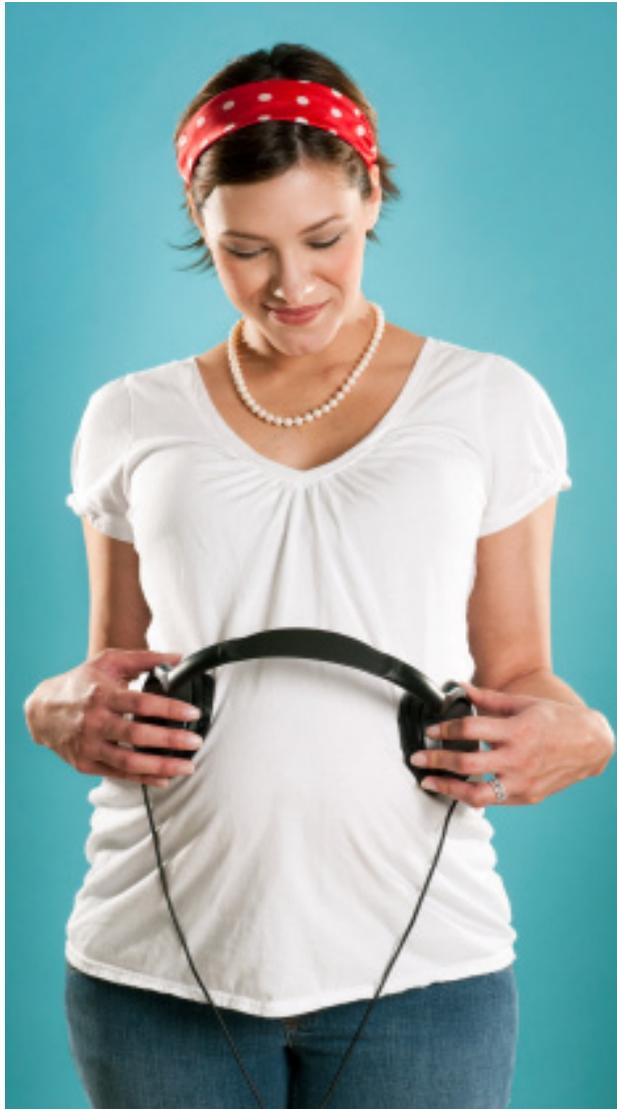


# MUSIC IN THE WOMB

the value of creating a musical environment very early



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Can a baby hear music played to it before it is born? If so, will it remember what it has heard, post-birth? Are there any benefits to playing music to an unborn baby, and if so, what is the best kind of music to play?

We answer these key questions in simple terms, and direct readers who would like to know more to some in-depth, technical, sources of information.

## The developing foetus—what it can hear

From the moment she knows she is expecting a baby, a woman's behaviour and lifestyle is bound to change: from the things she eats and drinks, the medicines she takes, to the exercise she does. All aspects of life now need careful consideration because of possible implications for the unborn child.

Much research has been carried out into the development of a foetus's hearing while in the womb. Expectant parents may play music and speak to their unborn child in the hopes that the sounds may have a beneficial impact on the baby.

Hearing is the first sense to develop in the embryo, beginning in the third week of gestation, and becoming functional between the fourth and fifth months<sup>1</sup>. However, the noises are restricted and muffled by a sound barrier of embryonic fluid and abdominal tissue. What the baby hears will mainly be low frequency pitches and rhythms, which can travel through that sound barrier more effectively:

*“Music is a generally stimulating pattern of sound for the brain... and foetuses do respond to music in their environment. But again, because of the way sound is filtered by the embryonic fluid, it's going to be attenuated; rhythm would be emphasized more than melody.”*

*“There is relatively little effect on sounds below about middle C on the piano, but an increasing reduction in sound levels with higher notes. As most instruments have harmonics about this frequency, there is a change in timbre. Those instruments having mainly high notes are affected most, such as the trumpet. On the other hand, melody and rhythm are not much altered. In fact, in utero recordings made of Beethoven's Fifth Symphony yielded a clearly identifiable sound. Thus, while sounds are greatly altered as they pass from the outside world to the ear of the foetus, there is more than sufficient musical stimulation to be heard in the womb.”*

For more detailed technical information about how hearing develops in a foetus, the article *Hearing and Listening in the Womb*<sup>4</sup> provides an excellent, approachable overview, along with recommendations and links to academic articles and studies.

