



Commentary

Preventing obesity across the preconception, pregnancy and postpartum cycle: Implementing research into practice[☆]



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Introduction

Women of reproductive age are on an accelerated pathway to increased weight and obesity, underscored by increasing background weight gain in women aged 18–35 (Adamson et al., 2007). Critical high-risk windows include pregnancy and post-partum which exacerbate weight gain, contributing to adverse reproductive, metabolic and psychosocial sequelae (Fraser et al., 2011; Johnson et al., 2013) and presenting a major public health challenge. Women of reproductive age gain more weight annually than older women (Adamson et al., 2007) and weight gain is inversely proportional to body mass index (BMI) (Cameron et al., 2003) with lean women the highest gainers and 20% progressing to higher BMI categories within five years (Ball et al., 2003; Adamson et al., 2007). Risk of health complications increase exponentially with even small increases in weight, including Type 2 Diabetes (T2DM) from a BMI of 22 kg/m² (Colditz et al., 1990) and cardiovascular disease risk increasing by 3% with each kilo gained (Willett et al., 1995).

Weight gain cycle in reproductive aged women

In this age group, weight gain translates to both maternal, and

subsequent generation, adverse health effects (Fig. 1). Preconception, women are a large, diverse population who do not identify themselves as a distinct high-risk group or at a specific life stage (Finer and Henshaw, 2006; Lewis et al., 2013). Coupled with limited research and awareness in this population, over 50% of women are falling pregnant overweight or obese (Trends in adult body-mass index in 200 countries from 1975 to 2014) (Fig. 1). Higher BMI prior to conception is an independent risk factor for adverse outcomes during pregnancy including hypertension, Gestational Diabetes Mellitus (GDM), preeclampsia, caesarean section and the delivery of a large-for-gestational-age infant (Nohr et al., 2008; McIntyre et al., 2012). During pregnancy, risk of excessive gestational weight gain (GWG) is high, with 50–60% of overweight and obese women gaining above international Institute Of Medicine recommendations (Rasmussen and Yaktine, 2009; Harrison et al., 2012; Deputy et al., 2015). Excessive GWG has major implications during pregnancy with every kilo gained above recommendations linked to ~10% increase in adverse outcomes (Cedergren, 2007), including foetal malformations, miscarriage, preeclampsia, gestational diabetes, labour complications and increased health care costs (Callaway et al., 2006; Guelinckx et al., 2008). Risks are exacerbated in the presence of pre-existing obesity. Following preg-

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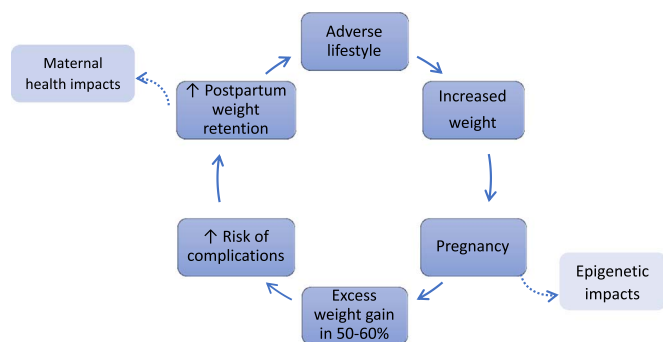


Fig. 1. The cycle of weight gain in women across the reproductive years.

nancy women retain, on average, ~2–5 kg (Adamson et al., 2007; Rasmussen and Yaktine, 2009) with excessive GWG a strong predictor for future maternal obesity, irrespective of pre-pregnancy BMI (Amorim et al., 2007). Women who gain above recommendations have a 300% increased risk of obesity development within two decades (Fraser et al., 2011).

Offspring outcomes of obesity during pregnancy add to the burden, with inter-generational epigenetic effects fuelling the weight gain cycle. Children born to obese mothers are twice as likely to develop childhood obesity, independent of confounding factors including maternal age, race, parity, education and gestational weight gain and gender and birthweight of the child (Whitaker, 2004). Recent research in animal mice models demonstrates obesity and associated metabolic disturbances including insulin resistance and dyslipidaemia prior to conception, result in transgenerational changes to offspring skeletal muscle mitochondrial functioning as far as three subsequent generations via the female germline (Saben et al., 2016). Mitochondria are primarily involved in fuel metabolism and dysfunction is, in turn, linked to aberrant metabolic functioning, insulin resistance and potentially to predisposition of obesity (Turner and Robker, 2015). However, generational risks are not confined to obese mothers. Irrespective of obesity, excessive GWG is also an independent risk factor for future offspring obesity, with children 3 times more likely to develop obesity later in life (Yu et al., 2013). Previous reports suggest the highest risk is in children born to mothers with a healthy pre-pregnancy BMI (Sridhar et al., 2014).

