Maternal ante- and post-natal depression and its impact

This year maternal mental health had its own session, a sign of the recognition of its significance in the DOHaD conversation. Maternal depression has been linked to several adverse outcomes and it appears that maternal and offspring mental health are linked. However, no clinically applicable marker for maternal depression is available. A secondary aim of this study showed that maternal antidepressant use was associated with a lower infant birth weight. The prevalence of antenatal and postnatal depression (PND) is quite high in India and several studies have reported that women with PND are more likely to have low birth weight children. The most recent study by Meera Gandhi et al. (2016) found that maternal depression in pregnancy is associated with lower birth weight and increased risk of preterm birth. The study also found that maternal depression was associated with lower maternal income and lower maternal education. This study highlights the need for further work to understand the mechanisms underlying the relationship between maternal depression and offspring health outcomes.

DOHaD and Epigenetics

This session explored the relationship between genetics and epigenetics and the effects on offspring phenotype. Epigenetics is defined as changes in the genome that can affect gene expression without altering gene sequence. Matt Silver discussed nutritional epigenetics in The Gambia. He found seasonal variation in paternal survival, which was 10 times lower in the rainy season compared to the dry season. He also reported increased methylation in rainy vs. dry season pregnancies, and methylation was associated with maternal 1-carbon nutrient biomarkers. Rebecca Richmond used Mendelian randomization to try to understand if there is a causal effect between maternal BMI and offspring BMI. Her study aimed to use large sample sizes and a genetic risk score using multiple SNPs on different than just FTO alone. She reported that a greater variation of maternal BMI on fetal BMI could be explained by those extra SNPs than by using FTO alone. The report showed that maternal antepregnancy BMI was transferred to offspring BMI once maternal genotype was considered. The principle of DOHaD describe how early life exposures in conception, pregnancy, infancy and childhood can have a significant impact on health and disease risk in later life. The presenters in this session answered the above question by highlighting interventions that are aimed at reducing risks in the pre-pregnancy period in order to avert disease in both the mother and offspring. According to the findings reported by Jennifer Hall et al., pregnancy intervention is associated with favorable maternal and offspring health outcomes. As a result, women with planned pregnancies were more likely to attend antenatal care (ANC) earlier and more often, take preventative actions like test for HIV and take folic acid supplements etc., in comparison with women with unplanned pregnancies. To further work is needed. Vanessa Pataia investigated the effect of paternal genome. A substantial proportion of the variability in weight gain could be having genome wide significance for gestational weight gain in the offspring. Rates of parenting stress are also high in HIV positive women. However, these associations may be quite complex as risk factors for one disorder may be protective against another. Dietary quality is also associated with PND as seen in the Norwegian study MoMa, as is pre-pregnancy obesity according to a study from University of Helsinki. The latter is attenuated by depressive symptoms during pregnancy.

Results from the ALSPAC Study in the UK show that both maternal ante- and post-natal depression are associated with depression in the offspring at 18 years of age. After adjusting for the sex of the offspring, antenatal depression increased the risk of depression in girls more than in boys and vice versa for the boys. Maternal postnatal depression is also linked to offspring antidepressant effects on the brain. A Callaway et al. study showed that PND is more strongly associated with persistent than transient obstetric obesity. The general consensus among the researchers present was the need for further work to elucidate causality pathways.

Proudly brought to you by DOHaD rapporteurs:

Asanda Mtshandelana
Alessandra Piroeschk
Richard Marshall
Sara Niewooldt
Ntabizicoco Dwele
Rihlat Said Mohamed
Stephone Wrefshely
Moji Maka
Mercy Nanyema
Cynthia Lampier

