

Taijiao (Foetal Education)

Abstract

Taijiao (literally foetal education) – the premise that maternal behaviour will affect the health and future development of her child – has been taught in Chinese culture for at least two thousand years. It is only fairly recently, however, that modern research has confirmed this to be so. This article looks at the ideas behind taijiao and the evidence for the influence of maternal emotional states, diet and exercise on the lifetime health of the individual.

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‘A person from birth on suffers from peak illness.¹ What is the name of this disease? How did he acquire it?’

Qi Bo: ‘The disease is named fetal disease. It is acquired in the mother’s abdomen. When the mother was extremely frightened, the qi rises and does not move down. It takes residence together with the essence qi. Hence, this lets the child develop peak illness.’

Yellow Emperor’s Internal Classic, between 2nd century BCE and 2nd century CE²

‘While the child is in the uterus, it shares the same body with its mother. When there is heat, both become hot. When there is cold, both become cold. If there is disease, both are diseased. If healing occurs, both recuperate. (For that reason,) the mother should take particular prudence and care about her food and drink as well as her daily life activities.’

Zhu Danxi, 14th century CE³

many women feel instinctively, after all her baby shares her body - her very bloodstream. For other women, though, it may be experienced as an unreasonable burden of responsibility, a feeling of being besieged by yet more admonitions about her behaviour. What is clear, however, is that over the past thirty or so years the evidence to back up many of the ideas behind foetal education has become steadily more compelling.

Whilst most traditional cultures understood the link between what happens during pregnancy and lifetime health outcomes for the child,⁵ it wasn’t until the later part of the 20th century that modern medicine began to accept such a connection. Previously it was believed that chronic disease in adulthood could only be due to poor genes on the one hand, or poor adult lifestyle on the other, with the quality of life of the mother during pregnancy having a negligible impact. This perception was challenged in 1989 by the British epidemiologist Professor David Barker who, after delving into birth and lifetime health records in the United Kingdom from 1910 to 1970, discovered the simple fact that people born with a low birth weight were at greater risk of developing coronary heart disease in later life.⁶ Subsequent research revealed similar links with other chronic diseases such as osteoporosis, type 2 diabetes, obesity, stroke and high blood pressure.

The nourishment a baby receives from its mother and its exposure to infection after birth, permanently ‘programme’ the body’s structure and metabolism, and determine its susceptibility to chronic disease in later life.

Professor David Barker⁷

The Barker hypothesis of foetal programming⁸ (which was initially met with considerable scepticism⁹) has radically changed the perception of medicine with regard to a woman’s health and nutrition during pregnancy and in preparation for conception. In 2010, Time Magazine dubbed it a ‘new science’, ignorant perhaps of the two thousand year history of taijiao in China.

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Taijiao, or foetal education (tai = foetus, jiao = to teach or instruct), has been promoted and practised in China for at least two thousand years.⁴ Taijiao proposes that how a woman lives while she is pregnant – her emotional state, the stresses she experiences, her diet and physical activity – may directly influence and impact on the health, intelligence and wellbeing of her baby, not only at birth but throughout its life.

In terms of Chinese medicine, although the basis of inherited (pre-heaven) essence is laid down by the coming together of the jing of both parents, taijiao teaches that it can be strengthened or weakened by the quality of life throughout the nine months of pregnancy.

The core principle of taijiao may be something that

In the three decades since Barker's work, there has been a much greater understanding of how not only nutrition but also physical activity and emotional events during pregnancy have potentially lifelong impacts.

Emotions

'During the period of the first month, the blood flow is blocked and inhibited and [the pregnant woman] should not engage in strenuous activities. Her sleeping place must be peaceful and quiet and she must not be exposed to fear or alarm.'

'During the period of the second month, the child's essence is being formed inside the uterus, and [the pregnant woman] must beware of and protect herself against being alarmed.'

During the third month, 'She must avoid feelings of sorrow and grief, thought and preoccupation, fright and commotion.'

During the fourth month, she must 'quiet her body, harmonize her heart and will, and moderate her drink and food.'

*Sun Simiao, 7th century CE*¹⁰

'The most important thing for a pregnant woman's psyche is to always have a peaceful state of mind. If her heart and mind are not peaceful it brings harm to her body and is harmful for the fetus. The harm brought by anxiety is the greatest.'

*Song Jiazhao 1936*¹¹

Alongside the general advice that a woman should try to maintain a calm, peaceful frame of mind, free from anxiety and agitation, early taijiao teachings included much that seems hard to achieve, oppressive and sometimes absurd. Examples include always sitting up straight, eating only regularly-shaped food and avoiding seeing 'horrific sights' and 'revolting colours', hearing 'obscene sounds' and speaking 'perverse words'.

