KEYNOTE LECTURE

Socio-economic inequality in childhood and beyond: an overview of challenges and findings from comparative analyses of cohort studies*

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Abstract

The growing number of countries with large child cohort studies offers an unprecedented opportunity for comparative research. A topic of central interest in my research is, to what extent the sizable gaps in development that exist between children from different socio-economic status (SES) groups in the US are also present in other countries, and to what extent the mechanisms explaining these gaps are similar or different across countries. This overview draws on the results of comparative analyses of birth cohort study data collected in Australia, Canada, the United Kingdom, and the United States, to illustrate the challenges that arise in carrying out this kind of research and the way these challenges were met – in particular those having to do with data access and comparability, and those having to do with causal inference. I conclude that this type of research also offers great promise as shown by findings on SES gaps in child development in the four countries.

Introduction

The growing number of countries with large child cohort studies now offers an unprecedented opportunity for comparative research. There are, of course, numerous challenges in carrying out this kind of work, in particular, challenges related to data access and comparability, and challenges related to causal inference. But this type of research also offers great promise. In this talk I will illustrate these points by drawing on comparative analyses of inequality in child development from a programme of research, using birth cohort data from Australia, Canada, UK, and the US, that I have carried out in collaboration with Bruce Bradbury, Miles Corak, and Elizabeth Washbrook. I conclude with a summary of key findings to date and next steps for further research.

The cohort data

Most of the work reported here, relies primarily on four main cohort datasets. (Other datasets used in the analyses are introduced briefly in subsequent sections). The sources are: Australia, *LSAC* (Longitudinal Study of Australian Children - Birth Cohort), representing children born in 2003-2004 (N=5,107); Canada, *NLSCY* (National Longitudinal Study of Canadian Youth) using a cohort of children born in 2000-2002 to match the other datasets (N=8,522); the UK, *MCS* (Millennium Cohort Study)

(N=19,517), for children born 2000-2002 (N=19,517); and the US, *ECLS-B* (Early Childhood Longitudinal Study-Birth Cohort), representing children born in 2001 (N=10,700; all sample sizes for ECLS-B are rounded to the nearest 50, in accordance with the requirements for the restricted data).

Challenges

Data access

The first challenge that arises in this kind of research is data access. Several of the cohort studies are restricted. For example, the Canadian NLSCY may be used only at approved research data centers in Canada, and the US ECLS-B may be used only by license holders in US.

These kinds of restrictions make comparative work more difficult. Analyzing another country's data is not always permitted, and datasets cannot be pooled. So, working in international teams becomes essential. International teams – with researchers from each country -- increase costs and coordination problems, but also confer benefits in terms of ensuring country expertise. This is especially useful in studies such as ours in which the country contexts, and in particular the policy contexts, are relevant.

Data comparability

A second challenge is that data must be "harmonized." It is rare that datasets from different countries use the same measures, so similar measures must be constructed to ensure that the constructs we are examining are equivalent. This challenge is a major one and, as Kohn (1987) pointed out in his seminal Presidential address to the American Sociological Association, poses major costs in terms of time, money, and effort.

Particularly important for this programme of work, measuring socio-economic status (SES) requires constructing similar measures of income or education, and measuring child development requires identifying similar measures of reading, math, behavior, or health. In doing so, there is a tension between using the best measures and the most comparable ones. So it is important to be clear in this kind of work about how data are harmonized and also how sensitive the results are to those decisions. We have also found it helpful to address this tension by

presenting main results drawing on the most comparable measures, but then augmenting those with supplemental estimates using the additional measures available in specific countries.

Causal inference

A further challenge in this type of analysis is the problem of causal inference. With just a single cohort from each country, it is difficult to estimate causal effects of policies, since usually all cohort members are exposed to the same policy regime. Repeated cohorts (if available) can be used to estimate effects of *changes* in policies. In addition, geographic or other forms of variation *within* a country can be used (Washbrook, Ruhm, Waldfogel & Han, 2011; Esping-Andersen et al., 2012). But even with single cohorts, comparative analyses can still be informative. At a minimum, they can point to the existence of different patterns or associations, even when explanations for those differences cannot be firmly established.

