

# The Power of Human Touch for Babies

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# THE POWER OF HUMAN TOUCH FOR BABIES

## Summary

Human touch has a powerful effect on our lives. Throughout life, humans use touch to interact with others, display affection, seek support, and develop relationships. Feeling the power of touch begins long before a baby is even born. One of the first senses to develop, research has shown that even by 8 weeks gestation (that is, 8 weeks after conception) a fetus is able to respond to the sensation of touch in utero. Babies use their own touch and the touch of others to help soothe themselves as they enter new environments. Even before birth, twins have been observed on ultrasound, as early as 14 weeks, sucking on their twin's face and fingers and appearing to be touching and exploring their twin's face. Thus, regardless of whether a baby is born at full term or whether they are delivered very preterm, touch is an essential component to help them reach their optimal potential.

Over 600 scientific papers have been published on the effects of human touch on babies. Babies have an innate need to be loved and nurtured and develop trust and attachment. Studies of babies (human and animal) in suboptimal conditions (e.g., orphaned infants, infants separated from their mothers) have shown the striking negative impact that results from separation from caregivers, especially mothers who are a source of nourishment, and lack of human touch. These include delayed growth and development, illness, higher stress levels and issues with attachment and properly bonding with caregivers. Babies need a certain amount of stimulation and touch to help promote healthy and normal development, including physical development (how their bodies grow), emotional development (their mental health and how they learn to manage their feelings), behavioural development (how they learn to control and manage their own behaviour), and social development (learning how to interact with other people).

Although initially not felt to be important for sick babies requiring neonatal care, the compelling nature of the evidence has led to a paradigm shift in neonatal care including change in unit design from open bay to single room in order to facilitate, where possible, uninterrupted contact between a mother and her baby.

Being held and, in particular, caregiver touch, is a natural, no-cost intervention that has been found to have many beneficial effects for babies in hospital. Studies have examined many different types of touch (including simple holding, holding in specific positions, massage, and skin-to-skin contact). Gentle touch or stroking and massage have been shown to have positive effects on newborns such as more regulated sleep, distress and activity. Touch stimulates tactile nerve endings in the skin, which leads to a release of endorphins, oxytocin and serotonin, often referred to as "love hormones", which produce pleasant sensations and feelings.

All forms of touch have positive effects but skin-to-skin contact, especially with mothers, has been found to be particularly powerful. Research has shown that the touch of a mother or a familiar adult or sibling helps ill and preterm infants cope with the many painful procedures they receive (sometimes as many as a dozen per day) as part of their routine care in neonatal intensive care units (NICUs). Other benefits of touch include: promotion of infant physiologic stability and regulation (e.g., keeping their heart beating at a normal and constant rate), improving sleep, supporting healthy weight gain, increased rates of breast feeding, and improved parent-baby relationship. There is also evidence that early touch can facilitate a positive transition for parents into their new role as a caregiver, and constructively establish the parent-child relationship.

Across different types of touch, the following beneficial effects are supported by science: 1) Pain relief, 2) Physiological stability (e.g., heart rate, temperature), 3) Crying, 4) Sleep, 5) Infant illness, 6) Weight gain and growth, 7) Time in hospital, 8) Parent satisfaction, 9) Breastfeeding rates, 10) Parent-infant interaction, 11) Infant mental health, 12) Parent mental health. Recent research has shown long-term positive effects of touch received as babies in children who have been followed to age 10. The beneficial effects of touch (all types of touch) are summarized as follows, as well as the specific effects of skin-to-skin/Kangaroo Care/Kangaroo Mother Care appear below, where a ✓ indicates that there is a sufficient amount of research evidence to say touch is beneficial; an empty box □ indicates that the research says it is neither harmful or helpful; a question mark ? indicates that there is not enough research evidence to say whether it has any effect.

BENEFIT	TOUCH	SKIN-TO-SKIN
Faster Weight Gain	✓	?
Shorter Hospital Stays	✓	?
More Stable Heart Rates	✓	Research shows no evidence of benefit
Improved Oxygen Levels	✓	✓
More Stable Body Temperature	✓	✓
Better Tolerance of Pain	✓	✓
Improved Sleep	✓	✓
Less Anxiety and Stress	✓	?
Stronger Immune System	✓	?
Healthier Brain Development	□	✓
Increased Social Skills (better mother-infant interactions, stronger attachment)	✓	✓
Improved Language Skills	✓	?

