



Letter to the Editor

Cite this article: Jones SL, Carmel A, Hayton BC, Poulin M-J, Schwartz H, Wolde-Giorghis R, Zolkowitz P, and Nguyen T-V. (2021) Translating developmental origins of health and disease in practice: health care providers' perspectives. *Journal of Developmental Origins of Health and Disease* 12: 824–825. doi: [10.1017/S2040174420001142](https://doi.org/10.1017/S2040174420001142)

Received: 19 October 2020
Accepted: 28 October 2020
First published online: 9 December 2020

Address for correspondence: Sherri Lee Jones, Research Institute of the McGill University Health Center, Montreal, Quebec, Canada. Email: sherri.jones@mail.mcgill.ca

Translating developmental origins of health and disease in practice: health care providers' perspectives

Sherri Lee Jones^{1,2} , Anabel Carmel³, Barbara C. Hayton^{2,4}, Marie-Josée Poulin⁵, Hannah Schwartz^{2,6}, Rahel Wolde-Giorghis⁷, Phyllis Zolkowitz^{2,4,8}, Tuong-Vi Nguyen^{1,2,9}  and on behalf of the Quebec Reproductive Psychiatry Network

¹Research Institute of the McGill University Health Center, Montreal, Quebec, Canada; ²Department of Psychiatry, McGill University, Montreal, Quebec, Canada; ³Hôpital Ste-Justine, Montreal, Quebec, Canada; ⁴Department of Psychiatry, Jewish General Hospital, Montreal, Quebec, Canada; ⁵Institut Universitaire en Santé Mentale de Québec, Québec, Québec, Canada; ⁶St. Mary's Hospital, Montreal, Québec, Canada; ⁷Hôpital Sacre-Coeur, Montreal, Québec, Canada; ⁸Lady Davis Institute for Medical Research, Jewish General Hospital, Canada and ⁹Department of Obstetrics and Gynecology, McGill University, Montreal, Québec, Canada

Dear Editor,

We agree with the timely article from the Molinaro *et al.*¹ concerning the need to increase health care provider's knowledge of DOHAD and its translation to clinical practice. From a developmental neuroscience perspective, we seek to conciliate these matters on a daily basis as a group of clinicians and researchers in reproductive psychiatry. We have identified three areas of developmental neuroscience that are of particular relevance to us in the context of our clinical practice.

Identifying modifiable vs. non-modifiable parental factors

One major challenge in translating research into clinical practice in reproductive medicine is the need to highlight modifiable biopsychosocial factors in the immediate relevance to the baby's well-being, even prior to conception. For example, parental age at conception and parental mental health are two modifiable factors with a significant impact on the unborn baby's brain and endocrine development. These factors contribute to the inter-generational transmission of risk through both biological and environmental pathways, leaving long-lasting imprints in the child's DNA that could be activated during later periods of development through the child's interactions with their parents.

In contrast, biological predictors in the parent that are difficult to modify, such as genetic profiles and metabolism, as well as socio-economic status, have less applicability in a clinical context. It is not that these factors should not be studied for other reasons such as public health, social policy, and political advocacy; however, as clinicians we have found that a sensitive and whole person focus discussion of risk factors is necessary in order to effect change in the individual patient. A discussion of non-modifiable (or less easily modified factors) may cause undue stress to the parents, which in itself is associated or may be associated with undesirable DOHAD outcomes.^{2–4}

Finally, there is a need to identify a clinical threshold to identify developmental vulnerability in the child by combining the effect size of each risk factor, perhaps in a similar fashion to the Framingham index for cardiac vulnerability.

Provide a full overview of risks and benefits to the family, focusing on modifiable parental factors

As discussed above, we have found that families can be aided in their decision-making process by a full discussion of both benefits and risks regarding lifestyle or treatment choices. For example, a father should be aware at the pre-conception stage that older paternal age can increase developmental vulnerability to neurodevelopmental disorders in his offspring.^{5–7} Another example is the impact of depression, anxiety, and other psychiatric disorders on the baby's well-being both *in utero* and later on during postnatal life.^{8,9} The risks and benefits of mental health treatments (e.g., antidepressants vs. psychotherapy) must also be weighed against the negative impact of mental health disorders on the function of the whole family.¹⁰

Not only should we, as clinicians, make particular efforts to provide balanced information to our patients that includes both risks and benefits, but we should also be aware of individual vs. societal responsibility in addressing reproductive risk factors and developmental outcomes. For example, a focus on non-modifiable parental risk factors is likely to diminish the patient's hope and motivation for change.