Socio-economic inequality in childhood

Recent decades have seen an increase in income inequality across most OECD countries (OECD, 2011). This is of particular concern because of evidence that countries with high levels of inequality also tend to have low levels of inter-generational mobility. This relationship is clearest with respect to the US where high levels of income inequality are associated with low levels of mobility between generations (Corak, 2013; Björklund & Jäntti, 2008).

Why is there this link between inequality and immobility and at what stages of life does it develop? Increasingly, attention is turning to the early years – which are seen by many psychologists and economists as particularly important for the development of social and economic capabilities (e.g. Heckman & Lochner, 2000). Moreover, strong social inequalities in learning skills at school entry are well documented in the US (Burkam & Lee, 2002; Magnuson & Waldfogel, 2005, Magnuson & Duncan, 2006, Murnane et al, 2006). Is this pattern repeated in other countries, and which features of national environments are associated with these indications of early socio-economic immobility?

The research agenda of our four country study therefore focused on using cohort data from across similar countries to address two key questions:

1) Is inequality in school readiness, and the factors that explain it, different across countries?
2) Does inequality widen or narrow after school entry, and does this vary across countries?

Using cohort data to examine socio-economic status gaps in school readiness in US and UK

Using ECLS-B (US) and MCS (UK), Waldfogel and Washbrook (2011a, 2011b) examined SES gaps in school readiness across the two countries. To create comparable SES groups, we divided families in each country into income quintiles (with Q1 representing the lowest income quintile, and Q5 the highest).[i]

To construct comparable cognitive outcome measures, given that the underlying cognitive assessments differed across countries, we created cognitive composite scores by taking the first principal component from a battery of test scores.[ii]

Our analysis also explored differences in behavioral development, drawing on 25 items from the parent-reported Strength and Difficulties Questionnaire (SDQ) in the MCS, and 21 highly similar items (collectively drawn from a number of survey instruments) in the ECLS-B. Scores were adjusted for gender and a cubic trend in age in months, and principal components analysis (PCA) was then conducted separately to extract the cognitive and behavioral indices.[iii]

Our analysis focused on bottom-middle (Q1-Q3) and top-middle (Q5-Q3) gaps in the cognitive and behavioral outcomes. We found sizable SES gaps in school readiness in both countries, but disparities were proportionately larger in the cognitive than the behavioral domain in both countries. Figure 1 shows the key patterns for the cognitive outcome, with clear differences across countries not just in overall magnitude of the gap but in the parts of the income distribution in which it is concentrated. For example, the difference in ability between middle- and high-income children is larger in the US than the UK, whereas the reverse is true for the disparity between the middle and the poorest.
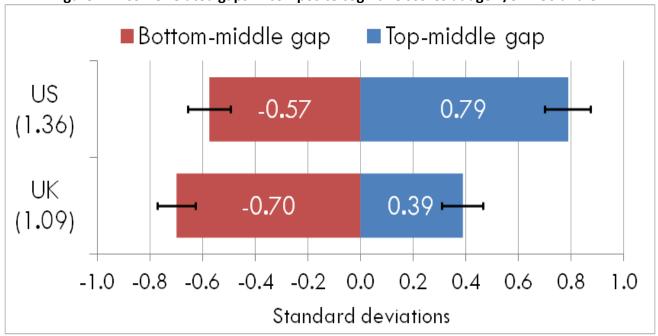
Figure 1. Income-related gaps in composite cognitive scores at age 4/5 in US and UK

Source: Waldfogel & Washbrook (2011b)

The next step was to use the rich data from the US and UK cohort studies to identify factors that might explain these gaps. To play a role in explaining gaps, a factor must:

- differ between income groups
- have an effect on the outcome

We considered a wide range of factors that met these criteria, and found in both countries that the single most important factor explaining the cognitive gaps was parenting. In this context, *parenting* is a construct that includes the sensitivity and responsiveness of parent-child interactions, as well as the quality of the home learning environment that parents provide. The importance of parenting was paralleled in the results for behavior gaps, although the analysis revealed some differences in the relative importance of different factors for the two dimensions of development.