During the third month, she was advised to 'see kings and dukes, empresses and concubines, princesses, and beauties, but not hunchbacks, dwarfs, repulsive looking or emaciated people, and monkeys,¹² In order to ensure a beautiful child, she should 'handle objects made of white jade and observe peacocks', and for a virtuous and capable child should read, 'poems and enlightening books'.¹³

During the 1930s, when there was a significant taijiao revival in Republican China, women were even advised to avoid reading popular fiction and going to the cinema.¹⁴

Yet not all taijiao advice was as demanding. Consider the 10th century *Ishinpo*'s¹⁵ rather appealing advice on desirable behaviour in late pregnancy: 'In the ninth month, [Have the mother] drink wine and eat sweets, loosen her belt and act aloof. Have people wait on her.'

The evidence

However directive traditional taijiao advice might appear, what is striking is how accurately observant it was on the effects of emotional stress during pregnancy. A 2007 review of the available evidence¹⁶ published in the *Journal of Child Psychology and Psychiatry* concluded that if a mother is stressed during pregnancy, her child is substantially more likely to experience emotional or cognitive problems such as anxiety, attentional deficit hyperactivity disorder (ADHD) and delayed language development. These effects were independent of whether or not she suffered from postnatal depression and anxiety, suggesting that it was emotional conditions during pregnancy that were crucial. The study further suggested that a woman's difficulties with a partner were likely to be a particularly powerful emotional factor.

'If the husband treats his wife the same as always and does not give her special psychological comfort and tender care, or if he goes to the extent of feeling as if the home is unpleasant and seeks pleasures elsewhere because his wife is sick in pregnancy, or if he is not happy with his wife and gets mad at her, this [behaviour] is enough to make the pregnancy agitated or troublesome, directly influencing the fetus.'

*Yun Qin, 1937*¹⁷

A literature review also carried out in 2007¹⁸ found that maternal depression and anxiety affected foetal and neonatal wellbeing and behaviour, as well as contributing to more difficult pregnancies and labour, while a further study found that prenatal maternal anxiety was associated with sleep difficulties in children aged six to 30 months.¹⁹

The seventh century quotations from Sun Simiao given above form part of the traditional advice to women regarding behaviour through each of the nine months of pregnancy. What is striking is that it is only in the early months that the focus is on emotional life, suggesting that she should try to remain free from anxiety, fear and stress. Later in pregnancy, attention shifts to diet and exercise.

There is some interesting confirmatory evidence for this. A 2004 study²⁰ found that anxiety occurring in the earlier stages of pregnancy (12 to 22 weeks) was associated with increased ADHD and anxiety symptoms in children when they reached the ages of eight and nine. These effects were more significant than when the mother's anxiety occurred later in pregnancy (at 32 to 40 weeks). Another 2004 study²¹ found that anxiety around 18 weeks, but not at 32 weeks, was associated with mixed handedness (neither left nor right-handed), a predictor of behavioural, mental and developmental problems such as language difficulties and ADHD symptoms in childhood, persisting into adolescence. A 2008 study found that the risk of schizophrenia and related disorders was raised in children whose mothers experienced the death of a close relative during the first trimester, but not the second and third trimesters,

of pregnancy.²² A 2009 study into the effects of a major traumatic incident (the Quebec ice storm of 1998) reported observable effects on children's fingerprint ridge counts (of a type commonly found in people with schizophrenia), reflecting disruptions in foetal development in weeks 14 to 22 (when fingerprints develop)²³ A 2010 study confirmed the possibly greater effects of early pregnancy anxiety by finding decreased brain matter densities in six to nine year-old children whose mothers suffered anxiety at 19 weeks, with no significant effect of anxiety at 25 and 31 weeks.²⁴

Even the 1930s advice to pregnant women not to go to the cinema is echoed in a 2008 study.²⁵ One hundred and thirty seven women at 32-weeks of pregnancy watched an 'emotionally evocative labor and delivery documentary'. Both their own and their foetuses' physiological responses were noted. Unsurprisingly there was a relationship between the two, and the foetuses of women who reacted more strongly to the graphic birth scene also showed a greater reaction. More surprisingly, those babies who responded intensively to the video were observed to demonstrate more irritable behaviour at six weeks of age.

