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# *Some Societal and Historical Scientific Considerations Regarding the Mother–Fetus Relationship and Parenthood*

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Pregnancy includes the mother–fetus relationship, the father–fetus relationship and the transition to parenthood; it is an important phase in the life of the couple. However, pregnancy cannot be studied in isolation as influences from society and science and their interaction need to be taken into account. To begin with, some societal considerations on the maternal–fetal relationship and the transition to motherhood are described, namely, in what way ideas about the Right Way to mother and societal ambivalence regarding motherhood/parenthood may influence the experience of being pregnant and becoming/being a parent. Next, looking back over 100 years of study of fetal behaviour gives rise to questions such as what was/is the right time to ask/answer scientific questions about fetal behaviour and whether maternal emotions can affect the fetus? We conclude that although significant progress has been made in the study of fetal psychology, much basic empirical work still needs to be done before we have a more complete understanding of the complex interactions between the pregnant woman and her fetus. Copyright © 2010 John Wiley & Sons, Ltd.

*Key words:* mother–fetus relationship; societal and historical scientific considerations

‘Changes in mode of life and in intellectual occupation are so frequent among all classes, that materials must exist for determining whether such changes during the prenatal period have any influence on the character of the offspring’ (Wallace, 1893, p. 390).

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## INTRODUCTION

DiPietro (2009) is one of relatively few psychologists who have sustained a long-standing commitment to studying fetal behaviour and whose work is characterized by the search for new methods to adequately solve intriguing and ever complex scientific questions. In her interesting paper, she considers some psychological and psychophysiological aspects of the bi-directional relationship between mother and fetus, and some of its consequences for subsequent individual and dyadic adjustments of mothers and infants after birth. The purpose of this commentary is to add relevant societal and historical considerations to the issues raised in the target article.

### *Societal Considerations*

Society plays an important role in the ways pregnancy and parenthood are experienced. Not only does it in one way or another take care of the circumstances in which pregnancy and parenthood are to be realized, but it also is the 'container' of explicit and implicit expectations. These expectations are also fed by science and professional care providers. Accordingly, '...the environment in which human development takes place is a constructed human environment' (White, 2002, p. 220). Cultural-historical scientific works have made the bi-directional relationship clear between on the one hand the changing society and on the other the 'construction' of science, especially in the case of clinical and developmental psychology, obstetrics, and paediatrics (e.g. see Badinter, 1983; Cunningham, 1995; Eyer, 1992; Kessel & Siegel, 1983; White, 1983, 2002). However, there can be a 'décalage' between the expectations raised by society and those raised by science that may, in important and often unrecognized ways, influence the ways in which worries and concerns are experienced during pregnancy, as well as the transition to and subsequent experience of parenthood.

Thus, for example, a societal emphasis on personal fulfilment and individual choice may make building a professional career an evident choice, not only for men but also for women. It seems that with this 'new freedom', parenting is at the locus of many options: the pregnant woman, like her partner, now has a choice as to when, where, whether and how she is going to 'mother' her baby (Raphael-Leff, 1991). More recently, a view of pregnancy as a normal developmental stage of the life cycle has dominated in life-span developmental psychology. Although this perspective is useful, its grounding in psychoanalytical ideology sees the optimal fulfillment of the due developmental task during pregnancy and motherhood, as 'adjustment' or 'adaptation' to a rather traditionally defined feminine role (Leifer, 1980). In the psychoanalytical tradition, the motivation for motherhood was seen as inevitable and biologically based (Badinter, 1983; Leifer, 1980), with Deutsch (1945) claiming to have confirmed the existence of a 'maternal instinct' no less. Psychologists, as well as medical experts, are often unaware of the fact that they see this traditionally defined feminine role as the one and only Right Way to 'mother'; they may promote a one-sided view of motherhood, while there are in fact several ways to 'mother' and 'father' (Raphael-Leff, 1986, 1988, 1991/2005). Moreover, alongside the idealization of motherhood, there is at the societal level also a kind of denigration of maternal status. The fact that the mother is in a way still treated as being responsible for many ills that befall the child may undermine her maternal self-confidence

(Rapfael-Leff, 1988). Breaking the silence about this ambivalence, explaining to parents how this societal reality may colour their experiences and sustaining them in the ways in which they ‘mother’ and ‘father’ may lead to a more comprehensive understanding of the maternal–fetal relationship and the transition to parenthood, not only for the parents in their daily life, but in research as well.

