Vivette Glover

Born 1942. Professor of Perinatal Psychobiology.

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1. Introduction

The following introduction was archived in 2021, with acknowledgement and thanks, from Wikipedia.

Vivette Glover is a British Professor of Perinatal Psychobiology at Imperial College London. She studies the effects of stress in pregnancy on the development of the fetus and child.

Her first degree was in biochemistry at Oxford University, and she undertook her PhD in neurochemistry at University College London.

Glover has worked at Queen Charlotte's and Chelsea Hospital, London where she became head of the Fetal and Neonatal Stress Research Group. She has applied her expertise in biological psychiatry to the problems of mothers and babies.

Her projects include studies showing that maternal prenatal stress, depression or anxiety increase the probability for a range of adverse neurodevelopmental outcomes for the child. These include emotional problems, attention deficit/hyperactivity disorder, conduct disorder, and cognitive impairment. Her group have also studied the biological mechanisms that may underlie such fetal programming, including the role of cortisol.

Vivette Glover on a project visit to the Gambia in November 2019.

Recently she has become interested in both global maternal perinatal mental health and methods for intervention that may be helpful in low income counties. She has been involved in a study showing how music and dancing can help reduce symptoms of stress in antenatal women in The Gambia.

Glover was awarded the Parent Infant Partnership UK Award for Research in Pregnancy and Infant Mental Health in 2017. She has also been awarded the Marcé Society Medal and the John Cox medal..

Vivette Glover is married to Jonathan Glover, a British philosopher known for his studies on bioethics, and they have three children and three grandchildren.

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2. Education Scotland Interview

This is the transcription of Vivette Glover's remarks during an interview produced in January 2016. It was part of the 'Pre-Birth to Three' multimedia resource created to accompany Education Scotland's 'Pre-Birth to Three: Positive Outcomes for Scotland's Children and Families' guidance.

During the time in the womb, the brain is developing all the time, as are the basic functions. So the control of breathing, and sight, hearing and so on, are all developing. So the baby develops its ability to sense the outside world. We now know that towards the end of pregnancy babies can learn quite a lot.

Babies in the womb swallow the amniotic fluid, and the chemistry of that is affected by what the woman eats. So there has been research showing that if women eat very spicy food the babies when they are born are more likely to turn to spicy smells. They learn to enjoy the food they are going to taste later. It is also known that they can learn to respond to particular music. Again at the end of pregnancy there is one study where women who listened to the soap opera Neighbours a lot; when the baby was born and the music from Neighbours was played the baby looked up and was alert. And they didn't respond to other music in the same way. There is evidence that this is really at the end of pregnancy. In the last six to eight weeks babies do really start to learn, in a way that will prepare them for what they are going to respond to in the world outside.

So the organs form in the first trimester. In the middle trimester things are settling down, the cells are finding their final place. And then the third trimester is particularly important for the brain and for general growth, with the cells expanding.

We now realise that if we are interested in the best outcome for our children, we musn't just think about how we treat them from when they are born, but what happens in the womb. Research over the last ten years has really shown that how the baby develops in the womb has a big effect on their health for the rest of their life. And this is true for the physical health. We know that babies that are born smaller are more likely to have vulnerabilities to cardiovascular disease and are more likely to die of cardiovascular disease in their seventies. But we also know that there is a big effect on neuro development. The emotional state of the mother while she is pregnant affects how the baby's brain develops in the womb. There's research showing that if the mother is more stressed, more anxious, her fetus develops in a way that makes the child more likely to suffer from anxiety or depression themselves, more likely to have ADHD, more likely to have conduct disorder, more likely to have cognitive problems. There is

a whole range of different problems that the child will be more at risk from if the mother is stressed while she is pregnant. Nothing is perfect, and I think mothers shouldn't worry too much. Some children are predisposed to be anxious, and some are predisposed to be more vulnerable to something like ADHD.

And for all these things we are talking about there is an interaction between the genetics - the innate predisposition of the child - and the environment. And I think that an emotionally balanced happy mother is likely to help to make an emotionally balanced happy child. But it's not the whole story. So that while we want to do all we can to do this, we musn't blame mothers for problems that children have either.

I do think that as a society we all should be supporting pregnant women more. Employers, for example, and members of the extended family such as grandparents. Friends can help. But what I would like to see is the whole of society becoming more aware of this, so that we all, professionally when necessary, give more emotional support to pregnant women.

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3. Interview by Jane Barlow

The following interview of Professor Vivette Glover by Professor Jane Barlow forms part of a FutureLearn course, and is archived here with acknowledgement and thanks.

