Inequality

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Early childhood inequalities: the rocky path from observation to action

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Introduction

The chapter on early childhood inequalities by Cattan et al. (2022) identifies a broad range of socio- and geo-demographic correlates of children's cognitive and social-emotional development in early life through analyses of three UK population cohort studies. The findings suggest that early life inequalities are driven by a complex nexus of multiple, often inter-correlated, factors that each have a small independent effect size. In this commentary, I discuss three key implications for research and practice that follow from the work of Cattan et al.: (1) the urgent need for a theoretical framework to identify and test the mechanisms that drive early life inequalities; (2) the persistent obstacles to ameliorating early childhood inequality; and (3) the immense value of population cohort studies for understanding socio-historical trends and developing evidence-based policies.

Cattan et al. describe the plethora of factors that are associated with children's differences in cognitive and social-emotional development, based on extensive analyses of three UK cohort studies, whose populations were born in 1970, 2000 and 2010–2012, respectively. Focusing on children's ages of 3 and 5 years, the authors show that differences in cognitive and socio-emotional development are evident already in early life, and that they are systematically associated with children's early life environments and their genetic propensities. Cattan et al. show that these differences have long-lasting influence on later life outcomes, such as educational attainment, mental health, and income in mid-life, and that the degree of these differences has remained stable across recent generations.

I draw two initial conclusions from the findings. First, the ability to systematically predict children's differences in cognitive and socio-emotional development implies the possibility to reliably identify children who experience the greatest risk for poor developmental outcomes. This is important because identifying those children is key to intervening effectively and reducing the effects of early life disadvantage. Second, the finding that the degree of children's differences in cognitive and socio-emotional development has remained stable across generations, while their systematic associations with children's early life experiences (e.g., housing, family structure, parental education) have strengthened, implies that previous efforts to reduce early life inequality have failed. At best, they have contributed to keeping early life inequalities stable across generations.

Children's environome

The vast number of environmental measures studied by Cattan et al. (2022) can be grouped into: family characteristics, such as parents' relationship status and age; emotional environments, for example parental mental health and conflict; economic factors, including housing and income; and educational provision, such as the cognitive stimulation that parents afford for their children. These measures broadly comprise the 'environome', a term coined to summarise all environmental factors that give rise to individual differences in affect, behaviour, and cognition (von Stumm and d'Apice, 2021).

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Many factors, same difference

Two principal phenomena emerge from the analyses of Cattan et al. First, the environmental factors they studied were associated with children's differences across two developmental domains; specifically, they were linked with both cognitive and socio-emotional development. In genetics, this phenomenon is known as pleiotropy, which means that one genetic variant affects the expression of multiple phenotypic traits. A key implication of finding 'environmental pleiotropy' in the context of early childhood inequality is that if we altered one aspect of children's environment, we are likely to produce change in more than one developmental domain, if altering this one environmental aspect has any effect at all. For example, Cattan et al. observed that secure housing benefitted children's cognitive growth, as well as their socio-emotional development. Thus, we can speculate that improving families' housing conditions will broadly improve children's outcomes across developmental domains.

Many differences, same factor

The second phenomenon is that many environmental factors were associated with children's cognitive and socio-emotional development, rather than just one or two or even a handful. Each environmental factor by itself had a relatively small independent effect size, but together and while taking their shared variance into account, environmental measures produced substantial prediction estimates. Specifically, the environmental measures accounted together for 24.1% of the variance in children's cognitive development and for an amazing 44.7% in socio-emotional development at age 3 in data from the Millennium Cohort Study. Akin to the phenomenon of polygenicity from genetics, which means that many genetic factors influence the phenotypic expression of one trait, typically each with small effect size, we might want to think of the findings of Cattan et al. as 'polyenvironicity' (von Stumm and d'Apice, 2021).

Quantitative, not qualitative risk and resilience

The finding of many environmental factors influencing many complex traits leads to three suggestions that should guide research and practice in the context of children's developmental differences. The first is that risk and resilience in early childhood inequality are quantitative dimensions that result from aggregating the effects of many factors, including environmental and genetic ones, rather than being qualitative categories of experiencing a given risk factor versus not. For example, children who are born into single-parent households are also more likely to experience impoverished language and education environments in early life, to live in more disadvantaged neighbourhoods, and to experience psychological distress. It is the cumulative effect of these experiences that brings about the pervasive long-term influences of early childhood inequality, not solely being raised by a single parent versus by a married or cohabitating couple.