## How and when to play music to your unborn baby

When it comes to playing sounds for your unborn baby you have several options: you could just sit and listen to the music yourself (at a reasonable volume) and know that some of the music as ambient sound will be audible to the baby<sup>5</sup>; you could get a pair of headphones and stretch them around your stomach so that the sound is directed; or you could use one of a number of prenatal music players on the market. Whichever method you use, particular care must be taken with the volume. Don't turn it up louder than 70 decibels (about as loud as a hairdryer or a normal conversation at a metre distance) if you are playing it aloud to yourself as well as the baby. Follow manufacturers' safety guidelines if you are using a purpose-built prenatal music player. Playing music too loudly may hurt or startle your unborn child<sup>6</sup>.

If you are playing the music directly into your stomach, it is recommended that you should limit this to no more than one hour per day, as it is up close and may risk over-stimulating the baby<sup>7</sup>. Choose a time when you are relaxed, and use it as an opportunity for yourself also:

*“A perfect time to stimulate your baby would be when you decide to take a nap or rest during the day... Although over-stimulation will not harm your baby physically, it can make Baby feel overwhelmed by the extra attention and she may stop responding to your efforts. Listen to your moods—if you're getting tired of hearing the same opera aria, chances are Baby is feeling the same. This should be a special time of enjoyment and bonding shared between you, your spouse/partner, and Baby. Remember, it is not about the amount of time, but the quality of the wonderful experience you are sharing together.”*

## What kind of music to choose

Many people may choose to play music to their baby because they have heard or read about something called “The Mozart Effect”. In simple terms, “The Mozart Effect” is the theory that “listening to Mozart improves intelligence”, or that early childhood exposure to classical music can have a beneficial effect on mental development. For this reason, parents often choose to play Mozart, and music by other classical composers, to their unborn child. There is no conclusive evidence that this is the case, long term (see next section), however there have been a number of studies into foetus's responses to different types of music played into the womb.

Dr Alexandra Lamont conducted a well-known study at the University of Leicester, UK, in July 2001, which was also featured on the BBC documentary, *Child of Our Time*. The purpose of the study was to show how music played to a child before birth remains in their memory for a surprising length of time after they are born. However, the research also showed that the style of the music didn't seem to make a difference:

*“The babies recognise UB40 just as much as they do Mozart but the pace of the music seems to be influential. Babies hearing faster music like Five's If Ya Gettin' Down or the start of Vivaldi's Four Seasons show stronger preferences, [positive or negative,] than babies with slower music like Mozart's Adagio for Winds.”*

Most scientists would agree that calming, melodic music is more likely to be beneficial than genres such as rap, heavy metal, or involving clashing, discordant sounds; one study even suggests that constant exposure to chaotic sounds can negatively impact on the brain's structure<sup>10</sup>.

## Effects for mother and child, before and after birth

There is considerable debate about the extent of the positive effects, if any, of playing music to a child while it is still in the womb. Some scientists say that musical stimulation can help a baby to learn to respond to the same stimulus after it is born, and can aid relaxation and soothing. Others say that there is no evidence of any benefits or lasting effects of playing music to

a foetus, but it can be of great emotional and psychological benefit to the mother, which in turn will benefit the baby.

Listening to classical music is beneficial for everyone, for all kinds of reasons: it can create a sense of calm and well-being, aid sleep and relaxation, improve memory function and help with concentration. It has even been found to help soothe pets with separation anxiety, and elderly people who listen to classical music have been found less likely to suffer from depression and to have better health in general than those who don't<sup>11</sup>. There are so many benefits, educational and medical, that it is simply not possible to list all of them in a short article, but in our view the scope of classical music to offer improvements in almost all aspects of life is quite clear.