JB: Today I am talking to Vivette Glover, who is Professor of Perinatal Psychobiology at Imperial College, London. We've been exploring in this course the way in which the parent's emotional mind and their cognitive mind influence the development of the fetus. Can you start by telling us a little bit about fetal programming?

VG: Yes, fetal programming is the idea that the environment in the womb affects how the fetus develops, with a long term effect on the child. We have always known that how we turn out depends on an interaction between our genes and our environment. But what we now realise is that the environment starts in the womb.

JB: Can you tell us a little bit about what the particular aspects of the environment are that are important?

VG: Well, they are different ones depending on what outcome one is interested in. This whole subject was given a great impetus by the work of David Barker. He found that babies that had grown less well in the womb, smaller babies, were more likely to die of cardiovascular disease in their seventies than larger babies. So he formulated what was called the Barker Hypothesis. That was that under-nutrition, as he called it, in the womb predisposed to vulnerability to the metabolic syndrome in later life. That is cardiovascular disease, raised blood pressure, diabetes, obesity.

And we now understand a lot about the mechanisms underlying that. That if the baby is grown less well than it was genetically designed to in the womb, the less kidney cells laid down, less pancreatic cells. And that makes it harder for the child and later adult to deal with environmental problems such as high salt in later life. It makes he or she more vulnerable to cardiovascular disease, and so on. If the baby was small because the parents are genetically small, or they come from an ethnic group that is small, then that's not a problem. It's only if they've grown less well than they were genetically designed to.

JB: So the original interest was really in the nutritional status of the mother.

VG: Yes, though we now understand that how the baby grows in the womb depends on a lot of factors. So the nutritional status of the mother is only one, in fact rather a minor one. If the mother has very little calorie intake, less than a thousand calories a day, then the baby is smaller. But there are

actually a lot of other reasons why the baby can grow less well in the womb. It is not primarily usually the nutritional state of the mother. So we've discovered recently about the importance of the mother's emotional state of mind in pregnancy and in particular things such as anxiety and depression.

JB: Can you tell us a bit about what that research tells us?

VG: Yes, we now realise that fetal programming is as important for neural development and for vulnerability to psychopathology, as it is for physical development and vulnerability to physical disease. There is now a lot of evidence that if a mother is anxious or depressed or stressed while she's pregnant, this affects the development of the fetal brain and has an impact on the later child. It has an increased risk. All the things we're talking about are increase of risk. Most children of even very stressful, depressed mothers actually aren't affected. But if the mother is in the top 15% for anxiety or depression in a normal population, this doubles the risk of her child having symptoms of ADHD or conduct disorder or emotional problems as they grow up.

JB: So what you are saying is that the duration and the chronicity of her experience of anxiety or depression affects whether the fetus is adversely affected.

VG: We don't know very much about the duration or the chronicity, actually. That is an aspect that we need to have much more evidence about. We know that if she is anxious or depressed at some stage in pregnancy, that does increase the risk, but there are a lot of unknown questions about the timing and the chronicity.

JB: So it's essentially the severity that is the key issue.

VG: Well also, there's a lot we need to know about that. In some of our research we found a dose response curve. That the more anxious the mother was, the greater the risk of the child having problems. But it's not true to say it's only toxic stress or extreme stress that matters. Some studies have found increased risk for the child if the mother's exposed to more daily hassles, for example. Or if she has increased pregnancy-related anxiety. So there does seem to be a dose response curve. But we musn't just focus on the very extreme end.

There's some evidence that for some outcomes for cognitive development and physical maturation, that a certain amount of stress actually can improve outcome, improve cognitive development. And it's been suggested that for some outcomes it might be an inverse U-shaped curve. That a little bit of stress improves and a lot of stress makes the outcome worse. But I think a lot depends on which outcomes you're looking at. For emotional

behaviour outcomes we haven't found that. We have just found a linear dose response curve.

JB: So what other sorts of outcomes are affected by anxiety and depression in pregnancy?

VG: Well, one thing that's striking about this research is the wide range of outcomes that can be affected. There's emotional, a child's more likely to be anxious or depressed themselves, ADHD, conduct disorder, cognitive development. Some studies have looked at, particularly, language development. There also can be an impact on physical development. The babies are somewhat more likely to be born a few days early, or a little bit lower in weight. It's a fairly small effect. but well-reproduced in large studies.

There can also be physical effects. There can be effects on the immune system, more vulnerability to asthma. Two recent studies have shown a decrease in telomere length. And that's interesting because the telomere is the end of the DNA, and a shorter telomere length is associated with living less long. So the one thing that's really striking is there's certainly not just one outcome that's affected. There seem to be a range of outcomes, that are affected.

