Problems with the neuroscience evidence in ‘Evidence-Based’ Intervention and the failure to confront the context of the systematic erosion of the Welfare State

We submit this jointly, as we consider that today both social science and neuroscience have a part to play in evidence based policy formation, particularly as it relates to very young children in adverse circumstances. In this we support the critical approach of Professor Rosalind Edwards and her colleagues (EY10039). The contribution of social science is relatively old - Booth and Rowntree come to mind - that of the neurosciences new. One of the difficulties that policy makers face is that because it is a relatively young field, some commonly held ideas claiming to be rooted in neuroscience, for example that the left brain is male and cognitive and the right female and emotive, are unsupported by neuroscience. Nowhere is this clearer than in the Royal Society’s report on neuroeducation which describes such claims as ‘neuromyths’ which must be challenged; in consequence the report is highly critical of the various devices and practices claiming to be based neuroscientific evidence, extensively advertised and sold to both parents and schools.

Although we argue for a biosocial perspective, as we are biological as well as social beings we would not wish to diminish the evidence for the effectiveness of social science based projects. Sure Start, for example, was evaluated as being evidence-based in its development and implementation. Its strong evidential base was widely recognised, including by Michael Rutter, Professor of Developmental Psychopathology at the Institute of Psychiatry. Rutter’s work has included a study of the Romanian orphans, some with severe neurological damage.

This is the summary of the research evaluation of Sure Start:
This report synthesises the evidence regarding the impact of social science on the development and implementation of the UK Government’s Sure Start initiative, which was established in 1999 to focus on providing integrated early years services primarily targeted on disadvantaged neighbourhood. The research was undertaken by Dr Steve Johnson, (Univerity of Hull) who has led a number of studies of the impact of research on policy, for ESRC and other organisations. Sure Start was selected as a focus for study because it has been seen widely as an excellent example of evidence-based (or evidence-informed) policy.  

A very brief history of ‘neuroscience-based early years intervention’.

One of the first to evoke neuroscience in support of early intervention was Chicago economist James Heckman with his concept of Human Capital. This was echoed by the UK’s 2008 Foresight report, again drawing on neuroscience, but this time speaking of Mental Capital. Foresight, like Heckman spoke of the economic and social gains of EI for the individual child and hence for the economy. Heckman’s and Foresight’s argument is echoed by the 2011 Allen reports. The cover of the second report graphically displays the huge costs of doing nothing in the early years and the huge savings, depicted as gold bars, to be secured by preventive intervention. In this Human Capital model, there is little commitment to children as children. A happy fulfilled child may as an adult contribute to the social wealth of a society rather than to its economic wealth.

From the Welfare State to Residual Welfare

Beveridge, Liberal; Butler, Conservative; and Bevan, Labour were the three key architects of the Welfare State. Beveridge identified the need to slay the Five Giants of ignorance, want, disease, squalor and idleness – though his particular contribution was to sort out the chaos of social security. Butler pioneered the reform of education. Bevan was responsible for insisting the Local Authority housing was built to a good standard, but it his creation of the NHS for which he will be remembered. For him the NHS provided ‘Freedom from Fear;’ in the current crisis, alas, such well-founded fear has returned.
The cost to disadvantaged young children of the systematic erosion of the Welfare State over the past decades scarcely needs rehearsal; there is a mound of statistical evidence of the intensifying divide between the have and the have-nots, the growth of poverty, not least of children, the poor access to mental health services, and increasingly the physical health services, the housing crisis, the chaos of employment policies and so on. That Rowntree has had to construct a category of ‘the destitute’ far below what Townsend and Abel-Smith called The Poorest of the Poor is symbolic of this destruction. Now we have the ‘working poor’ whose low wages make them unable to feed their children properly. The Child Poverty Action Group reports that one in four - 4 million - children are living in poverty – 700,000 of them in the immensely wealthy city of London, where this Select Committee meets. In 2017 the Trussell Trust reports a 13% increase in use of food banks. Between April and September, the banks supplied food to 586,907 people including 208,856 children\(^5\).

There is substantial evidence that child poverty ranks high among adverse experiences and more. The CPAG reports a 26% gap between children receiving free school meals and their wealthier peers in achieving at least 5 GCSE grades A*-C.\(^6\) (A number of local authorities are providing free school meals for all as that improves the take up, but rather rarely are there school dinners in the holidays. And despite the invocation of ‘the first 1001 days’ EI proposals largely ignore the proven evidence that women need to be at a good nutritional level at conception for the healthy development - including the brains – of children. The fertile woman who might become a mother is not on the agenda – however it might be important for the child.)