Are similar gaps in school readiness seen in other countries?

Bradbury, Corak, Waldfogel, and Washbrook (2012) extended this analysis to four countries, using cohort data from LSAC (AU), NLSCY (CA), MCS (UK), and ECLS-B US). To create comparable SES groups, we again divided families into income quintiles in the manner described above, but also extended the analyses to include comparisons by parental education level. While income quintiles are a relative measure (one that may result in families with very different average levels of resources being in the bottom group in different countries), parental education can arguably be seen as an absolute measure that serves to compare "like with like". Parental qualifications in all countries were coded using the International Standard Classification of Education (ISCED) measure, to ensure this was the case as far as possible.

Ensuring comparability of outcome measures becomes more difficult as the number of countries increases. An insufficient number of similar cognitive test scores were available in the NLSCY and LSAC, to enable the extraction of a principal component that measured the same latent construct in all four countries. Only two aspects of development were assessed directly and in a comparable way in all four countries. Vocabulary was measured using PPVT scales in three countries, and the BAS Naming Vocabulary scale in the MCS tapped a very similar ability. Externalizing behavior (a composite of hyperactivity/inattention and conduct problems) was assessed by two SDQ sub-scales in both the MCS and LSAC, and similar items could be selected from the behavior questions in the other two surveys. A number of other abilities were assessed comparably in at least two countries with, for example, a copying test of fine motor ability conducted in all surveys except the MCS. Our strategy was to focus our analysis on the vocabulary and externalizing behavior scores, since those measures existed for all four countries, but to calculate gaps for all available outcomes to see if the patterns would be replicated, if only partially, with other measures.

Focusing again on bottom-middle (Q1-Q3) and top-middle (Q5-Q3) income-related gaps in cognitive development, we found that SES gaps in school readiness exist in all four countries, but the size of the gaps differs, with generally smaller gaps at the top in AU and CN than in the UK and US (see Figure 2). The finding of smaller gaps in the Australian and Canadian cohorts was consistent for all the measures we were able to analyze, and differed little, whether income or education was used to capture SES. With regard to the measure of behavior problems, the results for all four countries echoed our earlier finding that socio-emotional disparities are consistently smaller than cognitive ones at the age of school entry.
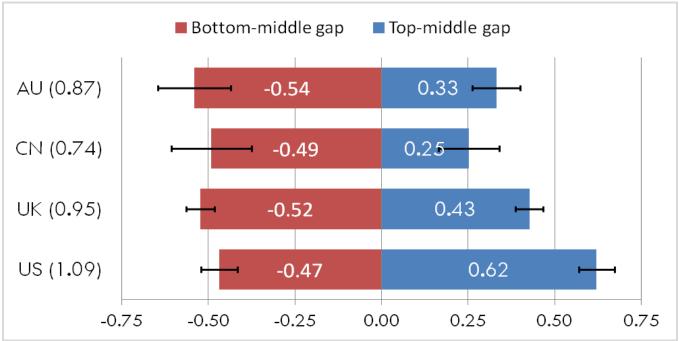
Figure 2. Income gaps in vocabulary at age 4/5: four countries

Are similar gaps seen for children of immigrants?

In many countries, children of immigrants make up a growing share of the child population, and inequality between children of immigrants and children of native-born parents is a growing concern. Thus, although our main focus to date has been on inequality associated with socio-economic status, we have also used the same cohort datasets to examine gaps in school readiness between children of immigrants and children of native-born parents (Washbrook, Waldfogel, Bradbury, Corak, & Ghangro, 2012).