One of the most obvious benefits of listening to music is its stress-relieving properties. Stress in pregnancy is obviously not good for either the mother or the unborn child, and should be avoided as far as is practical and possible. Dr Calvin Hobel, a perinatologist in Los Angeles, has worked for many years researching the effects of stress in pregnancy on the baby:

*“At each stage of development, the organism uses cues from its environment to decide how best to construct itself within the parameters of its genes... Stress is an example of how a foetus responds to stimuli in the womb and adapts physiologically. When the mother is stressed, several biological changes occur, including elevation of stress hormones and increased likelihood of intrauterine infection... The foetus builds itself permanently to deal with this kind of high-stress environment, and once it's born may be at greater risk for a whole bunch of stress-related pathologies. Pre-term births and low birth weight are among the most recognized effects of maternal stress during pregnancy, established over nearly two decades of animal and human research<sup>12</sup>.”*

Many researchers claim there is no concrete evidence supporting the theory that music stimulation prior to birth means a child has a higher intelligence in their future. Other specialists argue the opposite. For instance, there are direct studies showing that once they are born, babies have the innate ability to recognize their mother's voices and may be further able to respond to music familiar to them in the womb. The research carried out by Dr Alexandra Lamont at the University of Leicester showed that babies are able to recognise a piece of music that was played to them in the womb, for up to a year after birth. This is much longer than other studies have previously shown:

*“Previous research has shown infants remembering things like music, stories or people they encounter after birth for only a few days to months. Lamont says most people assumed that pre-birth memories would last about the same amount of time, if not less. Lamont thinks that the exposure over three months could explain the results. Most studies only give infants a few weeks to get used to something before being tested to see if they remember it. Also, adds Lamont, the mothers were told to sit and relax during their musical exposure. That could affect the mother's hormonal or chemical balance, perhaps further enhancing the effect<sup>13</sup>.”*

Lamont also makes sure to emphasise that there is no evidence that playing classical music to babies actually helps to make their brains develop<sup>14</sup>, and indeed this is also echoed in information about “The Mozart Effect”, which suggests that babies might increase their spatio-temporal reasoning after exposure to classical music, but that these memory improvements are short-term, not a permanent change<sup>15</sup>.

Numerous studies and reports demonstrate a link between what the baby hears while in utero and their preferences after birth. Newborn babies can recognise their mother's voice and find this calming and soothing, therefore it is logical to assume that any music that might be familiar to them may also have the same soothing effect, and aid sleep and relaxation. For the expectant mother also, making the time to sit quietly and listen to music is a huge boost to relaxation and stress-relief which can only be a positive thing for both mother and child, whether or not there is any long-term improvement in brain development.

[1. Center for Prenatal and Perinatal Music](#)

[2. ResearchPennState](#)

[3. Music and Science Information Computer Archive](#)

[4. Maternal and Early Years](#)

[5. Language Development: Early Speech Perception](#)

[6. babycenter.com](#)

[7. babycenter.com](#)

[8. babyzone.com](#)

[9. BBC news](#)

[10. babycenter.com](#)

[11. hubpages.com](#)

[12. medicinenet.com](#)

[13. New Scientist](#)

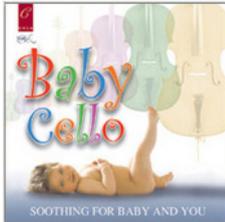
[14. BBC News](#)

[15. yahoo.com](#)

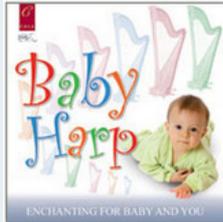
## Our recommendations

We believe that listening to classical music is beneficial in many ways, at any age, including in utero. It's never too early to begin a lifetime's enjoyment of music. Whether or not it can actually make your baby more intelligent, over the long-term, is not the point. Perhaps it can—and indeed many specialists support that view. Even if not, in our opinion it is sure, at the very least, to encourage relaxation, soothing and a sense of well-being, for both mother and child.

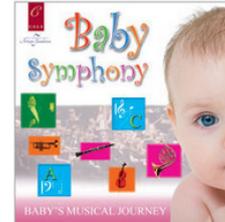
There are a number of excellent CDs available on our site, [babymusic.com](http://babymusic.com), which contain music which has been specifically chosen due to its suitability to play to an unborn child. We recommend the following:



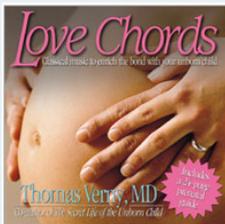
Welcome to *Baby Cello*, the award-winning CD which calms you and your baby when you most need it to, yet captivates listeners when in a receptive mood.



