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Pregnancy has repeatedly been described as a time when women may be particularly receptive to changing their health behaviour. However, rarely acknowledged is the volume of behavioural expectations placed on women before, during and after pregnancy, or the potential complexity of behaviour change. Healthcare guidelines tends to simplify health behaviour, with recommendations focusing on health education (sometimes referred to as lifestyle advice) that is characterised by messages that health professionals need to convey to women. Implicit assumptions underlying this approach include i) that pregnant women will be motivated by risk-related information to change their health behaviour and that this motivation is enough for health behaviour change, ii) that multiple health behaviours can be addressed simultaneously, iii) that changes will lead to improved outcomes, despite little being known about the timing of influence and relative importance of behaviours.

Healthcare guidelines contain a range of health behaviours relevant to pregnancy; some are universal recommendations for all pregnant women regarding routine care (e.g. UK's NICE guidelines CG62 Antenatal care for uncomplicated pregnancies) and others targeted to women with pre-existing health behaviours associated with poor pregnancy outcomes (e.g. NICE guidelines PH26 Smoking: stopping in pregnancy and after childbirth) or medical/health conditions that are pre-existing or develop in pregnancy (e.g. NICE guidelines CG63 Diabetes in pregnancy: Management of diabetes and its complications from pre-conception to the postnatal period). Mapping of the UK guideline for routine care (CG62) shows the numerous health behaviours women are expected to *initiate*, *maintain* or *modify* before, during or after pregnancy. These behaviours include supplementation (e.g. folic acid, various vitamins), diet and healthy eating (e.g. fibre intake, hydration), physical activity, alcohol consumption, smoking, other substance use, medication, screening tests,

preparation for birth/pain management, self-surveillance (e.g. monitoring symptoms of pre-eclampsia, depression, recognition of active labour) and infant feeding. There are several notable differences about these health behaviours; the timing of these behaviours vary and – linked to this - some (e.g. taking folic acid) can be considered new perinatal/pregnancy-specific health behaviours requiring *initiation*, whereas others (e.g. eating) reflect behaviours that need to be *maintained*. Other behaviours, such as smoking, will need to be *stopped*. It is conceivable that to achieve behaviour change, we need to better understand these behaviours and the support required by women.

The determinants of health behaviour change as a result of pregnancy can be understood using psychological theory. For example, promoting the developing maternal-fetal relationship (a woman's thoughts, feelings, attitudes and behaviours towards the unborn baby; Van den Bergh & Simons, 2009) may facilitate behaviour change, yet this would be expected to develop later in pregnancy reflecting salient moments including ultrasound scans and fetal movements. In addition, other variables, such as the causes and symptoms of stress may be responsible for the apparent association between health behaviours and the maternal-fetal relationship (Darwin & Walsh, 2017). Much of antenatal health promotion assumes increased motivation for behaviour change, without considering women's capability and opportunity to engage in these behaviours (Olander, Darwin, Atkinson, Smith, & Gardner, 2016) as suggested by the Capability-Opportunity-Motivation Behaviour (COM-B) framework (Michie, van Stralen, & West, 2011). For example, physiological side-effects of pregnancy such as nausea or backache will influence women's perceived physical capability for health behaviour change such as dietary intake and physical activity and need to be considered. These physiological symptoms will change throughout pregnancy and may differ from one pregnancy to the next, suggesting that timing of antenatal health behaviour change is important.

It is also important to recognise that some health behaviours may change as a result of pregnancy and without intervention from health professionals. For example, a UK survey of 1490 women found that self-reported smoking decreased from 27% before pregnancy to 15% at 11 weeks gestation (Crozier et al., 2009). More research is needed to examine the factors influencing why some women change their health behaviours whilst others do not. Initial findings from a recent review suggest that sociodemographic variables such as education may play a role in spontaneous dietary change (Hillier & Olander, 2017) but further work is warranted and needs to consider the behaviour's impact on maternal, fetal and pregnancy outcomes. Furthermore, it may be that some health behaviours are seen by women as more important or easier to change, potentially linked to the social expectations; and what is acceptable to women may differ to policy recommendations. An example of this is maternal smoking where in contrast to policy that advises abruptly quitting smoking, women may view cutting down as an aid to quitting, or indeed an alternative that is a positive health behaviour change and itself offers a harm reduction approach (Graham, Flemming, Fox, Heirs, & Sowden, 2014).

The number and nature of health behaviours women may need to *initiate*, *maintain* or *modify* during pregnancy need to be considered when developing and evaluating services targeting pregnant women. Communication and support is expected to focus on the first antenatal appointment without consideration of competing priorities or psychological theory (such as Health Belief Model or Social Cognitive Theory, see Ayers & Olander, 2013). In the UK and elsewhere, the first antenatal appointment is often with midwives. Midwives often report a lack of confidence and training in addressing public health issues and supporting health behaviour change, compounded by limited time in which to address these topics with women (Sanders, Hunter, & Warren, 2016). For some health behaviours, midwives can signpost or refer women to existing services (e.g. smoking cessation) whereas others fall to guidance largely from the midwife (e.g. physical activity), with little interdisciplinary support. Availability of services also varies regionally, depending on prevalence rates and local commissioning.

Thus, the role of the midwife changes depending on the health behaviour concerned and other support and services available.

In summary, more work is needed to understand the behaviour change related to pregnancy. To aid understanding we recommend utilising psychological theory, and exploring these health behaviours from the perspective of the woman and midwives and other healthcare professionals. Moving forward, collating information on health behaviours including their prevalence, determinants, clustering (i.e. co-occurrence of particular behaviours), risk and benefits to mother and to baby, timing, may help to prioritise behaviours – both from a policy perspective and in supporting women to make informed choices. There is an urgent need for future research to address priority setting for health behaviour change before, during and after pregnancy. Critical too is the need to better understand context, as the (perceived) relevance of health behaviours will vary with women's individual obstetric and medical history, and their wider circumstances, consistent with the personalisation agenda voiced in Better Births (National Maternity Review, 2016).

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