A 2013 review of many different studies into the effect of maternal stress in pregnancy coined a new term that mirrors the ancient Chinese 'foetal education'. The 'fetal origins hypothesis', was defined as the idea, 'that prenatal environmental exposures — including maternal psychological state-based alterations in in utero physiology — can have sustained effects across the lifespan'.²⁶

It is worth emphasising that 'maternal stress' is a catch-all term and can vary from mild everyday stresses to severe ones such as bereavement, physical or emotional abuse, other acute family problems, severe poverty, acts of war and natural disasters. All have been shown to have effects on the foetus, with resultant changes in childhood development and behaviour.

When dietary deprivation is extreme it has even been shown to have effects across more than one generation.

In relation to everyday stresses, however, it is worth mentioning a 2006 study²⁷ that looked at the effect of maternal anxiety mid-term on children at the age of two. Expecting to show negative outcomes, the study team was surprised to find the opposite. Children of mothers who had reported anxiety during pregnancy had better, not worse, motor and mental scores. Looking deeper, they found the mothers (described as well educated and financially stable women) had reported only moderate, not severe, anxiety. If the findings of this study are replicated,²⁸ it might demonstrate that stress in pregnancy follows a j-shaped curve pattern, a so-called hormetic response, where a small dose of a toxic substance or event is actually

beneficial, stimulating the organism, and only when that dose is exceeded does it become harmful.

Diet

'In the sixth month of pregnancy, [the fetus] begins to receive the essence of metal and uses it to develop its sinews ... It is appropriate for her to eat the meat of birds of prey and wild beasts. This is what is called transforming the interstices and stitching together the sinews to nourish their strength and harden the back and spinal column ... During the sixth month, the child's mouth and eyes are developing. Have [the pregnant woman] balance the five flavors and eat sweets and delicacies, but do not allow her to overeat.'

Sun Simiao, 7th century CE²⁸

Whilst it may seem obvious that maternal diet during pregnancy would have an impact on the later health of the child, it is only fairly recently that the evidence to demonstrate this has been gathered. It is not so long ago, after all, that cigarettes and alcohol were proven to be harmful to unborn babies.

Professor David Barker's discovery of the long-term health implications of low birth weight have been mentioned above. In fact, when dietary deprivation is extreme it has even been shown to have effects across more than one generation. Studies on women who were pregnant during the terrible Dutch Hunger Winter of 1944-45, when food intake was reduced to 500 to 1500 calories a day, not only found that their children were more likely than normal to be hospitalised for major affective disorder (for example depression, bipolar disorder or anxiety), especially when the pregnant women were exposed to famine during their third trimester,³⁰ but that some of the effects of the famine — in this case chronic physical disease — were found in the next generation down the line, i.e. the children of those born during and soon after the famine.³¹

But it is not only underweight babies that may have lifelong health problems. A 2013 Australian study³² demonstrated an association between maternal consumption of junk foods and maternal obesity with high subsequent birth weight. Maternal obesity and high infant birth weight, in this case defined as over four kilos, is known to be associated with the future risk of adverse health consequences. For example, a 2013 study into over 37,000 pregnancies and birth records dating from 1950 found that maternal obesity was associated with an increased risk of early death from cardiovascular disease in adult offspring.³³

The fact that both underweight and overweight babies may face later health problems illustrates some of the complexities of studying diet in pregnancy. Of course it is not surprising in itself that being both under- and overweight can have negative effects, but the underlying causes may be quite varied. For example, when there is nutritional deprivation during only one part of the pregnancy, or

during pregnancy but not after birth, or during some part of early childhood, there may be problems adapting to increased nutrition when it does, perhaps suddenly, become available.³⁴ This helps explain the apparent paradox that adults whose mothers were pregnant during the Dutch famine, demonstrated higher rates of obesity than those conceived before or after it.^{35,36} In another example, when mothers ate low levels of carbohydrate during pregnancy, it was found to lead to greater obesity in their children between the ages of six and nine, irrespective of birth weight or how thin or fat the mother was. It is thought that this may reflect an epigenetic response, where the baby alters its DNA based on what it expects its birth environment to be (in this case low levels of carbohydrate), and the way its cells process fat is therefore altered.³⁷

Studies of the effect on the foetus of inadequate diet during pregnancy are also complicated by the fact that reserves will be drawn from the mother's body whenever possible so that it might be her, rather than the child, who is injured.

Apart from overall food availability, deficiency or excess of specific nutrients and toxins can impact on foetal and child health and development. Since the 1960s it has been known that adequate folic acid consumption before and after conception can help protect against congenital malformations such as spina bifida,³⁸ as well as foetal growth retardation. Low maternal consumption of essential fatty acids during pregnancy is linked to lower birth weight and reduced cognitive and motor function, while foetal exposure to environmental toxins such as PCBs and methylmercury is linked to neurocognitive deficits.³⁹

Much of this information is well known, and many mothers, where resources allow, will try to follow a healthy, varied and nutritious diet during pregnancy, based as far as possible on natural and organic foods.