To do so, we divided children in each country into four groups, based on parents' immigration status and language: native-born parents, with the official language of the country spoken at home; at least one foreign-born parent, with the official language spoken at home; at least one foreign-born parent, with a foreign language spoken at home; and all others (this latter category includes families whose immigrant or language status could not be determined). The 'official language' was either English or French in Canada, and English in the other countries.

For the reasons discussed above, our plan was to focus our analyses on the two outcomes that are comparable across all four countries: the vocabulary and externalizing behavior scores. However, initial within-country analyses showed that, unlike SES disparities, gaps related to parental immigration looked very different between the verbal and non-verbal cognitive measures. It became clear that in this analysis, vocabulary tests administered in the country language could not be considered a single reliable indicator of overall cognitive ability and would provide only a partial picture. Specifically, large disparities between certain groups in verbal ability co-existed with markedly smaller differences in non-verbal skills that were sometimes even of the opposite sign. This was particularly marked in the case of copying skills (available in three countries) but also in the tests of non-verbal reasoning ability conducted in the MCS (the BAS Pattern Construction and Picture Similarities scales) and in several other tests of numerical and writing abilities.

Overall, we found that generally, children of immigrants enter school as, or more, ready to learn, as the children of native-born parents. The large

vocabulary deficits of the children of immigrants who speak a foreign language in the home, are the exception rather than the rule. These findings suggest that studies which rely upon measures of vocabulary may present a distorted picture of the capabilities of children from non-official language backgrounds. Indicators that are not reliant upon language will generally show children of immigrants to be much more capable. This suggests a need for future data collections to place more emphasis on assessing children in their home language (even for children who know enough of the official language to communicate with the interviewer).

Using cohort data to examine the evolution of inequality after school entry

We would also like to know what happens to inequality once children are in school. Do gaps widen or narrow?

Magnuson, Waldfogel, and Washbrook (2012) examined this for the US and UK, using data from ECLS-K (Early Childhood Longitudinal Study-Kindergarten Cohort, N=21,409, born 1993) and ALSPAC (Avon Longitudinal Study of Parents and Children, N=13,988, born 1991-1992). These cohorts are older than the ones discussed so far, enabling us to follow children from school entry up to the age of 14, in a way not possible for those born more recently. The ECLS-K is a nationally representative sample of children, clustered in schools and recruited in the fall of Kindergarten around the age of 5. Parental and teacher interviews have so far been conducted at six waves, the most recent in 2007 when the children were in 8th grade. In contrast to the other cohorts discussed here, ALSPAC is not a nationally representative sample, but an entire birth cohort from one region of England. Mothers were recruited in pregnancy, and they and their children have been surveyed with high frequency ever since. While ALSPAC lacks the advantage of national representativeness, its data is by far the richest of all the cohorts we use, and includes items not available elsewhere such as biological markers and a battery of psychological assessments. That said, validation studies have

shown that the demographic make-up of the Avon region is very similar to that of England as a whole.

The outcome measures examined in our study, are assessments of reading and math ability at several points between school entry and the age of 14. The measures are unusual in that they are measured on the same scale at all ages, allowing exploration of the evolution of absolute as well as relative disparities in achievement (i.e. with and without standardizing outcome variance at different ages). The ECLS-K measures are direct assessments of ability administered by the survey; the ALSPAC measures are National Curriculum levels from the Key Stage assessments administered in all English state schools at age 7, 11 and 14.[iv]

Again, disparities in achievement according to two measures of SES were examined, contrasting income quintiles and ISCED levels of parental education. A full description of the results is beyond the scope of this lecture but one key finding was that the characterization of the evolution of disparities was different depending on whether raw or standardized scores were used, although it was relatively insensitive to the choice of measure of outcome (reading or math) or of SES (income or education). Another key finding was that the pattern of the gaps differed across the two countries, with more marked narrowing of gaps in the first few years of primary school in the UK, but then possibly more widening of the gaps thereafter, as compared to the patterns for the US.