We're starting to do research now on trying to understand why some children are affected and not others and we're starting to have evidence that there's a gene environment interaction. So that if the child has a particular form of gene, for example, it causes vulnerability to emotional problems. Then, if the mother is anxious while she's pregnant, they're more likely to have emotional problems. So you have another form of the gene, very resilient. And the same with symptoms of ADHD, the same with memory.

So, we think that what's happening is that if the mother is anxious in pregnancy and the child has a particular genetic vulnerability to a particular condition and that double whammy can make the child have that increased risk of that outcome. And things aren't all over at birth. The outcome is also affected by the quality of the mothering. The attachment and so on. We've also found that if the child is securely attached, for example, that could protect against some problems with cognitive outcomes.

JB: So what are the mechanisms by which this happens in pregnancy?

Well, from animal models, we've had a particular focus on the HPA axis, a system that makes us stressful in cortisol. But in humans, we're not rats and it looks as though it could be a bit different. If the mother is stressed or actually so depressed, her cortisol often doesn't go up very much. And we actually don't know what the biological change in the mother is, that's significant for this. There must be something. We've looked quite a lot, and others are too, at the function of the placenta. And it's clear the placenta

filters what passes from the mother to the fetus. And if the mother is anxious or depressed, this affects the function of her placenta. And allows more cortisol to pass through. So even if the mother's own cortisol isn't raised, the fetus may be exposed to more cortisol.

We're also getting some evidence that there's a decrease in the enzyme that breaks down serotonin and the fetus may be more exposed to serotonin too. And we know that if the fetal brain and development is exposed to higher levels of cortisol or serotonin, that can affect the neural development. So we're just starting to begin to understand the underlying mechanisms, but we're only scratching the surface of understanding that. More research is needed. Much more research. But it's not so much a mystery. I mean, we could see the sort of pathways that are likely to be underlying this.

JB: So in terms of the mechanisms, what does recent research about epigenetics tell us?

VG: There's a lot of research now in this area about epigenetics. Epigenetics means on top of genetics. And it's how genes are expressed. Whether a gene is turned on or off or how much it's turned on or off. And that's affected by the environment. And we think and there's growing evidence, that a lot of these effects on the fetus and the child are mediated by epigenetic changes. So that if the fetus in the womb is exposed to higher levels of cortisol, this could cause epigenetic changes in the brain. Which then affect the development of the brain.

JB: So what sorts of things can we do to help women in pregnancy who are experiencing high levels of anxiety or depression?

VG: Well there's a range of things we can do. We know that perinatal services is still a Cinderella, well mental health services in general, is Cinderella of the NHS. We know that most women who are anxious or depressed in pregnancy, this isn't picked up and they're not treated. So the first thing to do is to have increased training of midwives and health visitors, obstetricians, so that they detect this. There's a lot of willingness to do it, but they haven't got time and they're not properly trained often, though that's improving. Professionals looking after pregnant women have to be much more aware that these are very important problems for the mother and for the child, and to detect and offer treatment.

Then as a society, there's a lot more we can do. Employers need to be aware that this could be a problem. And some women love working through pregnancy. But some don't. Some find it's getting too much, physical activity could be too much. There should be much more sensitivity to giving women a choice of how and when they work during pregnancy. We know that social support is very important. The partner is probably the most important of all. The support of partner can really buffer against

emotional problems in other. Not completely, but they could do a lot to help. An abusive partner could, on the other hand, make things much worse.

So I think to be aware of the role of the partner, health professionals and others ought to help bring the partner in to maternity services. And friends, family, we all could do a lot to support pregnant women. Then in terms of what actual professional help can be offered, there's a range of things depending on the problem. But we know how to treat anxiety and depression, and it's not different in pregnancy. So if it's very severe, a woman's very severely depressed, antidepressants are probably indicated. But for many other women, it won't be the right thing. So one could try CBT or IPT or mindfulness. A lot of interventions that can help.

But the main thing, I think, is not which intervention - though that has to be worked out - but detection and then having enough people who can provide interventions.

JB: Vivette, this is fascinating material. Thank you very much.

