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### Discussion with Reviewers

**Reviewer I:** How do these findings impact on how we respond to mothers' reports of reduced foetal movement?

**Author:** When a mother reports reduced foetal movements, it is usually because she has noticed a change from the normal baseline pattern of movements, where that baseline is normal for the current pregnancy. Therefore, in cases of FADS or arthrogyriposis, the mother may not self-refer for reduced movements due to the fact that the level of movement might have been reduced for an extended period of time. An enhanced emphasis on assessing foetal movements, whether with ultrasound, MRI or emerging wearable sensor technologies, would facilitate better prenatal diagnosis of musculoskeletal conditions related to prenatal movements, such as arthrogyriposis, and has the potential (in the long term) to determine a threshold for a healthy amount or pattern of foetal movements which

would assist with management of mothers reporting reduced foetal movement.

**Reviewer I:** How should we counsel women who have known foetal abnormalities about the effects of foetal movement?

**Author:** For parents of children with abnormalities such as arthrogyriposis or DDH, it might be helpful to understand why one or more joints have an abnormal shape or position, particularly where no genetic abnormalities are diagnosed. Perhaps this review, which is focussed on the effects of abnormal movements on the musculoskeletal system, will be a useful resource for clinicians when counselling parents of children affected by such conditions.

**Reviewer II:** In which species do the authors consider to perform the future investigation on biomechanical effects of uterine restraint over time?

**Author:** Separating the influences of intra-uterine space and amniotic fluid volume on foetal movement is highly challenging in animal model systems, as when a quantity of amniotic fluid is removed (as has been performed previously (Palacios *et al.*, 1992)), the available space is also reduced. We believe that computational modelling, for example, using foetal cine-MRI, will be the best tool with which to quantify the degree of restraint or restriction of the foetus (*e.g.*, different types of breech foetal positions) and the volume of fluid available, in order to investigate correlations between these parameters with the patterns and range of movements.

**Reviewer II:** Which species have sufficient amniotic fluid during pregnancy that reduction near term age occurs as in the human?

**Author:** Amniotic fluid volume changes during murine gestation exhibit similar trends as in human gestation, with an increase in fluid volume up until roughly three quarters through gestation, followed by a decrease up until birth (Beall *et al.*, 2007a; Beall *et al.*, 2007b), and it is likely that most mammalian species exhibit similar trends.

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