Emily Wheater // The 'Developmental Origins of Health and Disease' (DOHaD) hypothesis posits that environmental exposures that occur during critical periods of development have long-lasting effects on offspring health by acting on developmental processes. Even if you have not heard 'DOHaD' before, you are likely to already be familiar with the concept and seeped in its messaging. You will be familiar with headlines such as "Stress in pregnancy 'makes child personality disorder more likely.'" Conflicting messages are commonplace. While there are headlines such as 'Taking paracetamol during pregnancy may make grandchildren infertile, research suggests' and 'Pregnant women who take paracetamol are 'more likely to have a child with behavioural issues," there are also guidelines that state that paracetamol is the painkiller of choice during pregnancy, and certainly to alleviate fever in expectant mothers.

Based on public representation of the field, you would imagine that the 'D' of 'DOHaD' was strictly defined by mother-foetus dyad. However, this belies the scope of 'development,' which can encompass events from preconception, through pregnancy, and well into childhood and adolescence. In addition, the heavy skew towards studying maternal effects while neglecting the paternal role is possibly more indicative of societal biases than it is of evidence-based biology. Caroline Criado Perez's book '*Invisible Women*' may have exposed a female data gap in public services provision, drug development, and the workplace, but the one place women are certainly not neglected, when it comes to medical scrutiny, is pregnancy. This often feels rather double edged. It's as if pregnant women are important, yes, but primarily because they are providers of either an optimal or sub-optimal *in utero* environment for their offspring.

But where are the men?

One reason for the overrepresentation of pregnant women in DOHaD research is that pregnancy is a time when women are in frequent contact with the medical establishment through antenatal clinics, which means that there are more opportunities for recruiting them to research studies and more opportunity for measuring biological features directly rather than relying on lower quality self-report data. The same cannot be said for fathers, a banal, practical reason why fathers are underrepresented in this domain of human research. However, as pointed out by Gemma Sharp and co-authors in their paper, 'Time to cut the cord: recognizing and addressing the imbalance of DOHaD research towards the study of maternal pregnancy exposures,' this cannot be the reason why there is still a bias towards studying maternal pregnancy effects even within the animal research literature [1]. And it's not as though the animal literature on paternal effects are filled with null results which imply that there is simply no evidence to suggest that paternal effects exist.

An overview of paternal preconception exercise and nutrition in rodents suggests that these modify the methylation of DNA in sperm, and these epigenetic markers of paternal exposure may associate with metabolic risk profile of the offspring [2].

Invisible Women provides us with numerous instances of where the question 'what about the women?' sorely needs to be asked. But within the domain of DOHaD research a paradigm shift may be underway due to new generations of researchers asking: 'what about the men?'

[1] Sharp, G.C., Schellhas, L., Richardson, S.S., Lawlor, D.A., 2019. Time to cut the cord: Recognizing and addressing the imbalance of DOHaD research towards the study of maternal pregnancy exposures. J. Dev. Orig. Health Dis. 0–3. doi:10.1017/S2040174419000072

[2] Soubry, A., 2018. POHaD: why we should study future fathers. Environ. Epigenetics 4, 1–7. doi:10.1093/eep/dvy007