\*There was benefit for executive functions (i.e., memory and problem solving) but not for IQ.

<sup>1</sup> Types of touch included holding/rocking, facilitated tucking, infant massage, skin-to-skin contact, and/or kangaroo mother care

Science clearly supports that caregiver touch has a powerful effect on babies’ brains and bodies, optimizing healthy growth and development, both in the short and long term. However, with recent advances in highly technological care in the NICU, the power of touch for babies is sometimes forgotten.

## What are the different types of touch?

There are many different types of touch that parents, health care practitioners, and other caregivers can provide to infants. The type of touch that is appropriate often depends on the environmental context that the infant is in (e.g., at home or in the NICU), who is available to the baby (e.g., a healthcare provider, a parent, or another alternate adult), and whether the care provider has the appropriate skills and training to deliver a specific type of touch. Some health centres (such as one in Uppsala, Sweden) are prioritizing caregiver touch as an important part of family-centered medical care, and mothers and family members maintain almost continuous skin-to-skin contact with their baby.

Some of the most common types of touch are used and studies with babies are as follows:

### **HOLDING AND/OR ROCKING (H/R)**

The holding of a baby bundled in a blanket or wearing clothing by a caregiver.

### **FACILITATED TUCKING (FT)**

A developmentally supportive intervention that involves holding the babies' arms and legs flexed and close to the trunk of the body. This touch is performed using the hands of the caregiver and can be done by a family member or alternate care provider. FT is often used as an intervention to reduce infant pain during invasive medical procedures.

### **INFANT MASSAGE (IM)**

The application of massage therapy for babies.

### **SKIN-TO-SKIN CARE (SCC) OR KANGAROO CARE (KC)**

The ventral (belly) upright holding of a baby wearing only a diaper against a caregiver's chest. The caregiver delivering SSC can be a family member (e.g., fathers) or other adult.

## **KANGAROO MOTHER CARE (KMC)**

The ventral (belly) upright holding of a baby wearing only a diaper against his or her mother's bare chest on a continuous basis, until the baby begins to sweat and resist the position, with exclusive breastfeeding.

## What does the science show about the power of touch for babies?

Of the over 600 scientific papers, including systematic reviews and studies conducted by research teams around the world, that have been published on the impact of these different types of touch on outcomes for babies, we summarize the major findings of this large body of research in a table below. Effects of touch have been studied for:

- Babies' response to pain
- Babies' physiological outcomes (e.g., heart rate)
- Babies' behavioural outcomes (e.g., crying, sleep)
- Other baby outcomes (e.g., cognitive development, mental health, weight gain)
- Parent outcomes (e.g., parent mental health, parent-infant interactions, breastfeeding rates)

It is important to note that the appropriateness of different types of touch is affected by the gestational age of the baby (how far along the pregnancy was when the baby was born). Babies who are born extremely premature may not respond well to intermittent touch such as stroking or massage, because their dermis (the tissue that supports the skin) and skin is not fully developed yet. Before a baby is born, being in their mother's uterus minimizes exposure to loud noise and light, promotes sleep, and ensures continuous access to mother's smell and voice. When a baby is born early, they are often exposed to an environment where they are separated from their mother, there is excessive light and noise, sleep is often interrupted, and they are exposed to painful procedures. Research shows that this environment can negatively impact on infant brain development.

Therefore, it is important that parents and other care providers are aware of touch practices that positively influence development in infants who are born premature (for example, continuous Kangaroo Mother Care is considered a positive touch intervention for preterm infant development).

In the attached Appendix we summarize what we know from the scientific literature about the effects of each type of touch (holding/rocking, facilitated tucking, infant massage, Skin-to-Skin Contact, Kangaroo Mother Care) on various baby and parent outcomes. In some cases there is a sufficient amount of research evidence showing that each type of touch is helpful for certain outcomes. In other cases there is sufficient evidence to say that the type of touch is actually harmful for certain outcomes. Sometimes the research literature says the type of touch is neither harmful nor helpful. And sometimes there just isn't enough research evidence to say whether the type of touch has any effect or not.