Targeting critical developmental windows of intervention in vulnerable populations

Many biopsychosocial conditions can only be altered through major efforts from both individual families and changes in social policy. Thus, the only option for many clinicians is to identify and follow vulnerable families, with a particular emphasis on critical developmental stages when intervention is most likely to yield the greatest benefits, because of enhanced neuroplasticity or because of a critical transition when mastery in a wide set of cognitive and behavioral skills is required of the child.

Such periods also coincide with significant hormonal changes in the child that may activate inherited parental factors and modulate the plasticity of the brain to external influences. For example, mini puberty (0–6 months), middle childhood and adrenarche (6–8 years), and true puberty or gonadarche (11–13 years) are key developmental periods when interventions for parents and children (e.g., psychoeducation, family/couple therapy, academic aids, pharmacotherapy) may have the highest yield for vulnerable families. Clinicians and their patients should be aware of these critical windows of opportunity that can enhance the chances of successful positive outcomes.

In summary, we commend Molinaro *et al.*¹ for their work that emphasizes the need to inform clinicians about DOHAD and to translate research findings to the bedside. Here, we provide our clinical and researcher perspectives on general areas specific to our field of developmental neuroscience.

Acknowledgements. The authors would like to thank all members of the Quebec Reproductive Psychiatry Network.

Financial Support. This letter received no specific grant from any funding agency, commercial, or not-for-profit sectors.

Conflicts of Interest. None.

References

1. Molinaro ML, Evans M, Regnault TRH, de Vrijer B. Translating developmental origins of health and disease in practice: health care providers' perspectives. *J Dev Orig Health Dis.* 2020; 12, 1–7. doi: [10.1017/S2040174420000483](https://doi.org/10.1017/S2040174420000483).
2. Van den Bergh BRH, van den Heuvel MI, Lahti M, *et al.* Prenatal developmental origins of behavior and mental health: the influence of maternal stress in pregnancy. *Neurosci Biobehav Rev.* 2017. doi: [10.1016/j.neubiorev.2017.07.003](https://doi.org/10.1016/j.neubiorev.2017.07.003).
3. Rodgers AB, Bale TL. Germ cell origins of posttraumatic stress disorder risk: the transgenerational impact of parental stress experience. *Biol Psychiatry* 2015; 1–8. doi: [10.1016/j.biopsych.2015.03.018](https://doi.org/10.1016/j.biopsych.2015.03.018).
4. Chan JC, Nugent BM, Bale TL. Parental advisory: maternal and paternal stress can impact offspring neurodevelopment. *Biol Psychiatry.* 2018; 83(10), 886–894. doi: [10.1016/j.biopsych.2017.10.005](https://doi.org/10.1016/j.biopsych.2017.10.005).
5. Phillips N, Taylor L, Bachmann G. Maternal, infant and childhood risks associated with advanced paternal age: the need for comprehensive counseling for men. *Maturitas.* 2019; 125, 81–84. doi: [10.1016/j.maturitas.2019.03.020](https://doi.org/10.1016/j.maturitas.2019.03.020).
6. Khandwala YS, Baker VL, Shaw GM, Stevenson DK, Lu Y, Eisenberg ML. Association of paternal age with perinatal outcomes between 2007 and 2016 in the United States: population based cohort study. *BMJ.* 2018; 64, k4372-k4378. doi: [10.1136/bmj.k4372](https://doi.org/10.1136/bmj.k4372).
7. Simard M, Laprise C, Girard SL. Impact of paternal age at conception on human health. *Clin Chem.* 2019; 65(1), 146–152. doi: [10.1373/clinchem.2018.294421](https://doi.org/10.1373/clinchem.2018.294421).
8. O'Donnell KJ, Glover V, Barker ED, O'Connor TG. The persisting effect of maternal mood in pregnancy on childhood psychopathology. *Dev Psychopathol.* 2014; 26(2), 393–403. doi: [10.1017/S0954579414000029](https://doi.org/10.1017/S0954579414000029).
9. Rogers A, Obst S, Teague SJ, *et al.* Association between maternal perinatal depression and anxiety and child and adolescent development. *JAMA Pediatr.* 2020, 1–11. doi: [10.1001/jamapediatrics.2020.2910](https://doi.org/10.1001/jamapediatrics.2020.2910).
10. Lemon E, Vanderkruik R, Arch JJ, Dimidjian SA. Treating anxiety during pregnancy: patient concerns about pharmaceutical treatment. *Matern Child Health J.* 2020; 24(4), 439–446. doi: [10.1007/s10995-019-02873-7](https://doi.org/10.1007/s10995-019-02873-7).