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THE FUNCTION OF JOY IN PREGNANCY

It was a surprise when the organiser of a conference asked me to talk about 'The function of Joy in pregnancy'! Then I visualised the joyful faces of pregnant women at the end of a weekly singing group in the maternity unit in Pithiviers, France. I often wondered whether pregnant women and babies in the womb would not get more out of coming to sing with us than from going to yet another prenatal examination.¹ In other words I was tacitly raising questions about the function of joy in pregnancy.

To summarise our current understanding of this function, we have to overcome a major obstacle: although many emotional states have been studied in a scientific way by physiologists, psychologists, epidemiologists and other scientists, the concept of joy has not. Explore scientific and medical databases: the keywords 'anxiety', 'stress', 'depression', 'psychological distress', or 'fear' bring up thousands of references. 'Joy', on the other hand, remains as a sterile keyword. In such a context we don't even have well-accepted definitions.

It has been said that painters, poets, and other artists always precede scientists. So let us first look at what we can learn from them about joy. 'The Five Joyful Mysteries' is undoubtedly the most fruitful reference in the field of painting. We'll first notice that the terms *joy* and *mystery* are associated. The word *mystery* has the same root as the word *mystic*. A joyful experience transcends the limits of ordinary experience. The Annunciation, the Visitation, the Nativity, the Presentation in the Temple and the Finding in the Temple are events related to the emergence of life. Archetypal joyful experiences are related to maternal love. They are intense responses to rewarding events. We also learn that joy is contagious. After the Annunciation, Mary will share her joy with another mother-to-be. The sacred atmosphere of the Temple is appropriate for the expression of different facets of maternal love.

Poets and musicians are not strangers to joy. 'The Ode to Joy' is now the European Anthem. The music is the fourth movement of Beethoven's 9th symphony. One can wonder how the music by Beethoven evokes joy: sudden intermittent series of ascending notes are undoubtedly suggestive of the emergence of life. As for the original text, it is the poem written by Friedrich Schiller at the end of the 18th century. From the start of the poem, joy is presented as sudden access to the divine: "Freude, schöner Götterfunken" (Joy, beautiful spark of divinity). The last line of a poem by my own mother (²) about joy ("joie") is also highly significant:

"un grand hymne à la joie évoque le Très-Haut".

Poets also symbolically associate joy with the emergence of life. The poem by my mother includes the words 'printemps' (spring), 'oiseau qui chante' (singing birds), 'enfant' (child). The famous song by Charles Trenet is also suggestive of the emergence of life, as it occurs in spring, when the sparrows start singing:

"Y'a d'la joie...bonjour, bonjour les hirondelles..."

Today scientists do not hesitate to penetrate the realm of poets and other artists. All sorts of emotional states, including love³ and the connections to the sacred⁴, have already been "scientified". One day the concept of joy will be studied with scientific methods. One day the function of joy in pregnancy will appear as a serious topic.

Meanwhile, we can indirectly study joy in pregnancy by looking at the opposite pole of the emotional spectrum. Scientists have widely studied emotional states associated with the release of cortisol and catecholamines, such as adrenaline and noradrenaline. There are connections between the release of all these stress hormones; catecholamines, particularly adrenaline, are more involved in emergency situations; cortisol, on the other hand, is a slow-acting hormone and is more strongly-associated with chronic emotional states and personality traits. This is why the effect of cortisol in pregnancy has been studied more easily.

High levels of cortisol have been found in states of chronic anxiety, depression, bereavement, chronic stress, and 'maternal psychological distress in pregnancy'.⁵ In daily simplified language, we can claim that whatever facet of unhappiness one considers, the level of cortisol is high. It is well understood today that cortisol is an inhibitor of fetal growth, particularly of brain development,⁶ although a placental enzyme (11 beta-hydroxysteroid dehydrogenase) can, to a certain extent, protect the fetus by transforming the active cortisol into the inactive cortisone. There has been a recent accumulation of data confirming that maternal emotional states in pregnancy associated with high levels of cortisol have significant effects on fetal growth and fetal activity^{7,8}, and on the neuro-endocrine status of the offspring.^{9,10}

Furthermore, we have included in the Primal Health Research Database several studies about behavioural and emotional problems in childhood that are related to maternal emotional states in pregnancy characterized by high levels of cortisol. The "Avon Longitudinal Study of Parents and Children" has followed a cohort of 7,144 women who gave birth between April 1, 1991, and December 31, 1992. Maternal anxiety, which had been assessed at repeated intervals in pregnancy, appeared as an independent risk factor for behavioural and emotional problems when the child was four years old.¹¹ The levels of cortisol of 74 children aged 10 involved in the same "Avon study" were measured at awakening, 30 min after awakening, and at 4 pm and 9 pm on 3 consecutive days. Maternal anxiety in pregnancy was significantly associated with individual differences in awakening and afternoon cortisol.¹² This study provides human evidence that prenatal anxiety might constitute a mechanism for an increased vulnerability to psychopathology in children and adolescents. Attention deficit hyperactivity disorder (ADHD) belongs in this framework and has been related to maternal anxiety in pregnancy.¹³

