

Yes, Denmark Is a More Educationally Mobile Society than the United States: Rejoinder to Kristian Karlson

Stefan B. Andrade, Jens-Peter Thomsen

The Danish National Centre for Social Science Research

Abstract: In this rejoinder to Kristian Bernt Karlson (KBK), we maintain that there are substantial differences in intergenerational educational mobility between Denmark and the United States. In fact, when we include additional parental information from the National Longitudinal Survey of Youth 1997 (NLSY97) for the United States, as suggested by KBK, the gap between Denmark and the United States increases. To confirm our findings, we show that the same conclusion about markedly higher educational mobility in Denmark holds when data from the General Social Survey are substituted for the NLSY97.

Keywords: educational mobility; Denmark; United States; inequality of educational opportunity; welfare states

IN 2018, we published a comment in *Sociological Science* (Andrade and Thomsen 2018) on a study by Landersø and Heckman (2017) (L&H). In our comment, we showed that L&H arrived too hastily at their conclusion about similar educational mobility patterns in Denmark and the United States. Three years later, Kristian Bernt Karlson (KBK) has written a critical response (Karlson 2021) to our comment, in which he (1) claims that we inflated the differences in educational mobility between Denmark and the United States; (2) criticizes our categorical measures, which he believes overstate our empirical findings; and (3) points out what he considers statistical and data-related flaws, which “potentially undermine the credibility” of our analyses.

To put KBK’s comment in context, it is important to note that KBK completely refrains from dealing with our original critique of how L&H arrived at their conclusion of similar educational intergenerational mobility in Denmark and the United States. The purpose of our 2018 comment was to show that L&H’s claim was undermined by three problems. First, they confused row and column percentages in their reproduction of a table from the OECD (Organisation for Economic Cooperation and Development). Second, they only reported regression estimates from a study by Hertz et al. (2007), whereas Hertz et al. themselves gave more weight to correlation coefficients in their interpretation of the evidence. Third, L&H measured mobility in a problematic way in the figures when comparing educational mobility in Denmark and the United States.¹

Instead of engaging with our critique of L&H, KBK discredits our 2018 comment by highlighting supposed flaws that he speculates may have significantly impacted our conclusion. However, KBK does not produce any evidence that our choices lead to the wrong conclusion about differences in educational mobility between

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
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Denmark and the United States. We find this to be a surprising approach, given that KBK has easy access to all our data and program files. Therefore, our rejoinder to KBK comprises three parts. First, we briefly deal with KBK's way of interpreting comparative intergenerational mobility research. Second, we address in detail what KBK sees as errors and omissions in our original comment. When we follow KBK's recommendations, the differences in intergenerational educational mobility between Denmark and the United States reported in our 2018 comment become even more pronounced. If we use U.S. data from the General Social Survey (GSS) for similar cohorts, we reach the same conclusion as in our original analysis based on the National Longitudinal Survey of Youth 1997 (NLSY97).

Comparative Intergenerational Educational Mobility Research

KBK starts out by claiming that his reinterpretation of our results "[...] support[s] the well-known finding of a 'mobility paradox' in which educational and occupational mobility in the United States and the Scandinavian countries are very similar, whereas income mobility is dramatically different" (Karlson 2021:347). To back up his narrative of the existence of this "well-known mobility paradox," KBK cites studies by Breen, Mood, and Jonsson (2016), Breen and Jonsson (2005), Beller and Hout (2006), and Hout and Dohan (1996).