Exercise

In the seventh month, 'Have [the pregnant woman] tax her body and shake the limbs; do not allow her to be solid and motionless; make her engage in physical activities and bend and stretch, all in order to make the blood and qi flow.'

Sun Simiao, 7th century CE⁴⁰

Opinions on whether or not women should exercise while pregnant have fluctuated over the centuries. It seems probable that for most of human history, pregnant women – being essentially young and strong adults – continued to work throughout their pregnancy at tasks (farming, water gathering, clothes washing etc.) that many of us would find physically challenging today. Indeed, the advantages of remaining vigorous during pregnancy seem to have long been recognised. The biblical book of Exodus suggests that Hebrew slaves had easier births than their indolent Egyptian mistresses: 'And the midwives said unto Pharaoh, because the Hebrew women are not as the Egyptian women; for

they are lively, and are delivered ere the midwives come in unto them'.⁴¹ Similar observations were made during Tudor and Stuart times in England (15th to 17th centuries). Rich and respectable women were observed to experience more

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painful and dangerous childbirths than working women, a profitable state of affairs for the medical practitioners who therefore had to attend to them. Seventeenth and 18th century medical opinion encouraged cautious exercise, though it advised women against any excessive exercise such as horse-riding, brushing their own hair (to avoid straining the ligaments of the womb) or any circulating movements of the arms (to avoid strangulation of the baby by its umbilical cord). In Victorian times, however, women of higher status were distinguished from their physically strong and active inferiors by their delicate constitutions and inactive lifestyles – and exercise during pregnancy was frowned upon.⁴² Warnings against excessive exercise continued into the 20th century and until very recently women were still being told to bed-rest in cases of problem pregnancies, despite lack of evidence of its benefits and some evidence of its harm.^{43,44}

In recent years, in this exercise-conscious age, all this has changed and women are advised to exercise appropriately throughout pregnancy to maintain their own health and fitness, to reduce fatigue, varicosities and swelling of the extremities,⁴⁵ reduce levels of insomnia, stress, anxiety and depression,⁴⁶ and achieve better pregnancy outcomes and shorter labours.^{47,48}

Evidence for the beneficial effects of exercise on the babies of pregnant women, however, is fairly recent. A number of studies have found that women who exercise during pregnancy train not only their own hearts but those of their baby too (resulting in reduced heart rate and increased heart rate variability⁴⁹). In a 2013 study, women were asked to exercise moderately, three times a week for 20 minutes at a time during their second and third trimesters. Compared to other women who did not exercise, the babies of those who did showed greater brain maturity at eight to 12 days after birth.⁵⁰ Another 2013 study of women exercising for 55 minutes three times a week from weeks 10 to 38, resulted in women halving their chance of giving birth to a high birth weight (over four kilos) baby.⁵¹

Modern tajjiao

The earliest tajjiao tradition, dating back two thousand years, was directed at ensuring not only a healthy but also a morally upright child, and this same approach was evident in the revival of tajjiao in 1930s China.

'If for the 280-day period the pregnant woman knows how to take good care of herself, and the people around her also pay attention to her well being, then she can have the virtuous son or daughter that she hopes for.'

*Song Jiazhao 1936*⁵²

The late 20th century, however, saw a shift in focus both in China and in the West as ideas of foetal education began to spread more widely. In Beijing and in New York, parents are now talking to their unborn children, playing them Mozart (a child prodigy himself) and other classical composers, and buying into special education programmes designed to stimulate their foetuses with beneficial sound, light and movement. Websites teach how to 'increase your baby's chances of being smart from womb to birth',⁵³ or how to kick-start the learning of native and foreign languages.⁵⁴ In China these programmes might even include recordings of exemplary essays and speeches.

The idea that every thought, every choice, every experience a woman has might affect her unborn child is an enormous responsibility to bear.

There seem to be two main aims behind the modern taijiao phenomenon. One is simply to let a baby know that it is loved, with the aim of producing a secure and emotionally balanced child. The other is more hard-headed – to raise the child's intelligence and to start its education as early as possible. This second aim is especially important in China where children and young people face intense competition to secure a good education, a well-paid job, elevated status and a successful, financially secure future. Anything that can be done to steal a march on a child's peers is thought to be worth investing in – especially when, as a result of China's one child policy, single children are expected to bear the brunt of supporting both their aged parents.