Interventions are likely only to have small effects

The second suggestion that follows from polyenvironicity pertains to our expectations for and design of interventions that seek to reduce early childhood inequality. If many factors exist that have varying degrees of influence to bring about children's developmental differences, interventions are likely to show a similar pattern of effects. That is, interventions are unlikely to produce large effects that are limited to one or two related developmental domains; instead, they are likely to create small, perhaps even miniscule, changes that are spread broadly across developmental domains. This means that interventions, which are typically costly to design, implement, and scale, are likely to achieve only small systematic change, if indeed they are effective and successful (see Troller-Renfree et al., 2022). This recognition is key to developing realistic expectations about what an intervention can and cannot achieve. Such realistic expectations, in turn, are pivotal for upholding the principal ambition to ameliorate early childhood inequality through interventions, even if it is a slow, piecemeal, tiny-step-by-tiny-step process.

Developmental cascades as theoretical framework

The third suggestion is to develop a comprehensive theoretical framework that enables empirical tests of the processes and mechanisms that drive early life inequality in order to identify the best opportunities for intervention. The findings of Cattan et al. suggest that so-called cascade models of development may constitute a suitable framework. Developmental cascades refer to the cumulative influences on development that stem from children's many interactions and transactions with their environment that result in spreading effects across developmental levels and domains (Masten and

Cicchetti, 2010). These effects may be direct and unidirectional, akin to the modelling approach of Cattan et al., direct and bidirectional, or indirect through various pathways, including mediations and interactions. A first challenge for future research is to model and empirically test when, where and how developmental cascades emerge and unfold. The second is to find effective ways to disrupt negative cascades and to promote positive cascades.

Obstacles to ameliorating early childhood inequality

I have outlined two issues above that hinder the design and implementation of effective interventions to reduce early childhood inequalities. The first is acknowledging that many environmental factors, each with small effect sizes, influence child development. Thus, interventions, if they are effective, are likely to only achieve modest change, which may seem disproportionate to the cost of the intervention. The second challenge is to identify windows of opportunity to intervene; that is, determining those processes and mechanisms that can be modified to improve child development.

A third obstacle is the meritocratic ideologies that are predominant in industrialised Western countries, including the UK. Meritocracy describes the idea that society distributes profit and power to individuals according to their merit – that is, a person's hard work and talents. People who succeed in society do so because they have merit; thus, they deserve to rise to the top. The flip side of this logic is, of course, that those wanting for merit will not amount to very much; their misfortune, whether it is poverty or illness, is just the fair consequence of their lack of merit. Meritocracy serves as ideological justification for neoliberal policies of economic liberalisation, such as privatisation, deregulation, and reductions in government spending, that benefit the ones with merit but disadvantage those without (Haymes, Vidal de Haymes and Miller, 2014). For example, meritocratic principles are frequently used to justify removing funding from the poorest members of society, as for example in August 2021 when the UK's current prime minister, Boris Johnson, defended planned welfare cuts by suggesting claimants should rely on their own 'efforts' rather than accept 'welfare' (Bloom, 2021).

In putatively meritocratic societies, such as the UK, children's own merit becomes a significant determinant of their access to profit and power early in life. For example, children with high cognitive ability tend to perform well in primary school (Deary et al., 2007) and thus are likely to gain admission to higher-quality secondary schools (e.g., grammar or private schools) than their less cognitively able peers. The UK's education system, just like most other education systems in the world, rewards children who are smart and study hard, with school performance serving as a gatekeeper to further education, which in turn is key to achieving societal positions rich in profit and power. The analyses of Cattan et al. (2022) demonstrate that children's own merit is systematically associated with their family background, including the home environment that they are raised in and the genetic propensities that they inherited from their parents. These findings echo other research that demonstrated the pervasive long-term influence of family background on children's educational trajectories (von Stumm et al., 2020), and that this influence has remained stable in the UK over the past century (von Stumm, Cave and Wakeling, 2022). By the virtue of their family background, some children will be blessed with more and some with less merit in the birth lottery; therefore, they will gain more or less profit and power over the life course. For as long as we hold on to the belief that the ones with more merit are more deserving in society than those without, and that the distribution of resources should adhere to reward claims rather than to support needs, early life childhood inequality will prevail, together with its long-term consequences.