The Pre-pregnancy Period

The principles of DOHaD describe how early life exposures in conception, pregnancy, infancy and childhood can have a significant impact on health and disease risk in later life. The presenters in this session aimed to answer the above question by highlighting interventions that are aimed at reducing risks in the pre-pregnancy period in order to avert disease in both the mother and offspring. According to the findings reported by Jennifer Hall et al., pregnancy intervention is associated with favorable maternal and offspring health outcomes. As a result, women with planned pregnancies were more likely to attend antenatal care (ANC) earlier and more often, take preventative actions like test for HIV and take folic acid supplements etc., in comparison with women with unplanned pregnancies. To further work is needed. Vanessa Pataia investigated the effect of paternal genome. A substantial proportion of the variability in weight gain could be having genome wide significance for gestational weight gain in the offspring. Rates of parenting stress are also high in HIV positive women. However, these associations may be quite complex as risk factors for one disorder may be protective against another. Dietary quality is also associated with PND as seen in the Norwegian study MoMa, as is pre-pregnancy obesity according to a study from University of Helsinki. The latter is attenuated by depressive symptoms during pregnancy.
Breastfeeding: Putting Science into Practice

Four breastfeeding research luminaries presented a fascinating global overview of breastfeeding patterns and trends (Cesar Victora), determinants (Linda Richter) and intervention evidence (Nigel Rollins). The session chair, South Africa’s own Jerry Coovadia, began the session by highlighting that the study of breastfeeding is largely a question of science trying to catch up with what we already know, that breastfeeding is beneficial to both infant and mother. This argument was substantiated by Victora’s overview of the findings of 28 systematic reviews on breastfeeding just published in Acta Paediatrica (Supplement, Dec, 2015). Coovadia also intimated that the practice of breastfeeding is under threat. Using South Africa as an example, he highlighted how fear of HIV transmission alongside aggressive marketing by the formula industry has resulted in suboptimal breastfeeding. The threat of industry also was evident in data from an analysis of the economic value of the formula market, particularly in emerging markets. The formal presentation began with Victora, who gave participants a sneak-peek of data on global patterns and trends of breastfeeding, which will be published in The Lancet early next year. Linda Richter’s presentation followed, providing rich insight into why we find such large variations in breastfeeding practices over time and between populations. Using data from the 1970s until mid-2014 and an ecological approach, she presented a range of determinants from individual beliefs, e.g. milk insufficiency, and family support to the ways our very societies are structured in terms of social norms, labour (more women working), policies (maternity leave), health systems (training of workers), and market economies where formula companies have aggressively marketed breastfeeding interventions that have targeted health systems, home/ family environments, work environments and combinations thereof. While impact has varied, the evidence shows that combined interventions have the best results, but that the mix needs to vary by context. The results also give hope that practices can be changed, albeit against a backdrop of industry marketing and poor enforcement of the Code against the Marketing of Breastmilk Substitutes. Though the challenges of shifting breastfeeding practices were highlighted by all of the presenters, the overall tenor of the session was one of passion, determination and hope, guided centrally by a desire to improve the health outcomes of both children and their mothers.

Gestational diabetes and its impact

John Newman et al. opened the session by outlining the principles of DoHad and the cycle of life (see diagram below) in determining the long-term effects of gestational diabetes mellitus (GDM) in the offspring. In the Born Lynx study, they found that regular exercise didn’t prevent the recurrence of GDM but instead increased maternal fitness and psychological wellbeing.

Several DoHad speakers presented on their work and made the following conclusions:

- Vulnerable Windows Cohort Study, showed that greater maternal weight gain in pregnancy and lower birth BMI are associated with lower beta cell function. However, faster postnatal growth is associated with lower insulin sensitivity.
- Monash University Study reported an unexpected and lower estimated fetal weight at 32.34 weeks and lower birth weight. Preliminary data indicated that fetal kidney volume is normal in GDM

DOHaD Hot Topics

The DOHaD hot topics break out session featured a range of talks tackling environmental factors that may impact fetal development and postnatal outcomes. Some of the topics addressed the negative impact of intrauterine exposure to infection, alcohol and cigarette smoking as well as the positive effects of nutritional supplementation on birth outcomes. The impact of maternal obesity and in vitro fertilisation from donor eggs on intrauterine development was also discussed.