Several studies included in our database have explored the effects in adulthood of a great diversity of maternal emotional states in pregnancy associated with high levels of cortisol. Two Finnish psychiatrists studied the effects of bereavement. They identified 167 children whose fathers had died before they were born.¹⁴ The researchers also identified 168 children whose fathers had died during the children's first year of life. Then the medical records of all 335 of these children were followed for 35 years. Most of the fathers had died during the Second World War. In both groups, the parents were of comparable age and from comparable social classes. All the children grew up fatherless. However, *only those who lost their father while in the womb were at increased risk of criminality, alcoholism, and mental diseases*. The results of this study suggest that the emotional state of the mother during pregnancy has more long-term effects on the child than the emotional state during the year following birth. The material of another authoritative Finnish study consisted of a general population cohort of 12,059 children born in 1966 and followed to the end of 1998. For men aged 33 of antenatally-depressed mothers there was a significant increase in criminality.¹⁵

An unwanted pregnancy is another situation undoubtedly associated with high levels of cortisol. A large collection of literature exists about children born after the mother was

refused an abortion. The Prague study was based on a group of 220 subjects born to mothers who in 1961-63 were refused abortion both on initial request and on subsequent appeal (compared to a pair-matched control group of children born of accepted pregnancies). At ages 9, 14 to 16, 21 to 23 and 30 there were detectable differences between the two groups. For example, at age 9 the children's school performances in the study group were significantly poorer (although no differences were found in IQ); at ages 21-23, twice as many subjects had been court-sentenced in the study group.¹⁶ Similar results were provided by a Swedish study of 120 children born during the period 1939-1942, whose mothers had sought therapeutic abortion, compared with a control group of 120 children. In the study group, there were more frequent records of social and psychiatric difficulties at ages 21 and 35.¹⁷ In the Finnish 1966 Birth Cohort, mothers were asked, in the sixth or seventh month, whether the pregnancy was wanted, mistimed but wanted, or unwanted. It appeared that the risk of later schizophrenia among unwanted children was significantly raised compared with wanted or mistimed children.¹⁸

Our current understanding of the life-long effects of prenatal exposure to maternal stress hormones has many practical implications. The first duty of all those who meet pregnant women is to protect their emotional state. In the age of routine medicalized prenatal care the attitudes of health professionals can have powerful effects on the emotional states of pregnant women. Thus the main preoccupation, even the zeal of doctors, midwives and other specialized professionals should be to avoid the "nocebo effect" during prenatal visits.¹⁹ In practice, this means that they must create such interactions that a pregnant woman feels even happier after a prenatal visit than before... or at least less anxious. This will not be easy as long as the dominant style of prenatal care is to routinely offer all pregnant women a standardized battery of tests, thus turning every prenatal visit into an opportunity to realize all the risks associated with pregnancy and childbirth. There are reasons today to reconsider the contents of antenatal visits and to shift towards a selective attitude.

In an ideal world, the modern expectant mother should be guided by a primary practical question: 'What can the health professional do for me and my baby?' If we consider the usual case of a woman who has no serious chronic disease, who knows that she is pregnant, who knows roughly when her baby was conceived, and who can feel her baby growing in her belly, the humble response should be: 'Not a lot, apart from detecting a gross abnormality and offering an abortion'. In the same ideal world the health professional should be guided by a primary question: 'What are the basic needs of a pregnant woman?'. Starting from this simple question the health professional will find the time to offer discussions about lifestyle, including nutrition. Today an accumulation of data indicates that depressive disorders are exacerbated by nutritional deficiencies, particularly in long-chain omega-3 fatty acids (such deficiencies probably lower the serotonin levels at critical periods of neurodevelopment).²⁰ Prenatal care of the future will be guided by a rule of thumb: 'Eat sardines, be happy ... and sing!'²¹

Our current understanding of the life-long effects of prenatal exposure to maternal stress hormones can also help us to provide preliminary interpretations of the function of joy in pregnancy. If joy is the opposite of anxiety, depression and psychological distress, we can reasonably assume that it is associated with low levels of cortisol. We can therefore propose that the function of joy in pregnancy is to protect the unborn child against the effects of the harmful stress hormones. Since lasting effects are still detectable in adulthood, we can even understand that joy in pregnancy is *necessary* to transmit from generation to generation the capacity to be joyful. Let us anticipate that in the near future imaginative scientists will find ways to clarify the role hormones such as dopamine, serotonin and oxytocin in joyful experiences. Let us also anticipate that "The Scientification of Joy" will include the study of unexplored personality traits, such as "Joie de vivre".

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