Beloved lullabies and softly flowing music from our sixteen wonderful harp players will waft baby to calming sleep and sweet dreams.



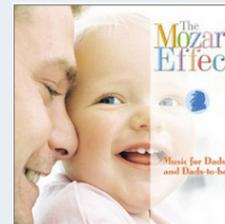
Gentle music by 12 great composers spanning 300 years, performed by the major London orchestras.



For mothers-to-be, here is music which will enrich the bond with your unborn child. Easy Baroque and Classical listening, compiled by a noted pre-natal psychologist.



For the expectant mother, this CD features world-class performances of some of Mozart's best-loved compositions.



A recording that celebrates the important role of the father and the incredible power of Mozart's music.

## Further reading

### Websites:

#### [Zen Babies](#)

An American website offering "relaxing music for moms and babies" through music, concerts, workshops and private sessions. There is an interesting "Articles and Studies" section, including more information on the study carried out at the University of Leicester by Dr Alexandra Lamont.

#### [Lullabelly](#)

A product website with links to research on the benefits of prenatal musical exposure. This website references a great deal of highly respected research on the topic, and includes some inspirational quotes from leading scientists in support of prenatal musical stimulation.

#### [Center for Prenatal and Perinatal Music](#)

A very informative website aiming to promote the holistic development of the baby in the womb. The facility offers a workshop curriculum for local families to attend, along with personal support for pregnant women, but the information on the site, along with an extensive FAQ section and excellent recommendations for music to listen to while pregnant, is suitable for anyone.

#### [Bellybuds](#)

This is another product website, but also lists some excellent, and highly academic, reference articles, with links to download and read.

#### [The Mozart Effect Resource Centre](#)

A huge resource of articles, websites, interviews, recordings and more, in support of "The Mozart Effect". This website promises to help you "discover the transformational powers of music for health, education and well-being".

### Online Articles:

#### [Fact or Fiction? Babies exposed to classical music end up smarter](#)

Scientific American article which summarises "The Mozart Effect" and poses some interesting questions.

#### [The Mozart Effect: Fact or Fiction?](#)

A simplified report on "The Mozart Effect" and how it relates to people of all ages, not specifically babies.

#### [The Effects of Music on Brain Development](#)

This article contains some quite technical scientific language and information, but nevertheless is very accessible and enjoyable to read.

#### [The Tomatis Pregnancy Program](#)

Information about a music therapy program created especially for expectant mothers.

#### [Wagner for the Womb](#)

Interesting research covering the effect of music on the brain in animal models, and its stress-relieving properties in humans.

#### [Hearing and Listening in the Womb](#)

This is a page from an NHS website about all aspects of health and development in pregnancy and early childhood. It contains some extra detail about the development of hearing in the foetus, and scientific opinion on the benefits of exposure to music pre-birth.

#### [Lessons of the Music Womb](#)

A good general essay on the subject with links to other sources. Very readable

#### [Music on the brain: Researchers explore the biology of music](#)

Article from the archives of the Harvard Gazette

#### [Can babies learn in utero?](#)

Information from Rick O. Gilmore, Ph.D., associate professor of psychology, director of the Brain Development and Cognition Laboratory and acting director of the Social & Life Sciences Imaging Center at Penn State University.

### Periodicals:

These are highly technical academic articles, but may be of interest to those wanting very in-depth information

Graven, SN and Browne JV (2008) "[Auditory development in the foetus and infant](#)" *Newborn and Infant Nursing Reviews*

Fridman R (2000) "[The Maternal Womb: The first musical school for the baby](#)" *Journal of Pre-natal and Peri-natal Psychology and Health* 15 (1) Fall 2000

Hepper PG (1998) "[Foetal 'soap' addiction](#)" *Lancet* (June 11) 1347-134

Arabin B (2002) "[Music during Pregnancy](#)" *Ultrasound Obstet Gynecol* 2002; 20: 425-430

### Books:

Verny, Dr T., and Kelly, J. (1982) *The Secret Life of the Unborn Child*, London, Sphere.