Various studies looked at the effect of maternal obesity on fetal kidney development and on metabolic programming in human populations in an indigenous Australian cohort (Kriztyn Pringle et al) and from the perspective of experimental mouse studies (Alcacer, M. A et). Emily Dorey’s presented a paper that also examined the effect of alcohol exposure during the periconceptional period on renal dysfunction. In this paper, she outlined an experimental genetic study that was conducted in rats that demonstrated altered renal gene expression and metabolism following exposure to alcohol.

Addressing the problem of preterm births is a major public health priority and understanding factors which may predispose to preterm birth is key. Thais Pereira outlined a case-control study that was conducted in the Brica Birth Cohort in Brazil and colleagues looked at the potential role of counter-regulatory cytokine (CRC) in predicting preterm birth. This was achieved by investigating the relationship between interleukin 10 (IL-10) and Transforming Growth Factor β (TGF-β) with the risk of preterm birth. Low levels of IL-10 and TGF-β individually or in combination were associated with increased odds of preterm birth.

The DOHaD hot topics break out session featured a range of talks tackling environmental factors that may impact fetal development and postnatal outcomes. The impact of maternal obesity and in vitro fertilisation from donor eggs on intrauterine development was also discussed.

Various studies looked at the effect of maternal obesity on fetal kidney development and on metabolic programming in human populations in an indigenous Australian cohort (Kriztyn Pringle et al) and from the perspective of experimental mouse studies (Alcacer, M. A et). Emily Dorey’s presented a paper that also examined the effect of alcohol exposure during the periconceptional period on renal dysfunction. In this paper, she outlined an experimental genetic study that was conducted in rats that demonstrated altered renal gene expression and metabolism following exposure to alcohol.

Addressing the problem of preterm births is a major public health priority and understanding factors which may predispose to preterm birth is key. Thais Pereira outlined a case-control study that was conducted in the Brica Birth Cohort in Brazil and colleagues looked at the potential role of counter-regulatory cytokine (CRC) in predicting preterm birth. This was achieved by investigating the relationship between interleukin 10 (IL-10) and Transforming Growth Factor β (TGF-β) with the risk of preterm birth. Low levels of IL-10 and TGF-β individually or in combination were associated with increased odds of preterm birth.

Neuro-developmental programming

The session on programming of infant neurological development and neuro-behaviour was chaired by Prof Linda Richter. All the speakers kept their time allocation and presented cutting edge research that examined and outlined various methodological issues and theoretical models to address the complex issues of reliable estimation of early infant and childhood cognitive function and behaviour. Barak Morgen kicked off the session with a uniquely theoretically rich presentation of neurodevelopmental programming by early social adversity. In this paper he discussed various learned behaviours in the child in relation to maternal care (sensitively) and he examined from an evolutionary perspective whether or not commonly perceived maladaptive behaviours were pathological or an adaptive advantage. The range of papers presented extended from the effect that maternal mental illness during pregnancy and the postnatal period had on infant cognition and emotion and on whether or not commonly perceived maladaptive behaviours were pathological or an adaptive advantage. The range of papers presented extended from the effect that maternal mental illness during pregnancy and the postnatal period had on infant cognition and emotion and on whether or not commonly perceived maladaptive behaviours were pathological or an adaptive advantage. The range of papers presented extended from the effect that maternal mental illness during pregnancy and the postnatal period had on infant cognition and emotion and on whether or not commonly perceived maladaptive behaviours were pathological or an adaptive advantage. The range of papers presented extended from the effect that maternal mental illness during pregnancy and the postnatal period had on infant cognition and emotion and on whether or not commonly perceived maladaptive behaviours were pathological or an adaptive advantage. The range of papers presented extended from the effect that maternal mental illness during pregnancy and the postnatal period had on infant cognition and emotion and on whether or not commonly perceived maladaptive behaviours were pathological or an adaptive advantage.