Evolution of inequality after school entry in AU, CA, UK, and US

In a new project funded by Russell Sage Foundation (RSF) and the Australian Research Council (ARC), Bradbury, Corak, Washbrook, and I are extending the analysis of inequality after school entry to the four countries, using data from LSAC (AU), NLSCY (CA), MCS (UK), and ECLS-K (US). Specifically, we are following children from school entry to age 11-13, analyzing whether SES gaps widen, hold constant, or narrow, and relating differences in inequality across countries to differences in family resources, labor markets, and policy contexts.

Conclusions and next steps

Our programme of work to date has demonstrated the rewards of using cohort data for comparative analyses. Although arranging data access and ensuring comparability are challenging and have been costly, they have also yielded considerable insights that would not have been possible in single-country analyses.

Results to date indicate that achievement gaps at school entry differ across countries, and interestingly, these differences mirror differences in adult social mobility, with larger gaps in the US and UK than in AU and CN. These results suggest that future research probing more deeply into the role of country contexts, and in particular policy contexts, would be fruitful.

We have also found results that are robust across countries. Our US-UK comparative analyses show that parenting is a key factor explaining SES gaps in child outcomes in both countries. This is an important finding, and one that has implications for policy in both countries. Moreover, our four-country analyses provide robust evidence that language is a key factor in explaining gaps for children of immigrants. In particular, on language-free tasks, children of immigrants do as well/better than children of native-born parents. This too is a policy-relevant finding, as countries seek to understand the implications of the influx of children of immigrants into their school systems.

Finally, the evolution of gaps after school entry also appears to differ across countries. However, this conclusion is, thus far, based only on data from the US and UK, and it will be important to extend it to other countries. Accordingly, the next step in this programme of research is extending the study of gaps after school entry to four countries -- AU, CN, UK, US (the subject of our current RSF and ARC studies).

Looking further ahead, it would also be useful to examine gaps at school entry, and the evolution of gaps after school entry, in additional countries, to take advantage of additional variation in country contexts and, in particular, policy contexts. It would also be informative to examine changes in gaps for succeeding cohorts, both within and across countries, for those countries (such as the UK) that have repeated cohorts. Both such extensions would strengthen our ability to draw conclusions about the sources of and potential remedies for the types of inequality that the rich, cross-national cohort data have so amply illustrated.

More generally, our work with the cohort data illustrates the potential of comparative cohort analyses to shed light on the processes underlying child and youth health and development, and the potential role of policies both in improving average outcomes and in reducing disparities in outcomes. As more cohort datasets become available, with rich data on health and developmental outcomes, we hope to see more analyses of this kind. My experience working on this programme of research suggests that although this kind of comparative research is costly, it is also immensely rewarding. In my view, the time and effort involved in addressing the challenges of accessing data and ensuring comparability, while substantial, are well worth it.

Acknowledgements

References

Björklund, A., & Jäntti, M. (2008). Intergenerational Income Mobility and the Role of Family Background. In W. Salverda, B. Nolan, & T. Smeeding (Eds), *The Handbook of Economic Inequality*. Oxford: Oxford University Press.

Bradbury, B., Corak, M., Waldfogel, J., & Washbrook, E. (2012). Inequality during the Early Years: Child Outcomes and Readiness to Learn in Australia, Canada, United Kingdom, and United States. In J. Ermisch, M. Jäntti, & T. Smeeding (Eds), *From Parents to Children: The Intergenerational Transmission of Advantage*. New York: Russell Sage Foundation.

Burkam, D. & Lee, V. (2002). *Inequality at the Starting Gate: Social Background Differences in Achievement as Children Begin School*. Washington, DC: Economic Policy Institute.

Corak, M. (2013). Income Inequality, Equality of Opportunity, and Intergenerational Mobility. *Journal of Economic Perspectives* (forthcoming).