We completely agree with DiPietro (2009) that ‘...there are significant opportunities to better understand the linkage between the neuro-endocrine milieu of pregnancy, the growth of affiliative feelings towards the fetus during pregnancy, and the ultimate impact of both on early parenting behaviours and attachment’. We are convinced, however, that the study of the ‘societal milieu’ of pregnancy needs more attention, both in its own right and because it may increase our understanding of the neuro-endocrine milieu of pregnancy, for example, by means of examining the influence of work-related stress during pregnancy (e.g. Mozurkewich, Luke, Avni, & Wolf, 2000) and the effectiveness of stress-reducing interventions (e.g. DiPietro, Costigan, Nelson, Gurewitsch, & Laudenslager 2008; Satyapriya, Nagendra, Nagarathna, & Padmalatha, 2009).

Inconsistent research findings regarding associations between maternal–fetal attachment and outcome variables may have to do with inadequate control for variables such as age, parity, gravidity, socioeconomic level and ethnicity, but may also be related to the fact that the scales used only tap overt (conscious) aspects of the maternal–fetal relationship and not more covert ones (Van den Bergh & Simons, 2009) that may reveal feelings of uncertainty about, for example, the prescribed Right Way to mother. These feelings may accompany a normal pregnancy and expressing them may be better than repressing them. From her research, based on interviews with pregnant woman, Leifer (1977, 1980) concluded that, in general, expressing some worries and concerns about the physical and mental health of the fetus may reflect an emotional investment in the fetus.

### *Historical Scientific Considerations*

Fetal behaviour and influences on the fetus have in humans been studied for at least the past 100 years (e.g. Joffe, 1969; Lecanuet, Fifer, Krasnegor, Smotherman, & Lipsitt, 1995; Lecanuet, Granier-Deferre, & Busnel, 1995; Martin & Dombrowski, 2008; Montagu, 1992; Nijhuis, 1992). DiPietro rightly remarks that many of the questions that were posed by pioneers in this field remain active areas of research today.

For some of the questions, the early answers that were given simply turned out to be wrong. For instance in 1885, Wilhelm Preyer, based on informal observations of neonatal behaviour, stimulation of the fetus with sound, and the fact that the fetal ear canal was filled, concluded that the human fetus had no auditory sensitivity (Kisilevsky & Low, 1998). This view prevailed for the first half of the 20th century! By the 1970s, studies employing new ultrasound technologies were reporting conflicting results, but by the mid-1980s there was clear evidence that fetuses respond to sound and vibration with body movements and heart-rate accelerations (see Lecanuet, *et al.*, 1995). Importantly, systematic research with designs that adequately control for the spontaneous activity of the fetus has shown that the particular acoustic or vibroacoustic stimulus, auditory stimulus, intensity and frequency as well as vibroacoustic stimulus duration modulate the threshold and magnitude of the response (Kisilevsky & Low, 1998; Kisilevsky, Hains, Brown, Lee, Cowperthwaite *et al.*, 2009). Such designs include, for example, no-stimulus control trials and compare the behaviour on stimulus and no-stimulus trials to determine stimulus-driven behaviour while taking

behavioural state into account (Mulder, Robles de Medina, Beekhuijzen, Wijnberger, & Visser, 2001).

