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**Poverty Gets Under the Skin: Evidence on Ageing from the UK**


Chiara Costi
(University of Luxembourg)
Andrew Clark
(Paris School of Economics)
Juan Carlos Caro
(Universidad de Concepcion)
Giorgia Menta
(LISER)
Conchita D'Ambrosio
(University of Luxembourg)

conchita.dambrosio@uni.lu



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# Poverty gets under the skin: evidence on ageing from the UK

**Chiara Costi (University of Luxembourg)**

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**Abstract**

The demographic transformation driven by an unprecedented rate of ageing represents a societal challenge, with profound implications for social and healthcare systems. Recent developments in the study of ageing have underlined the necessity of a multidisciplinary approach to better understand this process and, ultimately, to help slow it down. In particular, there is a need to consider ageing as a comprehensive phenomenon that not only includes how old an individual is chronologically, but also how old she is biologically.

Biological aging, the functional decline and deterioration of the human body, can be measured through a number of biomarkers, as first proposed by Baker and Sprott (1988). Some biomarkers are known by laymen, such as blood pressure, grip strength and BMI; others are based on more complex molecular and cellular changes that occur with age, such as the shortening of telomere length, and changes in DNA methylation (DNAm), an epigenetic biomarker that reflects environmentally modifiable and inheritable changes to gene expression. Epigenetic modifications are reversible, making them highly promising in the study of ageing, as they potentially enable the identification and validation of anti-ageing interventions. The portion of DNAm that predicts age, mortality and disease can be condensed into a unique measure (the epigenetic age, a specific type of biological age), expressed in years of age and directly comparable to chronological age. Epigenetic age acceleration, occurring when epigenetic age is higher than chronological age, is linked to higher risks of morbidity and mortality.

In this study, we investigate the effect of income poverty on DNAm age acceleration in a representative sample of the UK adult population from the UK Household Longitudinal Study (UKHLS). Drawing from the Molecular Biology literature, we measure epigenetic age acceleration with the epigenetic 'clock' developed by Belsky et al. (2020): the Dunedin Pace-of-Ageing (POAm). POAm is a relative measure of epigenetic ageing, capturing how fast an individual is ageing compared to their peers.

Our exposure of interest is income poverty, defined as having an equivalized household income below 60% of the median (relative poverty line). We do not only consider the current poverty status, but we also look at the longitudinal exposure to poverty over 12 consecutive years. To do so, we first compute a measure

of the 'chronicity' of poverty based on Foster (2009), which simply indicates the average time a person has spent in poverty over the study period. We then assign larger weight to longer poverty spells, using the index proposed by Bossert et al. (2012). In this case, each poverty spell is weighed by its length, thus capturing the 'persistence' of poverty. Exploiting both the chronicity and persistence of poverty, we can uncover the relationship between poverty profiles and epigenetic age, distinguishing between those who never experienced poverty, those who experienced it for no more than one consecutive period and those who experienced longer poverty spells.

Results from our empirical analysis show that income poverty leaves traces 'under the skin' of individuals: those who have experienced poverty age faster than their peers at a given chronological age. In particular, we find that the average time spent in poverty is positively associated to faster epigenetic ageing: a one standard-deviation (SD) increase in the chronicity of poverty correlates with 0.1 SD faster epigenetic ageing. Conditional on the chronicity of poverty, experiencing a poverty spell of at least two consecutive years is associated with double the increase in epigenetic ageing attached to being in poverty for no more than one consecutive period. Heterogeneity analyses show that the chronicity of poverty has a stronger negative impact for men, while persistence matters more for women. Moreover, both the chronicity and persistence of poverty correlate with faster epigenetic ageing in respondents below 60 years old compared to older people. In order to disentangle the effect of income poverty *per se* from the effect of other events that correlate with a reduction in equivalent household income (e.g., employment status, marital status, parity), we include these potential confounding variables in the analysis. We find that these factors only partially explain the effect of poverty on age acceleration, suggesting that experiencing poverty has a direct impact on individuals' epigenetic ageing.

**References**

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