Because of the developmental differences between healthy full-term babies and those babies born preterm, the table summarizes the results of this research separately for these two groups when possible. Some studies have included full term and preterm babies in the same group and have not reported their results separately, so in these cases we indicate that the results of these studies apply to both groups of babies.

The positive effects of touch on babies can be summarized as follows:

- Holding/rocking is beneficial for physiological responses and regulation after a painful procedure in full-term babies. Its effects on other baby and parent outcomes is not known.
- Facilitated tucking is beneficial for behavioural and physiological responses and regulation after a painful procedure in pre-term babies; heart rate stability and oxygen saturation; crying (in full-term babies too), and parent satisfaction. Its effects on other baby and parent outcomes is not known.

- Infant massage is beneficial for sleep in full-term babies and infant illness, weight gain, growth, and time in hospital (for preterm babies). Its effects on other baby and parent outcomes is not known.
- Skin-to-Skin/Kangaroo Care is beneficial for preterm babies' behavioural and physiological responses and regulation after a painful procedure; cardiorespiratory stability, blood glucose, oxygen saturation, and temperature (all in full-term babies too); and crying (in full-term babies), parent-infant interaction (in full-term babies), and breastfeeding rates (in both pre-term and full-term babies). Its effects on other baby and parent outcomes is not known.
- Kangaroo Mother Care is beneficial for behavioural and physiological responses and regulation after a painful procedure (in both pre-term and full-term babies); oxygen saturation (in both pre-term and full-term babies); infant mental health, parent mental health, and parent-infant interactions (for pre-term babies). Its effects on other baby and parent outcomes is not known.

Additionally, while not focused on providing touch directly to the babies, prenatal massage (i.e., massage during pregnancy) has been shown to have beneficial effects for both mother and baby, including improved mental health for mothers, decreased maternal pain, and improved relationship with their partner. Also, infants born to mothers who had prenatal massage had greater weight and gestational age at birth than those infants born to women who did not receive prenatal massage. Research has also shown that parental stroking of their infant after birth may help to protect them against the effects of risk factors, such as parent mental health problems, on the child's later development.

While most of the research above focuses on short-term outcomes of touch, researchers are also starting to follow babies over time to see what impact early touch has in the long-term. One recent study found that premature babies who received at

least 1 hour of kangaroo care each day for 14 days had better mother-child interactions, better sleep, better physical outcomes, and better outcomes on executive functioning (the processes involved in running the brain and organizing information and memories) when the children were 10 years old. Research by this same group has also shown more long-term positive family outcomes in children, mothers, and fathers when preterm babies received kangaroo care.

### **Does it matter who provides the touch? The role of mothers vs. other caregivers**

The vast majority of the research conducted to date has examined the influence of touch interventions delivered to the baby by the mother. Therefore most of what we know about the power of touch is specific to mothers and babies. Although not surprising, given the emphasis on the importance of the mother-baby dyad, there are times that mothers for various reasons may not be able to be with their babies. Thus, several studies have included fathers or other caregivers (such as health care providers, massage therapists, or research assistants) to delivering the touch intervention. In studies examining SSC, fathers who provided SSC to their preterm infants were found to be more sensitive and less intrusive in their interactions with their infants. Additionally research examining the use of SSC as a pain relieving intervention in preterm infants has found that while SSC provided by mothers is significantly more effective in reducing infant pain, SSC provided by fathers does provide pain relief in

comparison to no SSC. One study examining IM in preterm infants found that IM delivered by mothers and trained professionals had the same effect regardless of who was providing the massage, with both resulting in an increase in infant weight gain.

“Cuddler programs” have been incorporated into NICU’s over the years as a means to provide essential human touch to babies in the absence of parents or family members who are unable to visit regularly. These programs involve volunteers who will hold and cuddle hospitalized babies when their parents and caregivers are unable to do so. Surprisingly, despite the introduction of cuddler programs in some hospitals in North America almost three decades ago, to date, there has been no published studies examining the effects of these cuddling programs on baby and parent outcomes. However, it is reasonable to assume given our existing knowledge of the power of human touch on babies that they would likely be beneficial in the absence of the mother or other caregiver. Moreover, given that we know even babies born preterm can remember and be comforted by familiar smells, use of a consistent cuddler may possibly be an important factor to consider. Research is needed to see if there are benefits to implementing these programs in neonatal critical care settings not as an alternative to mothers or family members but rather in special circumstances when it is not possible for them to be available.