Conclusion

Taijiao, foetal education, foetal programming – whatever name is given to it – presents challenges of all kinds to pregnant women and to wider society. If, as seems to be the case, emotional and physical stresses during pregnancy can affect the lifetime health of a child, then the implications are profound – both personally and socio-politically.

On a personal level, the idea that every thought, every choice, every experience a woman has might affect her unborn child is an enormous responsibility to bear. For some women, in some circumstances, it might present a welcome challenge – to spend the nine months of pregnancy cultivating inner wellbeing and calmness, eating well, exercising, meditating or doing yoga, communing with her child and so on. For others, it risks inducing waves of guilt and anxiety, especially when the leisure and resources to do

this are unavailable.

As Margaret Oates, a consultant in prenatal psychiatry, has written, 'The modern Western pregnant woman must not drink more than four cups of coffee a day, drink alcohol, smoke cigarettes, change cat litter trays, eat soft cheese, uncooked eggs or packaged salads or go into the lambing sheds. They should not work too hard or too long, nor at night or be ambivalent about their pregnancies. Now it seems they must not become anxious either.'⁵⁵

In the end, we can all only do our best and will inevitably fail in some way. Mothers (and fathers) know this and have been reassured over the years by the words of Donald Winnicott, the psychoanalyst and paediatrician, who talked of the 'good enough mother' and 'the ordinary devoted mother ... an example of the way in which the foundations of health are laid down by the ordinary mother in her ordinary loving care of her own baby'.

On a socio-political level, it is clear that strong bonds of family, friends and society as a whole are needed to support a woman during pregnancy. Social policy must therefore facilitate rather than hinder these bonds. It also has to be deeply understood that poverty, poor housing, deprived neighbourhoods, limited access to good quality food and so on all impact on maternal wellbeing. If we accept some of the ideas and evidence behind taijiao, we need to find ways to support all women to achieve the life conditions that can help them to cope better with the inevitable stresses of life and pregnancy. Such measures have to include radically different economic, social and educational policies.

Peter Deadman is currently writing 'Live Well, Live Long', a book on the Chinese yangsheng (nourishment of life) tradition. Publication due summer 2015. Contact: peter@jcm.co.uk.

Endnotes

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- 3 YangShou-zhong & Duan Wu-jin (1994). *Extra Treatises Based on Investigation and Inquiry: A Translation of Zhu Dan-xi's Ge Zhi Yu Lun*. Blue Poppy Press: Boulder Colorado, p.24.
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- 5 For example: 'Ay ay, for this I draw in many a tear, And stop the rising of blood-sucking sighs, Lest with my sighs or tears I blast or drown King Edward's fruit, true heir to the English Crown.' - The pregnant Queen Elizabeth's response upon learning of her husband's imprisonment in Shakespeare's *King Henry VI (Part 3), Act IV, Scene IV*.
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- 12 The 10th century *Ishimpo*, Japan's oldest surviving medical text, is based on the Sui dynasty (581-618 CE) Chinese text *Bing Yuanhou lun (Prescriptions and Methods from the Heart of Medicine)*, 10th century. This passage was translated by Sabine Wilms.
- 13 *Zhubing Yuanhou Zonglun (General Treatise on the Causes and Symptoms of Disease)* by Chao Yuanfang 550-630CE.
- 14 The 1930s taijiao revival has been criticised for its patriarchal attitudes to women (asserting that their excessively emotional nature was due to their unique reproductive system) and for the whiff of eugenics in considering taijiao as a tool to improve the Chinese race. For example Michael Lackner in *Mapping Meanings: The Field of New Learning in Late Qing China* (Brill, 2004) quotes a 1931 text: 'As for the matter of fetal education, its purpose is not just to make sure that the fetus receives good influences: it also has an extremely important significance for the evolution of the human races'; other texts from the same period discuss such things as 'the preservation of the race'.
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- 53 <<http://www.wikihow.com/Increase-Your-Baby's-Chances-of-Being-Smart-from-Womb-to-Birth>> [accessed 15/09/14]
- 54 There is some evidence that unborn babies can indeed learn to recognise sounds and do have foetal memories of languages. See, for example, Hepper, PG (1991). "An examination of fetal learning before and after birth", *The Irish Journal of Psychology*, 12(2):95-107, and Hepper, PG (1996). "Fetal memory: does it exist? What does it do?", *Acta Paediatrica Supplement*, 416:16-20.

- 55 Margaret Oates, consultant in prenatal psychiatry at Queen's Medical Centre and senior lecturer in psychiatry at the University of Nottingham, has written in Oates, M. (2002). "Adverse effects of maternal antenatal anxiety on children: Causal effect or developmental continuum?", *British Journal of Psychiatry*, 180:478-479.