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## **The epigenetic imperative: responsibility for early intervention at the time of biological plasticity**

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Mortimer, McKeown and Singh's analysis of the ethics of early life intervention is a timely reminder that philosophy has practical applications. Their assessment of the ethics of early life interventions in UK and US policy offers a compelling example of why bioethics is critical to formulating policy consistent with intended aims, for example for fairness, equity and social justice.

Mortimer and colleagues focus on current policy in the United Kingdom and how it apportions responsibility for future population outcomes. The ways in which policy frames responsibility, they argue, provides a view into its 'applicability and actionability in the real world'. Their demonstration of the general policy ambivalence about the apportioning of responsibility is an important illustration of how political decisions are most often the result of multiple compromises, rather than the outcome of a neat translation of values into policy. This ambivalence notwithstanding, their analysis shows a strong focus on parental responsibility for a child's life chances, based on her early life environment. While the authors make mention of the increasing prominence of neurodevelopmental and epigenetic frameworks for explaining such associations in early life intervention policy, they engage less with how these new frameworks are fundamentally reshaping the responsibility debate.

The rise of the early intervention approach should be seen in the wider context of recent changes in our understanding of human biology. The question of parental responsibility for a child's outcomes for the latter half of the twentieth century was cast in terms of a nature/nurture binary, where 'nature', or genetics, was fixed, and biological heredity was understood only in genetic terms that is (mostly) ruling out direct environmental effects or non-genetic but biological factors (Meloni 2016). Importantly for any historical description of EI policy in the US and UK, eugenics ideas were influential in pre-World War II EI policy in the US but to a lesser degree in the UK. The formalization of epigenetics as a scientific field - the study of how gene expression is modifiable without alterations to the DNA - has recast the early life environment as a critical window of opportunity to mold the impressionable body

(Lock 2012). It signals a growing interest in brain and genomic plasticity that has taken place over the last fifteen years or so, in the so-called postgenomic era. A thoroughly developmental view of biology often underpins the logic of early intervention (Wastell and White 2017). In this view, embodied for instance in the field of Developmental Origins of Health and Disease (DOHaD), environmental factors operating in certain critical windows of biological sensitivity are deemed to shape in a (semi)permanent way long term health trajectories – sometimes even across generations. It is because biology is particularly plastic in certain critical windows – and not timeless as in the classical genetic view - that intervention is important. It is because time and place have come (again) to matter so deeply for human biology – for the brain and the genome - that intervention needs to be timely and specific (Mansfield 2012). The 'early life environment' in this formulation is frequently reduced to the maternal body, as an easily identifiable focus for policy intervention. While UK EI policy uses the 'gender neutral terminology of "parenting"' (Gillies et al. 2016), there is a gendered dimension as to how responsibility is apportioned which also requires bioethics engagement.

The growing appreciation of epigenetic factors in addition to existing genetic ones has important implications for conceptions of early childhood and is thus a crucial component of the responsibility debate for EI policy. Bioethicists have devoted considerable time to the implications of genetics for understandings of responsibility (see for example Levitt and Manson 2007, Hammond 2010). The philosophical question of 'epigenetic responsibility' (Hedlund 2011) merits closer attention.

This debate is important given that a developmental view of biology where the human body can be profoundly shaped in certain critical periods by social events implies a logic of social intervention very different from the old eugenic argument that it is the distribution of bad genes in certain social or racial groups to represent a problem for the overall wellness of a population. However, it does not rule out a eugenic view nor is by itself a guarantee of more inclusive social policy compared to hard hereditarian genetics. There are obvious historical references here: the 1910-1911 debate on the poisoning effects of alcoholism at the British Eugenics Society had “temperance doctors” claiming – for humanitarian reasons and against mainstream eugenicists - that parental alcoholism affected child health and advocating for restrictive measures on drunkards and sometimes their children, given their “poisoned” heredity (Meloni 2016). More recently neurobiologist Adam Perkins has made the controversial argument that welfare dependency is a transmissible trait. In his book *The Welfare Trait: How State Benefits Affect Personality*, he claims that welfare erodes human capital by encouraging the proliferation of an “employment-resistant personality profile”. According to Perkins, such people not only “suffer impaired life outcomes, but also transmit that difficulty to their children and thus risk damaging the life chances of the next generation” (2016, 4). Significantly, Perkins’ thesis about dysfunctional welfare does not follow a logic of faulty genes but one of developmental effects: it “hinges less on genetic factors and more on the crucial role of childhood disadvantage in forming the employment-resistant personality” (116, our italics). It describes welfare dependency as a social stressor that damages the developmental trajectory of the present and future generation. Through parental neglect or other disadvantages in early life the antisocial features of the ‘welfare trait’ are transmitted across generations impairing the personality of future citizens.

This example may seem extreme but it is significant in that it highlights the negative possibilities of new scientific knowledge that casts early life as plastic and malleable to social stressors or deprivation. As Mortimer and colleagues state, EI policy increasingly invokes neurodevelopmental science and epigenetics to advocate for early life intervention as a social good. However, such frameworks may also - inadvertently or explicitly - support the discrimination of certain groups exposed to unfavorable environments. As social scientists and as bioethicists, we need to be aware that the 'bios' of bioethics is rapidly changing, and that to be investigated appropriately philosophical enquiry should be associated with a stronger historical awareness through which we can appreciate the polysemy of the many moral economies potentially related to scientific findings. In the present world order, where right-wing, racist, anti-immigrant and populist voices are increasingly shaping policy in the US, UK and Europe, it is no longer possible to assume that science or policy will by default try to serve all members of a population equally and fairly. The narrative of the persistence and ineluctability of liberal-democratic institutions post World War II may be more fragile and precarious than we had hoped.

As a counter, we support Maria Hedlund's call for 'epigenetic responsibility'. Her formulation (2011), based on Young's social connection model (2006), advocates for a framework that is cognizant of the historical circumstances that have structured inequalities, but takes a forward-looking approach that calls for collective responsibility for improving those circumstances. This model is well suited to address outcomes that seemingly cannot be traced to single actors. For Hedlund, epigenetic responsibility is political, and accountability traceable to responsible governance. As such, it is a model that could successfully address the policy ambivalence about responsibility that Mortimer and colleagues describe for current EI policy, given the model's advocacy for collective accountability. Furthermore, this approach might respond to the frequent inconsistency Mortimer and colleagues identify for UK EI policy: that EI is often framed as an opportunity for addressing societal inequalities, and yet this would only be the case if attending to injustice is a collective responsibility. Importantly, it is a powerful counter to frameworks that pathologize individuals or allocate responsibility too squarely on one set of actors. Such a model will become increasingly important as neurobiological and epigenetic frameworks of health and wellbeing shape policy, which is never 'just policy', but carries far reaching implications for whether all are treated fairly and equally.

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