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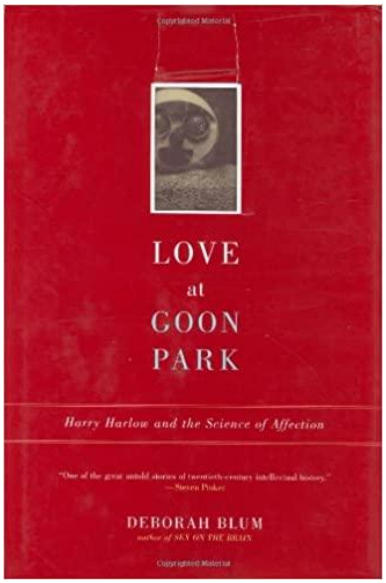
4. Five Books

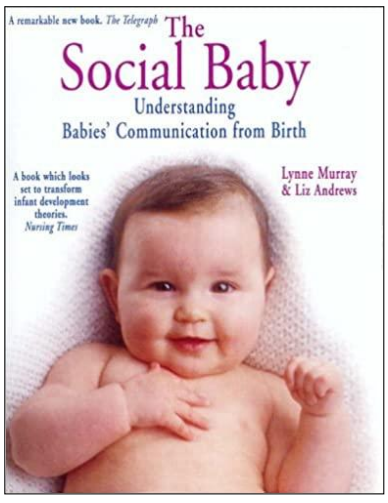
The following was archived in 2021, with acknowledgement and thanks, from the fivebooks.com website. In this piece Vivette Glover selects and describes five books about life before birth - and life after it.

Tell me about Deborah Blum's book.



This centres round the work of Harry Harlow who worked with monkeys and needed to breed more of them. He isolated them very early and took them away from their mothers and kept them clean and well-fed. They were fat and appeared healthy but they were miserable and rocked backwards and forwards. He started to understand that what was missing was maternal affection. This was very out of the current climate of the time. For example, Blum describes an American pamphlet distributed widely between 1914 and 1925 called Raising a baby the Government Way. It included the advice "never kiss a baby" and "parents should not play with the baby". The influential psychologist Watson stated "When you are tempted to pet your child, remember that mother love is a dangerous instrument". This is a good description of how attitudes have changed and I was stimulated by someone working in the same lab, Mary Schneider, who noticed that if you stress pregnant monkeys the babies are more anxious. This is a beautiful model of the effects of pre-natal stress.

The book describes how Harlow, in his studies of monkeys, helped to change attitudes to child care. He found how baby monkeys clung to a cloth model monkey rather than a wire one, and then went on the develop a scientific study of mothering and affection, and how important this is for the development of the child. The book also explains some of the more recent work that has arisen out of all this, and how we are now starting to understand how more sensitive mothering can affect the structure of the baby's brain for life, and have long term effects on behaviour.



Tell me about The Social Baby.

This is by a colleague of mine, and I have been very influenced by her. It describes how mothers with post-natal depression can affect the

outcome of the child. The babies are more anxious and more depressed themselves with some cognitive delay and ADHD.

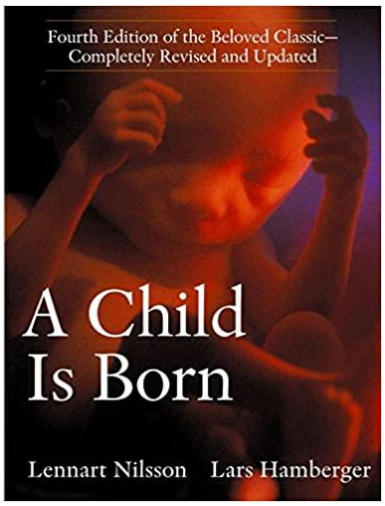
That is very worrying.

Well, the more positive side is that a lot of children in society have these problems and the more we can understand them the more we might be able to help. Guilt is the last thing I want to induce and that isn't where we should be going, but we now know how to prevent these things – by supporting pregnant women more and women who have just had a baby. As a society we can help them and thereby help the next generation. It also has implications for crime – ADHD and cognitive delay are strong indicators for criminal behaviour. If we want to prevent crime and prevent bad outcomes we need to start in pregnancy. This book is about the effects of post-natal depression but it is also a description of what happens when things go well.

Until quite recently it was thought that babies had no feelings, and were unaware of their surroundings. In the 1980s newborn babies were operated on without anaesthetic because it was thought they did not feel pain. Much research in the last 20 to 30 years has shown how very sensitive newborn babies are, how delicately they interact with their mother, and how long lasting these interactions can be. Older children, of mothers who had postnatal depression, are more likely to be anxious or depressed themselves and to have slower cognitive development.

This book shows, frame by frame, the marvellous two-way interaction that a sensitive mother can have with her baby. If the mother opens her mouth, so does her baby. If the baby smiles so does the mother. However it also shows how this interaction can go wrong. Depressed mothers are often over intrusive and poke their baby inappropriately for example. The book shows a mother putting her face too close to her baby, and how instead of initiating a happy interaction, the baby turns away and becomes sad and unresponsive.