## What are the take-home messages about the science behind the power of touch for babies?

The science behind the power of human touch for babies has identified the following positive effects for babies and their families (across the different types of touch examined):

1. Pain relief
2. Physiological stability (e.g., heart rate, temperature)
3. Crying
4. Sleep
5. Infant illness
6. Weight gain and growth
7. Time in hospital
8. Parent satisfaction
9. Breastfeeding rates
10. Parent-infant interaction
11. Infant mental health
12. Parent mental health

There is some research to suggest that these positive outcomes are not only seen in the short-term after birth, but that the effects can carry on into the baby's physical and cognitive development throughout childhood (in children followed to age 10), as well as contributing to positive outcomes for the parents and the family as a whole.

In very preterm babies, there are special considerations to ensure that touch is safe and tolerable for these very small babies, based on a number of factors (e.g., severity of illness,

gestational age, physiologic stability, behavioural state). Specifically, while there is a strong body of literature speaking to the benefits of skin-to-skin contact for preterm babies, it is important that infants with respiratory conditions be closely monitored when in skin-to-skin.

There is currently not enough research to say that infant massage should be used for all healthy full-term babies, though there is also no evidence to suggest that using infant massage in these babies is dangerous or damaging in any way, and it may help enhance the parent-infant relationship and reduce postnatal depression.

## What are the limitations of this research?

Although it is clear that all newborns need and should receive human touch, preferably from a mother or parent, there are some questions that remain. Many studies differ on various aspects of the type of touch, how often the baby receives the touch, and how they measured the babies' outcomes. While some studies have included fathers as the caregiver delivering touch interventions, very few report on differences in outcomes between mothers, fathers, and other care providers. Also, many of the studies only looked at small numbers of infants, with some samples including both full term and preterm infants. Therefore, findings of such studies may not be representative of how all babies will respond to touch, and may not fully capture differences in response to touch interventions across gestational ages. Additional rigorous research implementing interventions and measuring outcomes consistently is needed to fully understand the influence of different touch interventions across different care providers and infant gestational ages.

## APPENDIX Summarizing the Science on the Effects of Touch

The type of touch is indicated next to one of four symbols:

- A check mark ✓ indicates that there is a sufficient amount of research evidence suggesting that this type of touch is helpful with regards to the outcome in question;
- A cross ✗ indicates that there is a sufficient amount of research evidence suggesting that this type of touch is harmful to the outcome in question;
- An empty box ☐ indicates that the research says this type of touch is neither harmful nor helpful;
- A question mark ? indicates that there is not enough research evidence to say whether or not this type of touch has any effect.

### Holding/rocking

OUTCOMES	EVIDENCE FOR PRE-TERM BABIES	EVIDENCE FOR FULL-TERM BABIES
<b>BABIES' RESPONSES TO PAIN</b>		
Behavioural responses (e.g., facial expressions, crying)	?	☐
Physiological responses and regulation after a painful procedure	?	✓
<b>BABIES' PHYSIOLOGICAL OUTCOMES</b>		
Cardio-respiratory stability, heart rate, blood glucose, oxygen saturation, stress hormones, temperature	?	?
<b>BABIES' BEHAVIOURAL OUTCOMES</b>		
Crying	?	?
Sleep	?	?
<b>OTHER BABY OUTCOMES</b>		
Cognitive development, infant mental health, infant illness, weight gain, growth, or time in hospital	?	?
<b>PARENT OUTCOMES</b>		
Parent mental health, parent-infant interactions, parent satisfaction/preferences, maternal pain, or breastfeeding	?	?