Embarrassed by such figures, the Cameron government abandoned the 2010 four party consensus on the goal of abolishing child poverty by 2020, and then rejected the OECD quantitative measure of poverty as 60% of the average family income, returning to the moralising language of the pre-welfare state which blames the victim for ‘entrenched worklessness’ rather than tackling the problem. The Committee does not need reminding of this erosion of the very foundations of the welfare state, leading to a system of Residual Welfare.

Health visitors are a central profession in EI, and were promised expansion in numbers by the government, and indeed in 2015 achieved 10309, the highest number for a decade, of full time equivalent Health Visitors. But with the transfer of the
responsibility for health visitors to the increasingly underfunded Local Authorities, by January 2016, the figure was down to 9,259 – a 10.1% loss.\(^7\) Local Authorities are also responsible for funding Children’s Centres, Women’s refuges and Social Care - these too are suffering from insufficient funding. Reduction of the Centres’ funding diminishes resources for young children. The reduction of financial support for the refuges is also a blow. It has been battered women with young children who have found in the refuges somewhere safe where they could go. This cut will ensure that more children will see and perhaps experience violence and sexual abuse. The preventive logic would suggest these counterproductive cuts are immediately reversed.

While well evidenced projects for young children’s safety and development are to be welcomed, to be effective they must have adequate foundations in the adequate provision of services from housing, social security to education

**The necessary combination of social and neuroscience evidence**

In launching the Enquiry, its Chair, Norman Lamb states that ‘Adverse childhood experiences can have a huge impact on an individual in later life.’ Neuroscientific data supports this finding. A pioneering collaboration between social scientists and neuroscientists in the US examined the development of children’s brains in relation to socio-economic status studied 1099 ‘typically developing’ youngsters between the ages of three and 20 and found that the surface area of the brain was related to family income. Amongst poorer families, a small increase in income increased brain area significantly – especially in brain areas associated with language and reading skills. If the family was rich, then an increase in income made little difference\(^8\). The implication is that the simplest and most effective of early interventions to increase children’s life chances would be to lift them out of poverty.

The health visiting and social work proposals of Early Intervention re important, but they cannot be allowed to trump material need. In our everyday lives we recognise this. Ask those Grenfell Tower families with children still in temporary accommodation, six months after the fire, what they need most? They have made this more than clear – a permanent home in their own locality to rebuild their lives. This is not to diminish either the informal psychological support of family, fellow victims,
friends, neighbours or the professional the psychotherapists and social workers. It is simply that a home is a prerequisite of family life.

We see this problem in even the best thought-out proposals such as the Munro *Review of Child Protection.* The Review sadly fails to confront the reality that we live in an increasingly residual welfare system. She proposes that early intervention is made a statutory duty of Local Authorities with the proviso that the services to be offered and the staff training specified in detail. But for this to happen the Government has to make sufficient resources available. In a discussion of the report the President of the Association of Directors of Children’s Services observed sceptically that funding for EI services had been reduced by 22% since 2010. The example of health visiting is not encouraging; although there is a statutory duty of L.As to provide 5 visits to every child under two and a half, cuts have made this impossible

Meanwhile Graham Allen’s hopes that business will fund EI projects as an alternative to the government is reminiscent of the frictionless wheel.

**The neuroscientific claims underlying EI programmes.**

Underlying the various EI programmes is the claim that, without early intervention, adverse childhood experiences in the first ‘1001 days’ from conception to age 3 of a child’s life result in irreversible brain damage with lasting effects on subsequent life chances and that EI can mitigate or reverse such damage. The appeals to neuroscience are not strongly evidence-based and, more importantly, there is no neuroscientific evidence as to the effectiveness of EI programmes. Here we address the evidence for three common neuroscience-based claims.

*EI Claim 1. MRI images of neglected children’s brains show dramatic abnormalities.*

The dramatic MRI images reproduced on the covers of the Allen reports and extensively replicated in EI publications and programmes claim to compare a ‘normal’ three year old versus one suffering from ‘extreme neglect.’ Although these images have been widely used, their source is an unrefereed report by Houston-based Bruce Perry. The extreme differences – far more dramatic for example, than anything seen amongst the severely neglected children rescued from Romanian orphanages in the 1990s and better compared with the microencephaly such as
that caused by the recent zika virus epidemic. MRI images require careful interpretation; meanwhile Perry has publicly dissociated himself from their use, because the reports ‘distorted’ his research into childhood neglect.\textsuperscript{14}

\textbf{EI Claim 2. Poor environments in these critical years permanently reduce the numbers of connections between neurons in the brain (synapses) and the brain doesn’t wire up properly.}

According to one EI training programme ‘an adverse environment will lead to a child having 25\% less synapses or connections in their brains than they could have had, while a stimulating environment can lead to 25\% more connections’.\textsuperscript{15} This claim reflects a failure to comprehend the normal sequence of brain development. One of the key features of the ‘first 1001 days’ is a vast overproduction of neurons and synapses. The surplus is then steadily pruned away, so that by adulthood in some brain regions there are less than half of those present at age three. This pruning both removes unused connections and improves the efficiency of those that remain.