Other questions, such as whether maternal emotions influence the fetus, have made a remarkable tour. Alfred Russel Wallace was co-originator of the theory of evolution by natural selection written in 1859 by Darwin. When Wallace (1893c) wrote the above quoted sentence in a letter entitled 'Prenatal influences on character' into *Nature*, the belief that a mother's emotions could affect the child she carries was seen as resting on old wives' tales (Joffe, 1969). Wallace (1893 a,b) was also publishing articles about the possibility of being able to study whether 'individually acquired characters are inherited'. Lamarck had incorporated this idea in his theory of directed evolution; it was seriously challenged in 1880 by Weismann's theory, on which the modern understanding of genetic inheritance became based, and since the turn of the 20th century it became widely rejected by the scientific community. However, this old question that had originated in ancient time, with Greek philosophers, recently got renewed interest with the discovery of epi-genetic variation between individuals and the finding that in some cases epigenetic variants can be inherited by the offspring, a biological inheritance that cannot be explained by changes in the DNA-sequence itself (Jablonka & Raz, 2009; Rakyant & Beck, 2006). Bird (2007, p.398) proposes a unifying definition of epigenetic events as 'the structural adaptation of chromosomal regions so as to register, signal or perpetuate altered activity states'. Nowadays, it is an intriguing question whether emotions and stress of the pregnant woman may act upon the genome of the offspring to bring about epigenetic changes in gene expression and behavior and whether these epigenetic processes may mediate enhanced susceptibility for behavioral disorders (see Mill & Petronis, 2008). Prenatal maternal emotions has been convincingly shown to be not only associated with alterations in fetal behaviour in studies controlling for behavioural state (e.g., DiPietro, 2009; Groomez, Swiber, Bentz, Holland, & Atterbury, 1995; Sjöström, Valentin, Thelin, & Marsal, 2002; Van den Bergh, 1990, 1992; Van den Bergh, Mulder, Visser, Poelmann-Weesjes, Bekedam et al., 1989), but also with alterations in cognitive, social and emotional behaviour of the infant, child and adolescent that may underlie behavioral disorders, in methodologically sound prospective human studies (for reviews, see Alder, Fink, Bitzer, Hosli, & Holzgreve 2007; Mennes, Van den Bergh, Lagae, & Stiers, 2009; Talge, Neal, & Glover, 2007; Van den Bergh, Mulder, Mennes, & Glover, 2005; Van den Bergh, Van Calster, Smits, Van Huffel, & Lagae, 2008; Weinstock, 2008).

DiPietro (2009) indicates a number of times that the literature exploring the manner in which maternal psychophysiological alterations affect the fetus leaves many unanswered questions. On the one hand, it is clear that systematic research as seen in research on prenatal auditory function is still largely lacking for that on maternal emotions, which may be due to its complexity. On the other hand, although based on only a few studies, the concepts of a fetal orienting response to intrauterine changes and of a fetal effect on the maternal nervous system are very challenging, as were the issues raised by Preyer and Wallace at the end of the 19th century. For several reasons, however, evidence based on some studies in which inducing maternal relaxation and arousal results in similar fetal consequences (DiPietro, 2009) is not sufficient to falsify the general hypothesis that (induced) maternal psychological stress is damaging to fetal neurobehaviour. Preclinical research has shown that the effect depends on the timing, intensity and chronicity of the maternal emotions. Moreover, some effects have to do with an altered HPA-axis or altered neuronal functioning (e.g. in the dopaminergic systems of the brain; Schneider & Moore, 2000), and are probably only to be seen later in life.

To conclude, although significant progress has been made in the study of fetal psychology, as this Special Issue illustrates, we agree with DiPietro (2009) that much basic empirical work is still required before a more complete understanding of the complex interactions between a pregnant woman and her fetus is obtained.