However, most of these studies focus on occupational and income mobility rather than educational mobility. In fact, the only educational mobility study on the United States and Sweden (or Scandinavia for that matter) is the book chapter by Hout and Dohan (1996), which was published 25 years ago. In their chapter, Hout and Dohan used survey data from 1981 and 1991 to analyze a sample of individuals born between 1906 and 1973. Regardless of the quality of Hout and Dohan's study, we fail to see how this source alone, which examines individuals born as early as 1906, justifies the claim that there is a "well-known" mobility paradox in contemporary educational/income mobility studies. By contrast, we may cite Black and Devereaux (2011), a standard reference that KBK also relies on. In a subsection, Black and Devereaux review the (economic) literature on intergenerational educational mobility and state the following:

Compared to earnings, there have been fewer advances in the estimation of intergenerational education correlations and elasticities since 1999 [...]. Hertz et al. (2007) provide an impressive survey of correlations and regression coefficients for a sample of 42 countries using comparable sample and variable definitions. [...] They find that the correlations are highest in South America at about 0.6. They are typically about 0.4 in Western Europe, with the lowest estimates being for the Nordic countries. The U.S. estimate is 0.46. Chevalier et al. (2009) find generally similar results in their more limited sample of European countries and the U.S. (P. 1505)

In the study by Hertz et al. (2007), out of 42 countries, Denmark had one of the lowest correlations, ranking 39th while the United States ranked 15th. In the

other study mentioned by Black and Devereux, Chevalier, Denny, and McMahon (2009) split participants from the International Adult Literacy Survey into two age groups and showed that the younger group (people under the age of 45) was more educationally mobile in both Denmark and Sweden than in the United States. In their 2014 report, the OECD (2014:93) arrived at a similar conclusion: the likelihood of participating in tertiary education for individuals whose parents have upper-secondary or tertiary education, relative to individuals whose parents have no upper-secondary education, is two times higher in the United States compared with Denmark (a relative risk of 6.8 in the United States and 3 in Denmark; 2 in Norway and 2.3 in Sweden).² In sum, we have yet to see evidence of a “well-known mobility paradox” in studies on educational and income mobility that compare Scandinavia and the United States.

Importantly, our 2018 comment should be read not as a free-standing article on educational mobility but as a comment showing that when we used the same literature and data sources as L&H, we found their claim to be unsubstantiated. However, KBK read our comment as the former rather than the latter. This is best illustrated by KBK’s criticism that we do not engage with a 2008 article by Pfeffer. KBK draws heavily on Pfeffer’s (2008) analysis of intergenerational educational mobility in 20 countries and invests much effort into examining how Pfeffer’s findings change when different levels of educational aggregation are used to estimate unidiff models. However, Pfeffer’s article uses survey data for much older cohorts than the ones included in our 2018 comment. We used data on the cohorts born between 1980 and 1984 because this was what L&H did. As Pfeffer deals with much older cohorts born between 1929 and 1972 (who were aged 26 to 65 years in 1994 to 1998), we wonder why KBK puts so much emphasis on this study. In our 2018 comment, we dealt extensively with Hertz et al.’s (2007) study rather than that of Pfeffer (2008) because the former constituted the reference that L&H drew on to substantiate their claim regarding similar educational mobility in Denmark and the United States (L&H did not refer to Pfeffer). Therefore, we do wonder why, instead of dealing so extensively with Pfeffer’s (2008) analysis, KBK does not analyze the same data that were used by L&H and us. Furthermore, Pfeffer (2008) is careful not to push his conclusion too far, noting that “the empirical results presented here await validation with different data” (P. 556).

In another line of argument, KBK compares our figures with those found in income mobility studies in an effort to show that the differences in educational mobility between Denmark and the United States are very small (Karlson 2021:349). First, we would argue that it is more relevant to compare intergenerational educational persistence across countries than to compare correlations in intergenerational income with those in education. Second, KBK argues (Karlson 2021:349) that a correlation that is 1.2 times higher in the United States than in Denmark (0.47 vs. 0.39) is close to similar. Although a 20 percent difference may be interpreted in various ways when examined in isolation, the difference in correlations that we reported needs to be considered in light of the entirety of our results, which rely on multiple measures, classifications, and methods. As we have shown (Andrade and Thomsen 2018) and will show below, our other analyses indicate the existence of substantial differences between Denmark and the United States, including relative

risk and odds ratios that are twice as large in the United States compared with Denmark.