Tell me about A Child is Born.



This is the most outstanding book of photography showing the development of a child from the very beginning. It shows the initial blob of a few cells after the sperm meets the egg, and all the later developmental stages, culminating in the fetus at the end of pregnancy, just ready to be born as a new baby. It shows the development of all the organs, and of the hands and feet, and an unborn baby sucking its thumb at 20 weeks gestation.

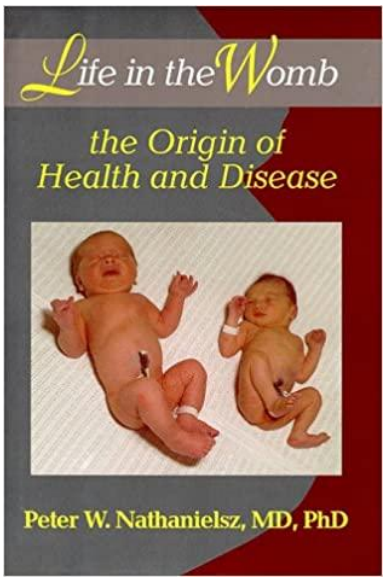
Many of the photographs have become famous, and no one has ever taken better.

What implications does the knowledge about different stages of development have?

I have written about fetal pain and I think the fetus can feel pain at about 20 weeks. At 13 weeks the brain is not connected to the rest of the body. You can touch the foot and it might move away but that is just a reflex.

It has made me very aware of the different stages of development. As far as abortion goes, I would have little concern under 13 weeks and I am not always against late abortion. The trouble is that in later abortions they often chop the fetus up before extracting it. I don't know for sure because we can't ask them, but the state of the nervous system between 20 and 26 weeks would suggest that it is increasingly likely they would feel pain. This is the dark side of this, of course. The fetus is not one thing. It is different at different stages and this book makes one aware of the joy and the beauty of it.

What about Life In the Womb?



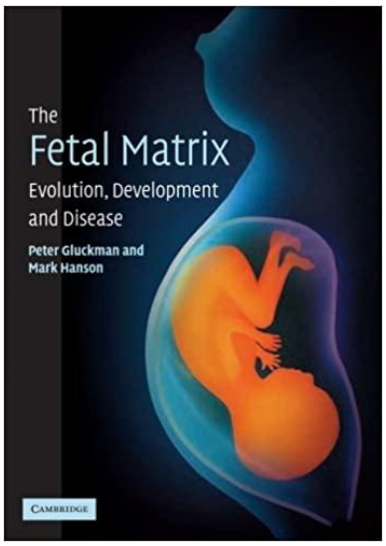
This is a very clear and stimulating overview of how sensitive the development of the fetus is to outside influence, and how this can have implications for the health of the individual, across the lifespan. Nathanielsz discusses the work of David Barker and colleagues who have shown that babies who are born smaller are more likely to die of coronary heart diseases at the end of life, than those who are born larger. Environmental effects from the womb can even be passed to the grandchild generation.

He writes about the new understanding of genetics and the environment and describes how the environment that will influence the development of the person starts in the womb and how that has implications for health. It is very well-established that babies with a lower birth weight are more likely to die in their 70s of coronary heart disease and it is as big an indicator as smoking or being overweight.

Most people die in their 70s though. It doesn't seem too bad an innings.

Maybe not, but it is interesting in terms of fetal programming and the effects of maternal stress on the long-term outcome.

Your next book is The Fetal Matrix.



This is a bit more specialist. It's a more recent book which discusses the possible evolutionary reasons for why the fetus in the womb maybe especially sensitive to its environment. The authors develop the concept of the "predictive adaptive response", suggesting that this is an additional evolutionary mechanism to prepare the offspring for the environment in which it is going to find itself. Instead of traditional evolution, which involves mutation and natural selection over many generations, this occurs more rapidly and more reversibly. For example, we now know that if a mother is stressed while pregnant her child is more likely to be anxious and to have readily distracted attention (as in ADHD). These outcomes are undesirable in our society but this book helped me to understand how being extra vigilant (more anxious) and more distractible, may have been protective in the wild with dangerous predators about.

It might once have been adaptive to have small babies if there is less food around, but if you have a small baby now, for another reason, there is a mismatch and the child will eat to catch up and become fat. Stress is just as big a factor for low birth weight as smoking. This book shows that there is epigenetic change depending on environment – not a change to the basic structure of the gene but a change that can be passed on even to the grandchild generation dependent on environment.
