.048***
	(0.012)
13	-0.051***
	(0.013)
14	-0.053***
	(0.014)
15	-0.038**
	(0.015)
Sex	
Male	Ref.
Female	0.332***
	(0.012)
Child's age at separation * Female	
0	-0.022
	(0.015)
1	-0.018
	(0.018)
2	-0.016
	(0.017)
3	-0.021
	(0.016)
4	-0.012
	(0.016)
5	-0.003
	(0.016)
6	0.002
	(0.016)

7	0.030
	(0.016)
8	0.005
	(0.017)
9	0.030
	(0.017)
10	Ref.
11	0.018
	(0.018)
12	0.028
	(0.018)
13	0.032
	(0.019)
14	0.020
	(0.020)
15	0.019
	(0.021)
Birth Order	
1	Ref.
2	-0.115***
	(0.003)
3	-0.178***
	(0.005)
4	-0.229***
	(0.009)
Constant	-0.354***
	(0.009)
N	830214
BIC	863884.1

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

References:

Amato, P. R. (2010). Research on Divorce: Continuing Trends and New Developments. *Journal of Marriage and Family*, *72*(3), 650–666. doi:10.1111/j.1741-3737.2010.00723.x

Amato, P. R., & James, S. (2010). Divorce in Europe and the United States: Commonalities and differences across nations. *Family Science*, *1*(1), 2–13. doi:10.1080/19424620903381583

Bernardi, F., & Boertien, D. (2016). Understanding heterogeneity in the effects of parental separation on educational attainment in Britain: do children from lower educational backgrounds have less to lose? *European Sociological Review*, *32*(6), 807–819.

Grätz, M. (2015). When Growing Up Without a Parent Does Not Hurt: Parental Separation and the Compensatory Effect of Social Origin. *European Sociological Review*, *31*(5), 546–557. doi:10.1093/esr/jcv057

Härkönen, J., Bernardi, F., & Boertien, D. (2017). Family Dynamics and Child Outcomes: An Overview of Research and Open Questions. *European Journal of Population*, *33*(2), 163–184. doi:10.1007/s10680-017-9424-6

McLanahan, S., Tach, L., & Schneider, D. (2013). The Causal Effects of Father Absence. *Annual Review of Sociology*, *39*(1), 399–427. doi:10.1146/annurev-soc-071312-145704

Sigle-Rushton, W., Lyngstad, T. H., Andersen, P. L., & Kravdal, Ø. (2014). Proceed With Caution? Parents' Union Dissolution and Children's Educational Achievement: Union Dissolution and Children's Achievements. *Journal of Marriage and Family*, *76*(1), 161–174. doi:10.1111/jomf.12075