The value of cohort studies

Cattan et al. (2022) highlight the enormous value of the British cohort studies for addressing complex research questions, and they exemplify how cross-cohort comparisons can inform our understanding of socio-historical trends. The UK is exceptionally rich in nationally representative, longitudinal population cohort studies, whose data are extensively analysed by researchers across social science research disciplines, for example sociology, economics, epidemiology, genetics, and psychology (Cave, Wright and von Stumm, 2022). One in every 30 people volunteers to contribute to a population cohort study in the UK (Pell, 2014). By contrast, other European countries have rarely recruited large-scale population

samples for research purposes. They have certainly never attempted to assess an entire generation of children with a standardised psychological test, as Scotland did – twice! The first time was in 1932, when Scotland's 1921-born population of 87,498 children completed the Moray House Test on 1 June in school, and again in 1947 when 70,805 children, who comprised Scotland's 1936-born population, completed the test (Deary, Whalley and Starr, 2009).

Preserving the existing population cohort studies, for example by following them up, enabling data linkage, and conceiving new cohorts are key for studying what brings about societal change. Conducting comparative analyses across generations, as Cattan et al. do, helps to build the empirical evidence base that is needed for policy development and for testing the impact of policies on society at large. Because such analyses require rich, longitudinal cohort data, the continuous investment in maintaining and expanding population cohort studies should be an urgent priority of the UK's research funders. Some are reluctant to initiate such large-scale data collections, because of their considerable demands in time, effort and money. However, these costs are justified by the immense knowledge returns that representative cohorts with in-depth assessments bring. For example, the ongoing explosion of knowledge about the role of genetics in psychological development has only become possible because the UK's cohort studies already collected genotype data at a time when the utility of these data was unknown, and many doubted their value (Plomin, 2018).

One limitation of secondary data analyses of population cohort studies is that data were collected according to theoretical frameworks that may be outdated by the time of analysis. For example, some constructs may not have been adequately measured because their importance was not recognised when the population cohort study was conceived. If developmental cascades are indeed appropriate for modelling children's developmental differences, as suggested above, their empirical validation would require collecting many in-depth measures or big data, perhaps using digital assessment technologies, to completely capture children's environome. However, most population cohort studies have only assessed a limited range of proxy measures, to remain efficient and fundable, which leads to 'blind spots' in our understanding. For example, Cattan et al. considered a vast number of environmental measures, but some important aspects of children's early life experiences were not analysed, such as childcare arrangements, school type, or the wider family structure (e.g., grandparents' involvement; Tanskanen and Danielsbacka, 2018). This is not the result of a purposeful omission by Cattan et al. but rather because these data were not collected. Funders of future population cohort studies should favour broad, in-depth assessments, even if their precise utility is unknown at the time of data collection.

Richer data will also help to avoid biased interpretations of empirical findings. For example, the analyses of Cattan et al. emphasise the role of mothers' characteristics for early childhood inequality, such as maternal age and education. While it is possible that mothers' characteristics are indeed particularly relevant for children's cognitive and socio-emotional development, the lack of valid comparisons with fathers' characteristics is striking. Cattan et al. did not exclude fathers' characteristics from their analyses for theoretical reasons, but simply because far fewer measures were collected from fathers than from mothers. Yet, in describing their results, which are conditioned on data availability, Cattan et al. unwittingly substantiate the idea that in child development mothers play a more significant role than fathers – an idea that is not empirically falsifiable in the three population cohort studies that were analysed here, because the relevant data are not available.

Conclusion: stumbling on

Cattan et al. (2022) observe that children's developmental differences are shaped, to varying degrees, by a broad range of proximal factors, such as genetics, family environments, and major life events, as well as distal factors, including neighbourhood characteristics, climate and culture. Each of these factors has only a small independent effect on child development. This observation is key to developing interventions with realistic expectations for their impact, especially when they pursue ambitious goals such as reducing childhood inequality. Current intervention efforts are still entrenched in the ill-fated assumption that small nudges, such as images of flies in urinals, or big interventions, such as Sure Start, will produce big effects. Abandoning this assumption will usher a new era of action, one that accepts, encourages and appreciates small effect sizes.

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