Reproducing Our 2018 Analyses while Considering KBK's Comments

KBK states that we (1) use incorrect survey weights, (2) report biased standard errors, and (3) do not include certain parental information available in the NLSY97 data (we address what KBK considers to be minor flaws in the online supplement). Without presenting any evidence, KBK speculates that the problems he identifies may jeopardize the overall conclusion of our article. We will show that when we reproduce our analyses while taking KBK's comments into account, the gap in educational mobility between Denmark and the United States becomes even larger than what we reported in our 2018 comment.

First, we thank KBK for pointing out that we incorrectly specified frequency weights in our logit models for the United States, in which we should have indeed used probability weights. However, we note that in the online supplement to our 2018 comment we also presented unweighted estimates from all models (including the logit models in question), which showed statistically significant and empirically substantial differences between Denmark and the United States (we also note that L&H did not use weights in their tables).

We also thank KBK for bringing to our attention the fact that our inferential procedures needed to consider the complex survey design of the NLSY97 by including weights adjusting for the sample structure of the NLSY97 data.³ KBK further suggests that not specifying standard errors as robust jeopardizes our conclusions. Again, we are puzzled as to why KBK simply did not re-estimate our models using correct weights and standard errors (as we do below) instead of remaining in the speculative realm.

Finally, we thank KBK for highlighting the possibility of using information on nonresidential parents as well as parents' retrospective data, which adds a substantial number of parents to the analyses. As far as we can tell, L&H did not include such information in their analyses either, and to some degree, we were simply not aware of this possibility.⁴ This is unfortunate, not least because, due to this omission, our 2018 comment presented an overly optimistic picture of U.S. educational mobility (likely because the added parents include a larger share of parents with lower socioeconomic status). Below, we re-estimate the models employed in our 2018 comment using correct weights in all cases, correct inferential procedures, and the additional parental information available in the NLSY97. To address some of KBK's arguments, we also estimate unidiff models. It turns out that when we incorporate the changes suggested by KBK, the mobility gap in education between Denmark and the United States increases.

Empirical Results

We use the same data as in our 2018 comment: Danish administrative data for Denmark and the NLSY97 for the United States. We measure educational attainment

Table 1: Children's degree status (2013) by parents' highest degree

Denmark (<i>n</i> = 250,954)				
Parents	Offspring			Total
	No HS	HS	College	
No HS	32	48	20	100
HS	16	48	36	100
College	8	28	64	100
United States (<i>n</i> = 5,177; unweighted)				
Parents	Offspring			Total
	No HS	HS	College	
No HS	49	41	10	100
HS	23	51	26	100
College	9	34	57	100
United States (<i>n</i> = 5,177; weighted)				
Parents	Offspring			Total
	No HS	HS	College	
No HS	51	40	9	100
HS	22	50	28	100
College	9	32	59	100

Notes: Children born between 1980 and 1984. Data are expressed as row percentages. No HS = no high school degree; HS = high school degree; College = college degree or higher. Parental education is the maximum of the two parents' education. For the United States, No HS includes GED certificates, whereas College includes junior college/associate degrees, four-year college degrees, and advanced degrees. For Denmark, College includes business academies, university college degrees, and university degrees. Parental education was measured in 1997.

in 2013 for children born between 1980 and 1984 (when they were 29 to 33 years old), and we measure parental education in 1997 (when the children were between 13 and 17 years old). We also present estimates for the United States based on data from the GSS as an additional robustness check.