Given the vital need to address and arrest the cycle of increasing weight gain, prevention is at the forefront of the international public health agenda, as highlighted by major organisations including World Health Organization, National Institutes of Health and key Government agencies (Teede et al., 2014; Obesity, 2004; Lumeng et al., 2015).

Antenatal lifestyle interventions to optimise weight gain

Pregnancy is a recognised teachable window with increased motivation towards healthy lifestyle behaviours to ensure positive pregnancy outcomes (Phelan, 2010). Together with the majority of women experiencing at least one pregnancy (Australian Social Trends, 2010) and 95% of pregnant women attending antenatal care regularly (Bergsjø, 2000; Redshaw and Heikkilä, 2010), this provides an ideal platform to capitalise on a broad population regularly engaged with the healthcare system and with added potential for further reach of healthy lifestyle messages to children, partners and the wider family. Consequently, much of the research to date has focused on antenatal lifestyle intervention to prevent excessive weight gain, reduce postpartum retention and address obesity prevention. Conversely, there is a paucity of research in other critical windows including preconception and postpartum with key barriers including hard to capture populations, limited engagement opportunities and less connectedness with the healthcare system.

Several systematic reviews summarising lifestyle intervention in pregnancy show improvement in GWG and maternal outcomes. Meta-analysis of 7278 women found a reduction in GWG of 1.42 kg [95% CI: 0.95–1.89 kg] overall, compared to no intervention, as well as reduced risk of preeclampsia and shoulder dystocia, with a trend towards reduced GDM (Thangaratinam et al., 2012). There appears to be little impact on birth weight and foetal outcomes and a trend towards reduced large for gestational age babies (Thangaratinam et al., 2012). Weight gain monitoring can facilitate healthy GWG, however weight monitoring alone, without intervention, is ineffective (Jeffries et al., 2009; Harrison et al., 2014). Additionally, behavioural strategies such as motivational interviewing, as well as modern technology, appear to be important components of successful intervention programs (Thangaratinam et al., 2012; Muktabhant et al., 2012; Hill et al., 2013; van der Pligt et al., 2013). Alignment with, or integration into, routine antenatal care facilitates engagement and reduces attrition, as noted in our behavioural Healthy Lifestyle Program (HeLP-her) in high risk pregnancies (Harrison et al., 2013; Harrison et al., 2014). Longer-term, antenatal lifestyle intervention may have sustained effect, with data six years post pregnancy showing a 4 kg weight difference in favour of women receiving intervention compared to those who did not (Claesson et al., 2014), with further supporting longitudinal research required.

With evidence of antenatal lifestyle intervention now consolidated, including the largest meta-analyses of individual patient data of women receiving antenatal lifestyle intervention undertaken by the International Women in Pregnancy (iWIP) consortium (Ruifrok et al., 2014), it is now time to shift focus on otherwise isolated efficacy trials and accelerate action towards implementation research by understanding how to best adapt such studies into routine antenatal care (Peters et al., 2013). Development of implementation strategies are vital to capitalise on investment in efficacy studies, translate evidence to inform policy and practice (Peters et al., 2013) and deliver programs ready for scale-up to deliver broader public health impact.

Implementation research – Barriers, enablers and knowledge to action

Implementation research is the “study of methods to promote the systematic uptake of research findings and other evidence based practices into routine practice, and, hence, to improve the quality and effectiveness of health services.” (Eccles and Mittman, 2006; Bauer et al., 2015). This is crucial in the setting of increasing weight gain in reproductive aged women and excessive GWG where otherwise isolated efficacy trials demonstrate health improvement is achievable without adverse risks. Despite this, a penetration of these interventions into practice is limited and at a population level, are almost unnoticed.

Addressing implementation barriers is vital to improve translation and future scale-up in this area. Barriers exist across the spectrum of health care in women, staff and health systems, with no systematic approach to healthy lifestyle in pregnancy and gaps at all levels of the antenatal health care system. Barriers include misperceptions around weight among health professionals and women, with less than 18% of obese pregnant women perceiving they are obese (Shub et al., 2013). Health systems challenges include inadequate weight monitoring in routine care, misperceptions of the importance of the prevention of excess GWG and disparities in medically advised GWG targets. On survey analyses of practices within a large Australian teaching hospital, only 4% of obstetricians and midwives accurately identified IOM GWG recommendations, only 25–30% suggested weight targets; only 1% based targets on knowledge of IOM guidelines and ~70% reported inadequate education and training in lifestyle (Stewart et al., 2012). In our national midwifery survey, even with knowledge on optimal GWG, lifestyle advice was suboptimal. There is inadequate health professional training and staff time to support lifestyle change (Biro et al., 2013). Sociocultural challenges for health professionals and women are

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