## REFERENCES

- Alder, J., Fink, N., Bitzer, J., Hosli, I., & Holzgreve, W. (2007). Depression and anxiety during pregnancy: A risk factor for obstetric, fetal and neonatal outcome? A critical review of the literature. *Journal of Maternal–Fetal and Neonatal Medicine*, *20*, 189–209.
- Badinter, E. (1983). *De mythe van de moederliefde (The myth of motherhood)*. Amsterdam: Muntinga BV.
- Bird, A. (2007). Perceptions of epigenetics. *Nature*, *447*, 396–398.
- Cunningham, H. (1995). *Children and childhood in western society since 1500*. London and New York: Longman.
- Deutsch, H. (1945). *Psychology of women* (Vols. I and II). New York: Grune and Stratton.
- DiPietro, J. A. (2009). Psychological and psychophysiological considerations on the maternal–fetal relationship. *Infant & Child Development*, DOI: 10.1002/icd.651.
- DiPietro, J. A., Costigan, K. A., Nelson, P., Gurewitsch, E. D., & Laudenslager, M. L. (2008). Fetal responses to induced maternal relaxation during pregnancy. *Biological Psychology*, *77*, 11–19.
- Eyer, D. (1992). *Mother–infant bonding a scientific fiction*. New Haven: Yale University Press.
- Groome, L. J., Swiber, M. J., Bentz, L. S., Holland, S. B., & Atterbury, J. L. (1995). Maternal anxiety during pregnancy: Effect on fetal behavior at 38 and 40 weeks of gestation. *Journal of Developmental and Behavioral Pediatrics*, *16*, 391–396.
- Henikoff, S., & Matzke, M. A. (1997). Exploring and explaining epigenetic effects. *Trends in Genetics*, *13*, 293–295.
- Jablonska, E., & Raz, G. (2009). Transgenerational epigenetic inheritance: Prevalence, mechanisms, and implications for the study of heredity and evolution. *The Quarterly Review of Biology*, *84*, 131–176.
- Joffe, J. M. (1969). Prenatal determinants of behaviour. In H. J. Eysenck (General ed.) *International series of monographs in experimental psychology* (Vol. 7). Oxford: Pergamon.
- Kessel, F. S., & Siegel, A. W. (1983). *The child and other cultural inventions*. Houston Symposium 4. New York: Praeger.
- Kisilevsky, B. S., & Low, J. A. (1998). Human fetal behavior: 100 Years of study. *Developmental Review*, *18*, 1–29.
- Kisilevsky, B. S., Hains, S. M. J., Brown, C. A., Lee, C. T., Cowperthwaite, B., Stutzman, S. S., Swansburg, M. L., Lee, K., Xie, X., Huang, H., Ye, H.-H., Zhang, K., & Wang, Z. (2009). Fetal sensitivity to properties of maternal speech and language. *Infant Behavior & Development*, *32*, 59–71.
- Lecanuet, J. P., Fifer, W. P., Krasnegor, N. A., Smotherman W. P., & Lipsitt, L. P. (1995). *Fetal development: A psychobiological perspective*. Hillsdale, NJ: Erlbaum.
- Lecanuet, J. P., Granier-Deferre, C., & Busnel, M. C. (1995). Human fetal auditory perception. In J. P. Lecanuet, W. P. Fifer, N. A. Krasnegor, W. P. Smotherman, & L. P. Lipsitt (Eds), *Fetal development: A psychobiological perspective* (pp. 239–262). Hillsdale, NJ: Erlbaum.
- Leifer, M. (1977). Psychological changes accompanying pregnancy and motherhood. *Genetic Psychology Monographs*, *95*, 55–96.
- Leifer, M. (1980). Pregnancy. *Signs*, *5*, 754–765.
- Martin, R. P., & Dombrowski, S. C. (2008). *Prenatal exposures. Psychological and educational consequences for children*. New York: Springer Science+Business Media, LLC.
- Mennes, M., Van den Bergh, B. R. H., Lagae, L., & Stiers, P. (2009). Developmental brain alterations in 17 year old boys are related to antenatal maternal anxiety. *Clinical Neurophysiology*, *120*(6), 1116–1122.
- Mill, P., & Petronis, A. (2008). Pre- and peri-natal environmental risks for attention-deficit hyperactivity disorder (ADHD): The potential role of epigenetic processes in mediating susceptibility. *Journal of Child Psychology and Psychiatry*, *49*, 1020–1030.
- Montagu, A. (1992). *Prenatal influences*. Springfield, IL: Thomas.