Table 1 (comparable with Table 2 in the 2018 comment) is a mobility table that shows the intergenerational transmission of education in Denmark and the United States. We focus on the educational destinations of children with parents with no high school degree (no upper-secondary education). This is a highly relevant group to consider if we want to compare how countries fare in terms of providing their most disadvantaged citizens with educational opportunities. In this group of disadvantaged children, 49 percent (40 + 9) finish at least high school in the United States, whereas 68 percent (48 + 20) do so in Denmark. Twice as many get a college degree in Denmark (20 percent) compared with the United States (nine percent) (we find the same differences using GSS data).⁵ If we express these results as relative risk ratios, advantaged children (compared with disadvantaged children) are three times as likely to get a college degree in Denmark (0.64/0.20), whereas in the United States advantaged children are 6.5 times as likely (0.59/0.09) to do

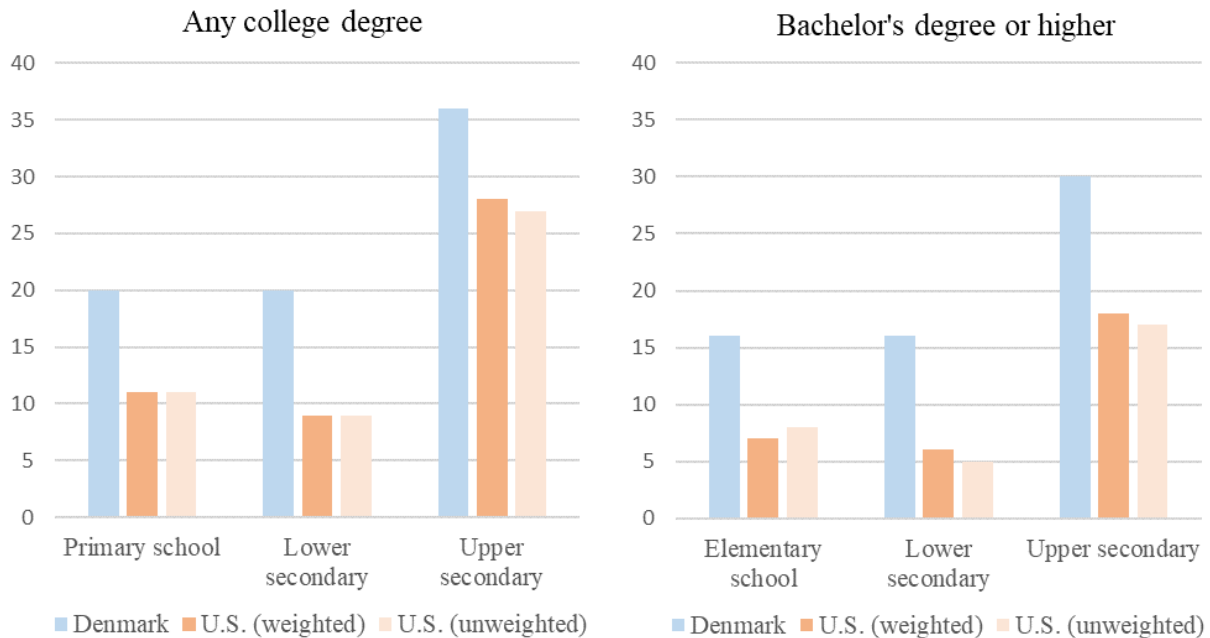


Figure 1: Share of children who obtain any college degree or at least a bachelor's degree by parents' education (only lower educated parents shown). *Notes:* Primary school comprises grades 0/1 to 7, lower secondary grades 8 to 11; upper secondary comprises high school diploma, gymnasium, and vocational education and training. "Any college degree" is any higher education degree. Denmark: $n = 250,956$; United States: $n = 5,177$.

so. This difference is very similar to what was found by the OECD (2014:93), as reported above (Denmark: 3; United States: 6.8).

As KBK places much emphasis on separating parents with primary and lower secondary schooling, in Figure 1, we have depicted the share of children from lesser-educated backgrounds who obtain a college or bachelor's degree. Differentiating between primary and lower secondary education among parents does not alter the pattern shown in Table 1: children from disadvantaged backgrounds are much more likely to get a college or bachelor's degree in Denmark than in the United States. The GSS data show the same differences between Denmark and the United States.