Furthermore synapses are highly dynamic, continually being modified, disappearing and being reformed throughout life. This remodelling capacity – plasticity -is the neural mechanism that enables a person to learn from experience, remember, and change how they respond. So the claim about the significance of synapse numbers is misleading.

Animal studies show that synapse numbers and brain structures can be modified by environmental experience. Rats reared in so-called ‘impoverished’ environments, kept in isolation in bare cages, have thinner brain cortices and fewer synapses than their littermates in ‘enriched’ environments – reared with companions, in larger cages and toys to play with. The problem with extrapolating these results to humans however is that even the rats’ ‘enriched’ environment is impoverished by comparison with the busy, smelly world in which wild rats thrive, let alone the complex physical and social environments that most growing children experience. Furthermore even when they are adult, rats reared in the impoverished environment transferred to an enriched one show a fair degree of catchup. Is this relevant to humans? As we said earlier studies of the Romanian orphans suggest that it may. Even following early malnutrition, which slows brain and body development, children can recover; given improved conditions, a growth spurt enables considerable catch-up.
The term plasticity, though, has many meanings. In the sense of the previous paragraph, it describes one of the necessary processes of development. But it is also used to describe the limited capacity of the brain to repair itself after injury, and also the delicate remodelling of synapses that accompanies learning. In the EI literature it has become a rhetorical device with which to mobilise support for the potential of such interventions. But plasticity as neuroscientists understand it is neither unlimited nor necessarily positive in its capacity to remould the brain; rather it is part of the rich and varied dynamic processes through which all living organisms interact with their environments throughout their life cycle.

**EI Claim 3 ‘Toxic stress’ in infancy has lasting consequences for later development.’**

Key to many EI programmes is the link between stress and a hormone, cortisol, which has multiple effects across the body, from regulating blood sugar, salt and water balance to learning and memory. Blood levels of cortisol vary through the day, being highest in the morning, lowest at night, and also across the life cycle from infancy to old age. Furthermore, the levels are quite labile; stress, from the need to meet a sudden challenge, to chronic anxiety and life hazards, all increase cortisol levels at least briefly. All this means that any single measurement of the blood level of the hormone is not very informative because of the daily variation, but it’s been found that it accumulates in hair. Hair grows at a centimetre a month, so the cortisol content of that centimetre could be seen as an index of the level of a person’s stress over that month. So some of the EI protocols propose routine sampling of a baby’s hair to provide an index of chronic stress, thus providing a biomarker for ‘toxic stress.’ However because there are large individual differences in cortisol levels between individuals - ‘baseline levels’ measured mid-morning, may vary fivefold between one person and another, and across different populations –a direct correlation between cortisol in hair and stress levels is hard to make.

The EI literature tends to ignore such complexities; setting aside individual differences, instead asserting that high cortisol levels are indicative that an infant has been subject to ‘toxic’ stress as a result of an unsupportive environment, even referring to it as ‘corrosive cortisol.’ Neither neuroscience nor endocrinology could accept such a simplistic designation.
A Postscript

Before the term ‘early intervention’ is set in stone, we would ask the committee to consider its implications. At worst ‘Early intervention’ suggests that the parents have already messed the kids up and only the experts can save them. For the government of a party which has historically set itself against the Nanny State, surely ‘early intervention’ smacks of the know all nanny who tells parents just what they are doing wrong and just how to get it right. Sure Start avoided such a bossy tone.

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1 Royal Society, Brainwaves Module 2, 2011
2 Johnson, S Report to the Economic and Research Council, November 2011
4 Allen Reports, Early Intervention, two independent reports, HM Government 2011
5 Trussell Trust website, consulted January 4 2018
6 Child Poverty Action Group website, consulted January 4 2018
7 Jozwiak, G, Health visitor numbers continue to fall Children and Young People Now April 26 2017.
10 Allen reports op. cit.
12 Rutter, M et al Quasi-autistic patterns following severe early global privation,

14 Lewis, P and Boseley, S, Iain Duncan Smith ‘distorted’ research on childhood neglect and brain size, *Guardian* 9 April 2010
