Cyflwynwyd yr ymateb i ymgynghoriad y Pwyllgor Iechyd a Gofal Cymdeithasol ar Atal iechyd gwael - gordewdra

This response was submitted to the Health and Social Care Committee consultation on Prevention of ill health - obesity

OB41 : Ymateb gan: Tom Bond, Carolina Borges and Deborah A Lawlor from the Medical Research Council (MRC) Integrative Epidemiology Unit at the University of Bristol

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Written Evidence submitted by Tom Bond, Carolina Borges and Deborah A Lawlor from the Medical Research Council (MRC) Integrative Epidemiology Unit at the University of Bristol

About the Institution:

The MRC Integrative Epidemiology Unit develops and applies novel causal methods for use in clinical and population cohort studies, including large record linkage studies. It has also pioneered triangulation of evidence from different analytical methods and different types of data to more robustly identify causes and consequences of health and diseases, particularly where randomized controlled trials are not possible or would be very difficult. Prof Deborah Lawlor and Dr Carolina Borges co-lead a programme of work focussing on women's health before, during and after pregnancy, aiming to achieve a step change in the evidence on prevention, early detection and treatment of complications related to pregnancy. We obtain evidence of causal effects by triangulating results from different non-randomized scientific approaches, to answer causal research questions in the most robust way.

Consultation addressed in this submission:

This submission addresses the Welsh Parliament Health and Social Care Committee consultation on "Prevention of ill health - obesity", focusing on the consultation area "interventions in pregnancy and early childhood to promote good nutrition and prevent obesity".

Summary

Maternal adiposity and risk of offspring obesity

Our research (1-3) shows that although a mother's body mass index (BMI) is correlated with her children's BMI, this link is mainly due to confounding by inherited genes. Because of this, starting pregnancy with a healthy BMI is unlikely to be a major influence on the offspring's risk of obesity in childhood and adolescence.

Key findings from our studies are:

- Although mothers with higher BMI in early pregnancy have children with higher obesity risk, this link is mainly due to confounding by genetic variants that children inherit from their mothers, rather than a causal intrauterine effect of maternal BMI on the developing fetus
- Our results suggest that higher maternal BMI before or during pregnancy is not a key driver of higher obesity risk in the next generation

Recommendations

- Children's risk of obesity in childhood and adolescence is unlikely to be strongly influenced by their mother's weight at the start of pregnancy. Consequently, policymakers and health professionals should support people of all ages, including women of childbearing age, to establish and keep a healthy weight
- Further investigation is warranted into the effect of maternal obesity on offspring obesity risk and cardiovascular outcomes in adulthood

More information

It is well known that a mother's BMI before or during pregnancy is associated with greater risk of obesity and adult cardiovascular disease in her children (4, 5). This could be because maternal obesity alters fetal or pre-conceptional development, causing increased offspring cardiovascular risk in subsequent adult life (6).

However, these associations could be confounded - i.e. 'fool' us into thinking that higher maternal BMI causes offspring obesity when in fact another factor (or factors), such as genetic variants, influence both maternal BMI and child obesity to generate a non-causal correlation between the two. It can be challenging to determine when correlations represent causal effects, creating confusion for mothers and healthcare workers and undermining the evidence base for sound policy making.

There is strong evidence that a major part of BMI variation within populations is due to genetic factors (7). Consequently, genetic inheritance is an alternative explanation (i.e. an example of "confounding") for the association between maternal BMI and offspring obesity and cardiovascular risk.

We triangulated evidence across several complementary study designs to investigate whether the association between maternal BMI and offspring childhood obesity risk is causal, or is instead due to genetic inheritance.

First, we used mendelian randomization (8, 9) to estimate the causal effect of maternal BMI before or during pregnancy on offspring BMI and fat mass in infancy, childhood and adolescence (3). We found no strong evidence for a causal effect of maternal BMI on offspring BMI or fat mass in childhood and adolescence.

Second, we compared how strongly maternal BMI and paternal BMI were correlated with offspring childhood BMI (a negative control study) (2). We saw no consistent differences in the associations of maternal and paternal BMI with offspring BMI, suggesting that factors shared within families (such as genetic variants) explain most of the association between maternal and offspring BMI.

Third, we used two complementary genetic techniques to determine the extent to which confounding by genetic inheritance explained mother-offspring BMI associations (1, 2). This confirmed that such associations are mainly due to genetic inheritance.

Taken together with previous studies in the literature, our findings provide strong evidence that starting pregnancy with a healthy weight is unlikely to influence the offspring's risk of obesity in childhood and adolescence.

Dr Tom Bond, Dr Carolina Borges, Prof Deborah A Lawlor.

Prof. Deborah A Lawlor is a Professor of Epidemiology with a clinical background. She is Deputy (currently acting) director of the MRC Integrative Epidemiology Unit. Her research focuses on applying novel causal methods to understanding the causes and consequences of ill-health, mainly in relation to fertility, pregnancy, perinatal and cardiovascular health.

Dr Carolina Borges is a Senior Research Fellow, funded by a UoB Vice-Chancellor' Fellowship (2020-2024) and previously by an MRC Skills Development Fellowship (2017-2020).

Dr Tom Bond is a Senior Research Associate working on Prof Lawlor's/Dr Borges's programme and previously funded by the British Heart Foundation.

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