In Table 2, we look at correlation and regression coefficients. Even though all cross-country differences in estimates are statistically significant, they vary in magnitude. Nevertheless, all estimates show the same pattern (i.e., more mobility in Denmark), and in several cases the cross-country differences are substantial. GSS estimates also support the conclusion of lower educational mobility in the United States.⁶

In Table 3, we present results based on a categorical measure of education. This is our preferred measure, as education is inherently categorical. In addition, unidimensional measures tend to average out important differences in the educational

Table 2: Educational mobility by continuous measures: children's years of education (2013) by parents' years of education (maximum of parents' education)

	Denmark (<i>n</i> = 251,016)	United States (years of education: <i>n</i> = 5,226) (degrees: <i>n</i> = 5,177)	
		Weighted	Unweighted
Correlations			
Parents–child (coded from years of education)	0.35* (0.00) [0.35; 0.35]	0.47* (0.01) [0.45; 0.50]	0.45* (0.01) [0.43; 0.48]
Parents–child (coded from highest degree)	0.39* (0.00) [0.39; 0.39]	0.46* (0.01) [0.43; 0.48]	0.45* (0.01) [0.43; 0.48]
Regressions			
Parents–child (coded from years of education)	0.35* (0.00) [0.34; 0.35]	0.49* (0.01) [0.46; 0.52]	0.47* (0.01) [0.44; 0.49]
Parents–child (coded from highest degree)	0.42* (0.00) [0.42; 0.43]	0.46* (0.01) [0.44; 0.49]	0.46* (0.01) [0.44; 0.48]

Notes: Children born between 1980 and 1984. * $p < 0.01$. Separate models for each country. Standard errors are in parentheses, and 95 percent confidence intervals are in brackets. For U.S. unweighted estimates, standard errors are robust. For U.S. weighted estimates, standard errors fully consider the complex survey design of the NLSY97. All differences between the two countries are significant at * $p < 0.01$. Spearman rank-order correlations produce similar results.

distribution (Black and Deveraux 2011). We find cross-country differences that are statistically significant and substantial in magnitude. For example, the odds ratio for college completion relative to not completing high school for children of parents with a college degree (relative to children with parents with no upper-secondary education) is about 30 in the United States and 13 in Denmark (similar odds ratios are found using GSS data). The pattern is the same when we consider odds ratios from models based on positional measures (see Table A1 in the online supplement)—that is, the odds ratios are substantially higher in the United States than in Denmark.

Finally, in Table 4, we look at educational mobility as summarized by the unidiff parameter from a log-linear model (Xie 1992; Erikson and Goldthorpe 1992). For the United States, we include GSS data to check the robustness of our findings. As KBK has done, we set Denmark as the reference country, and we compare estimates based on different levels of aggregation for educational attainment. In one of our analyses, we differentiated between primary and lower secondary levels of schooling, as KBK suggests that we may have understated the degree of educational mobility in the United States by collapsing the two. Regardless of whether we classify education into three, four, five, or six categories (or whether we use NLSY97 or GSS data), the United States is significantly less educationally mobile than Denmark. For

Table 3: Educational mobility by categorical measures: children's degree by parents' highest degree

	Denmark (<i>n</i> = 250,954)	United States (<i>n</i> = 5,177)	
		Weighted	Unweighted
High school completion			
Parents' education			
High school	2.06* (0.03) [2.00; 2.11]	2.98* (0.37) [2.32; 3.83]	2.71* (0.28) [2.21; 3.32]
College	2.40* (0.04) [2.32; 2.48]	4.67* (0.59) [3.63; 6.02]	4.45* (0.52) [3.54; 5.59]
College completion			
Parents' education			
High school	3.64* (0.06) [3.52; 3.75]	7.08* (1.41) [4.75; 10.55]	5.89* (0.93) [4.32; 8.04]
College	13.24* (0.25) [12.77; 13.73]	36.93* (6.90) [25.42; 53.65]	31.73* (5.18) [23.05; 43.68]

Notes: Children born between 1980 and 1984. * $p < 0.01$. Values are odds ratios (reference: no high school). Standard errors are in parentheses, and 95 percent confidence intervals are in brackets. Separate multinomial logit models for each country. For U.S. unweighted estimates, standard errors are robust. For U.S. weighted estimates, standard errors fully consider the complex survey design of the NLSY97. Two-tailed t -test statistics show all differences are significant at $p < 0.01$.