Esping-Andersen, G., Garfinkel, I., Han, W.-J., Magnuson, K., Wagner, S., & Waldfogel, J. (2012). Child Care and School Performance in Denmark and the United States. <u>*Children and Youth Services Review*</u> *34,* 576-589.

Heckman, J.,& Lochner, L. (2000). Rethinking Education and Training Policy: Understanding the Sources of Skill Formation in a Modern Economy. In S. Danziger and J. Waldfogel (Eds.), *Securing the Future: Investing in Children from Birth to College*. New York: Russell Sage Foundation.

Kohn, M. (1987). Cross-National Research as an Analytic Strategy. *American Sociological Review* 52, 713-731.

Magnuson, K., & Duncan, G. (2006). The Role of Family Socioeconomic Resources in the Black-White Test Score Gap among Young Children. *Developmental Review* 26, 365-399.

Magnuson, K., & Waldfogel, J. (2005). Child Care, Early Education, and Racial/Ethnic Test Score Gaps at the Beginning of School. *The Future of Children 15*, 169-196.

Magnuson, K., Waldfogel, J., & Washbrook, E. (2012). The Development of SES Gradients in Skills during the School Years: Evidence from the United States and England. In J. Ermisch, M. Jäntti, & T. Smeeding (Eds), *From Parents to Children: The Intergenerational Transmission of Advantage.* New York: Russell Sage Foundation.

Murnane, R., Willett, J., Bub, K., & McCartney, K. (2006). Understanding Trends in the Black-White Achievement Gaps during the First Years of School. *Brookings-Wharton Papers on Urban Affairs* (pp.97-135). Washington DC: Brookings Institution Press.

Organization for Economic Cooperation and Development (OECD) (2011). <u>Divided We Stand:</u> *Why Inequality Keeps Rising.* Paris: OECD Publishing.

Waldfogel, J., & Washbrook, E. (2011a). Early Years Policy. *Child Development Research* 2011, 1-12.

Waldfogel, J., & Washbrook, E. (2011b). Income-Related Gaps in School Readiness in the United States and United Kingdom. In T. Smeeding, R. Erikson, & M. Jäntti (Eds), *Persistence, Privilege, and Parenting: The Comparative Study of Intergenerational Mobility.* New York: Russell Sage Foundation.

Washbrook, E., Ruhm, C., Waldfogel, J., & Han, W.-J. (2011). Public Policies, Women's Employment After Childbirth, and Child Well-Being. *B.E. Journal of Economic Analysis and Policy* 11, Article 43. Available at: http://www.bepress.com/bejeap/vol11/iss1/art43.

Washbrook, E., Waldfogel, J., Bradbury, B., Corak, M., & Ghanghro, A.A. (2012). The Development of Young Children of Immigrants in Australia, Canada, the United Kingdom and the United States. *Child Development* 83, 1591-1607.

Endnotes

[i] Incomes were equivalized for household size, expressed in constant prices and averaged over three waves of data to reduce measurement error. (We thus did not examine income dynamics – for example the influence of changes in income or income at different stages of the child's life). Weights provided with the surveys were used when calculating the quintiles so that, as far as possible, the groups were representative of the underlying national populations.

[ii] To construct our composite, we used all 5 test scores available in the MCS - Bracken School Readiness (age 3); BAS Naming Vocabulary (age 3, 5), BAS Picture Similarities and Pattern Construction (age 5) – and all 6 available in the ECLS-B - literacy, math, receptive vocabulary, expressive language, color knowledge and fine motor copying ability (age 4).

[iii] PCA has the advantage that it extracts the maximum possible "signal" from a number of potentially noisy measures and the first component can be used as a single focal index in complex analyses between groups and across countries. When conducting international comparisons, however, careful inspection of the results of the PCA is necessary to ensure that the loadings and other diagnostic statistics are similar across countries.

[iv] An Entry Assessment score measured at age 4 can also be used for the ALSPAC cohort in the standardized analyses only.