- Mozurkewich, E. L., Luke, B., Avni, M., & Wolf, F. M. (2000). Working conditions and adverse pregnancy outcome: A meta-analysis. *Obstetrics & Gynecology*, *95*, 623–635.
- Mulder, E. J. H., Robles de Medina P. G., Beekhuijzen M., Wijnberger D. E., & Visser G. H. A. (2001). Fetal stimulation and activity state. *Lancet*, *357*, 478–479.
- Nijhuis, J. G. (Ed.) (1992). *Fetal behaviour. Developmental and perinatal aspects*. Oxford: Oxford University Press.
- Raphael-Leff, J. (1986). Facilitators and regulators: Conscious and unconscious processes in pregnancy and early motherhood. *British Journal of Medical Psychology*, *59*, 43–55.
- Raphael-Leff, J. (1988). The mother mystique: Psychosocio-logical factors which promote an unrealistic view of mothers. In P. G. Fedor-Freybergh & M. L. Vogel (Eds.), *Prenatal and perinatal psychology and medicine. Encounter with the unborn* (pp. 581–597). Casterton Hall, Carnforth, UK: Parthenon.
- Raphael-Leff, J. (1991/2005). *Psychological processes of childbearing*. London: Chapman & Hall/ London: Anna Freud Centre.
- Rakyan, V. K., & Beck, S. (2006). Epigenetic variation and inheritance in mammals. *Current Opinion in Genetics and Development*, *16*, 573–577.
- Satyapriya, M., Nagendra, H. R., Nagarathna, R., & Padmalatha, V. (2009). Effect of integrated yoga on stress and heart rate variability in pregnant women. *International Journal of Gynecology & Obstetrics*, *104*, 218–222.
- Schneider, M. L., & Moor, C. F. (2000). Effect of prenatal stress on development: A nonhuman primate model. In Ch. A. Nelson (Ed.), *The effects of early adversity on neuro behavioral development. The Minnesota Symposia on Child Psychology* (Vol. 31, pp. 201–244). Mahwah, NJ: Erlbaum.
- Sjöström, K., Valentin, L., Thelin, T., & Marsal, K. (2002). Maternal anxiety in late pregnancy: Effect on fetal movements and fetal heart rate. *Early Human Development*, *67*, 87–100.
- Talge, N. M., Neal, C., Glover, V., and the early stress translational research and prevention science network (2007). Fetal and neonatal experience on child and adolescent mental health. Antenatal maternal stress and long-term effects on child neurodevelopment: how and why? *Journal of Child Psychology and Psychiatry*, *48*, 245–261.
- Van den Bergh, B. R. H. (1990). The influence of maternal emotions during pregnancy on fetal and neonatal behavior. *Pre- and Perinatal Psychology Journal*, *5*, 119–130.
- Van den Bergh, B. R. H. (1992). Maternal emotions during pregnancy and fetal and neonatal behaviour. In J. G. Nijhuis (Ed.), *Fetal behaviour: Developmental and perinatal aspects* (pp. 157–178). Oxford: Oxford University Press.
- Van den Bergh, B. R. H., Mulder, E. J. H., Mennes, M., & Glover, V. (2005). Antenatal maternal anxiety and stress and the neurobehavioral development of the fetus and child: Links and possible mechanisms. A review. *Neuroscience & Biobehavioral Reviews*, *29*, 237–258.
- Van den Bergh, B. R. H., Mulder, E. J. H., Visser, G. H. A., Poelmann-Weesjes, G., Bekedam, D. J., & Precht, H. F. R. (1989). The effect of (induced) maternal emotions on fetal behaviour: A controlled study. *Early Human Development*, *19*, 9–19.
- Van den Bergh, B. R. H., & Simons, A. (2009). A review of scales to measure the mother–foetus relationship. *Journal of Reproductive and Infant Psychology*, *27*, 114–126.
- Van den Bergh, B. R. H., Van Calster, B., Smits, T., Van Huffel, S., & Lagae, L. (2008). Antenatal maternal anxiety is related to HPA-axis dysregulation and self-reported depressive symptoms in adolescence: A prospective study on the fetal origins of depressed mood. *Neuropsychopharmacology*, *33*, 536–545.
- Wallace, A. R. (1893a). Are individually acquired characters inherited? *Fortnightly Review*, *53*, 490–498; 655–668 (<http://www.wku.edu/~smithch/wallace/S468.htm>).
- Wallace, A. R. (1893b). The non-inheritance of acquired characters. *Nature*, *1893*, 267 (<http://www.wku.edu/~smithch/wallace/S473.htm>).
- Wallace, A. R. (1893c). Prenatal influences on character. *Nature*, *389–390* (<http://www.wku.edu/~smithch/wallace/S476.htm>).
- Weinstock, M. (2008). The long-term behavioural consequences of prenatal stress. *Neuroscience & Biobehavioral Reviews*, *32*, 1073–1086.
- White, S. H. (1983). Psychology as a moral science. In F. S. Kessel & A. W. Siegel (Eds.), *The child and other cultural inventions* (pp. 1–25). New York: Praeger Publishers.
- White, S. H. (2002). Notes toward a philosophy of science for developmental science. In: W. W. Hartup & R. A. Weinberg (Eds.), *Child psychology in retrospect and prospect. The Minnesota Symposia of Child Development* (Vol. 32, pp. 207–225). Mahwah, NJ: Erlbaum.