NLSY97 estimates, the association between parents' and children's education is on average roughly 33 percent stronger in the United States than in Denmark. To compare, whereas Pfeffer (2008) found a 0.58 gap between the least and the most educationally mobile country out of 19 countries in total, in our analyses using the NLSY97 data, the difference between Denmark and the United States ranges from 0.26 to 0.36.⁷

Concluding Remarks

In our 2018 comment, we engaged critically with L&H's claim that educational mobility is similar in Denmark and the United States, and we showed that Denmark is more educationally mobile than the United States. In his criticism, KBK refrains from dealing with our critique of L&H's analysis and does not present any evidence to counter our findings. Given that we shared with KBK all the Stata programs used in our analyses, KBK could have re-estimated our models after incorporating his methodological corrections and data improvements, which would have resulted in more constructive and substantial criticism. In any case, when we modify our analyses to fully take into account KBK's criticisms and observations, the mobility

Table 4: Unidiff model parameters (ϕ): different levels of educational aggregation

	Three-level categorization	Four-level categorization	Five-level categorization	Six-level categorization
	1. High school or lower 2. Short college degree 3. Bachelor's degree or higher	1. No high school 2. High school 3. Short college degree 4. Bachelor's degree or higher	1. No high school 2. High school 3. Short college degree 4. Bachelor's degree 5. Master's degree or higher	1. Primary school 2. Lower secondary 3. High school 4. Short college degree 5. Bachelor's degree 6. Master's degree or higher
Denmark ($n = 5,028$) (reference)	1.00	1.00	1.00	1.00
United States (NLSY97) ($n = 5,177$)	1.26	1.36	1.36	1.29
(p value)	(< 0.01)	(< 0.01)	(< 0.01)	(< 0.01)
United States (GSS) ($n = 1,124$)	1.09	1.35	1.35	1.27
(p value)	(0.36)	(< 0.01)	(< 0.01)	(< 0.01)

Notes: Child–parent (maximum of parents' education). U.S. estimates are based on mobility tables computed using weighted data from both NLSY97 and GSS. The GSS data comprise persons aged 30 to 36 years born between 1979 and 1985 (see also note 7). For Denmark, two percent sample used.

gap between Denmark and the United States turns out to be wider than what we presented in our 2018 comment.

Comparative studies of intergenerational educational mobility have many pitfalls, as they are hampered by, among other things, hard-to-operationalize qualitative differences in education systems across countries, substandard surveys and poor data, and insular academic perspectives (i.e., economic and sociological blinders). These challenges make it problematic to rely on any single measure of intergenerational educational mobility. To quote Breen and Jonsson (2005),

A ranking of countries according to degree of openness must be approached cautiously because of data incomparability, conceptual problems, and measurement error. Furthermore, to the extent that countries differ in their patterns of fluidity, ranking them in any unidimensional way is unrealistic. (P. 232)

In both our 2018 comment and in this rejoinder, we have followed this advice and relied on multiple ways of measuring education and modelling educational mobility. As Black and Deveraux (2011:1504) stated, “education is generally measured as a discrete variable and, as such, it is also natural to use methods that explicitly acknowledge that fact” (see also Blanden 2013:44). Unidimensional measures of education may average out and hide important differences across countries. For instance, we have shown that disadvantaged children (those from homes without an

upper-secondary education) are twice as likely to get a college degree in Denmark as in the United States (20 percent vs. 10 percent), something that the linear regression coefficient cannot capture.

Whereas all our analyses have led to the same conclusion—namely, that intergenerational educational mobility is higher in Denmark than in the United States—the magnitude of the difference varies across analyses. Each analysis has to be evaluated in light of its own methodological premises. In his criticism, KBK picks out the only measure of educational mobility (the linear regression coefficient of children's years of education on the fathers' years of education) in which confidence bands overlap to problematize our findings (Karlson 2021: 354), despite the fact that a range of alternative analyses show substantial differences between the two countries. Although comparative studies of occupational and economic mobility have advanced significantly, research on educational mobility has lagged behind. We have tried to offer a more robust comparison than the one made by L&H, and we thank KBK for giving us the opportunity to confirm and solidify our findings.

Replication package (codes for Denmark as well as codes and data for the United States) available for download at <https://osf.io/v8nuf/>.

Notes

- 1 L&H measure family origin by fathers' education only (omitting households for which information on fathers' education was missing). They coded educational levels based on years of education, even though direct information on educational levels achieved (the diplomas and/or degrees attained) is available in both Danish and U.S. data. L&H used children's educational status at age 27, likely underreporting educational achievements in Denmark (the median tertiary graduating age was 28 in Denmark in 2007). For details, see our 2018 article.
- 2 In OECD (2014), the estimated ratios are erroneously referred to as "odds ratios," but they are, in fact, relative-risk ratios.
- 3 The weights are discussed at the following NLSY97 webpage: <https://www.nlsinfo.org/content/cohorts/nlsy97/using-and-understanding-the-data/sample-weights-design-effects/page/0/1>. We thank an anonymous employee at the U.S. Bureau of Labor Statistics for valuable advice regarding weights and parental information.
- 4 We left out retrospective information in the first place as we wanted to retrieve information on parental education in 1997 in both countries, similar to L&H's approach. There is another alternative to the children's retrospective information in NLSY97, namely, the round 1 screener, which adds a smaller number of parents. Including these in the analyses does not alter the results presented here.
- 5 For father-child estimates, see Table A1 in the online supplement.
- 6 Our GSS results differ from those reported by Karlson and Landersø (K&L) (2021), who repeat the claim that intergenerational educational mobility is similar in Denmark and the United States. We find a correlation of 0.51 (0.47, weighted) for the United States, compared with 0.35 for the same cohorts in Denmark (beta coefficients are 0.42 [0.38, weighted] for the United States, compared with 0.33 for Denmark). As K&L have generously shared parts of their code with us, we can see that they made several debatable coding choices. Our estimates were based on (1) comparing the maximum

of parents' education in both countries (whereas K&L use the maximum for the United States and the mean for Denmark); (2) comparing persons aged 30 to 36 years in the United States with persons aged 33 years in Denmark (whereas Karlson and Landersø used persons aged 30 to 59 years in the United States and persons aged 30 years in Denmark); (3) retrieving parental information at the same age of children in Denmark (when they were 24 years old) across cohorts (whereas K&L retrieve information on parents' educational status at different ages of the children); and (4) grouping cohorts the same way (whereas K&L use, e.g., 79 to 86 cohorts in the United States and 82 to 85 cohorts for Denmark). We have approached K&L several times with questions about their coding choices, but they have declined to answer.

- 7 Bouchet-Valat (2019) has proposed a version of the intrinsic association coefficient (Goodman 1996) that provides an easy-to-interpret measure of the overall strength of association in a mobility table that varies between 0 and 1. Using this measure, we find that Denmark is more mobile than the United States, regardless of the granularity at which we measure education. For example, whereas the intrinsic association coefficient for the five-level educational classification is 0.41 for Denmark, the measure is 0.55 for the United States for the NLSY97 and 0.59 for the GSS (for all results, see Table A3 in the online supplement).

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Stefan B. Andrade: The Danish National Centre for Social Science Research. E-mail: sba@vive.dk.

Jens-Peter Thomsen: The Danish National Centre for Social Science Research. E-mail: jpt@vive.dk.