## Facilitated tucking

OUTCOMES	EVIDENCE FOR PRE-TERM BABIES	EVIDENCE FOR FULL-TERM BABIES
<b>BABIES' RESPONSES TO PAIN</b>		
Behavioural responses (e.g., facial expressions, crying)	✓	☐
Physiological responses and regulation after a painful procedure	✓	☐
<b>BABIES' PHYSIOLOGICAL OUTCOMES</b>		
Cardio-respiratory stability	?	?
Heart rate	✓	?
Blood glucose	?	?
Oxygen saturation	✓	?
Stress hormones	?	?
Temperature	?	?
<b>BABIES' BEHAVIOURAL OUTCOMES</b>		
Crying	✓	✓
Sleep	?	?
<b>OTHER BABY OUTCOMES</b>		
Cognitive development, infant mental health, infant illness, weight gain, growth, or time in hospital	?	?
<b>PARENT OUTCOMES</b>		
Parent mental health	?	?
Parent-infant interactions	?	?
Parent satisfaction/preferences	✓	?
Maternal pain	?	?
Breastfeeding rates	?	?

## Infant Massage

OUTCOMES	EVIDENCE FOR PRE-TERM BABIES	EVIDENCE FOR FULL-TERM BABIES
<b>BABIES' RESPONSES TO PAIN</b>		
Behavioural responses (e.g., facial expressions, crying)	?	?
Physiological responses and regulation after a painful procedure	<input type="checkbox"/>	<input type="checkbox"/>
<b>BABIES' PHYSIOLOGICAL OUTCOMES</b>		
Cardio-respiratory stability	?	?
Heart rate	?	?
Blood glucose	?	?
Oxygen saturation	?	?
Stress hormones	?	<input type="checkbox"/>
Temperature	?	?
<b>BABIES' BEHAVIOURAL OUTCOMES</b>		
Crying	✓	<input type="checkbox"/>
Sleep	?	<input type="checkbox"/> / ✓
<b>OTHER BABY OUTCOMES</b>		
Cognitive development	?	<input type="checkbox"/>
Infant mental health	?	<input type="checkbox"/>
Infant illness	✓	<input type="checkbox"/> / ✓
Weight gain	✓	<input type="checkbox"/>
Growth	✓	<input type="checkbox"/> / ✓
Time in hospital	✓	?
<b>PARENT OUTCOMES</b>		
Parent mental health	?	?
Parent-infant interactions	?	✓
Parent satisfaction/preferences	?	?
Maternal pain	?	?
Breastfeeding rates	?	?

## Skin-to-Skin Contact

OUTCOMES	EVIDENCE FOR PRE-TERM BABIES	EVIDENCE FOR FULL-TERM BABIES
<b>BABIES' RESPONSES TO PAIN</b>		
Behavioural responses (e.g., facial expressions, crying)	✓	☐
Physiological responses and regulation after a painful procedure	✓	☐
<b>BABIES' PHYSIOLOGICAL OUTCOMES</b>		
Cardio-respiratory stability	✓	✓
Heart rate	☐	☐
Blood glucose	✓	✓
Oxygen saturation	✓	✓
Stress hormones	?	?
Temperature	✓	✓
<b>BABIES' BEHAVIOURAL OUTCOMES</b>		
Crying	?	✓
Sleep	?	?
<b>OTHER BABY OUTCOMES</b>		
Cognitive development	?	?
Infant mental health	?	✓
Infant illness	?	?
Weight gain	?	?
Growth	?	?
Time in hospital	?	?
<b>PARENT OUTCOMES</b>		
Parent mental health	?	?
Parent-infant interactions	?	✓
Parent satisfaction/preferences	?	?
Maternal pain	?	☐
Breastfeeding rates	✓	✓

## Kangaroo Mother Care

OUTCOMES	EVIDENCE FOR PRE-TERM BABIES	EVIDENCE FOR FULL-TERM BABIES
<b>BABIES' RESPONSES TO PAIN</b>		
Behavioural responses (e.g., facial expressions, crying)	✓	✓
Physiological responses and regulation after a painful procedure	✓	✓
<b>BABIES' PHYSIOLOGICAL OUTCOMES</b>		
Cardio-respiratory stability	?	?
Heart rate	☐	☐
Blood glucose	?	?
Oxygen saturation	✓	✓
Stress hormones	?	?
Temperature	?	?
<b>BABIES' BEHAVIOURAL OUTCOMES</b>		
Crying	?	?
Sleep	?	?
<b>OTHER BABY OUTCOMES</b>		
Cognitive development	?	?
Infant mental health	✓	?
Infant illness	?	?
Weight gain	?	?
Growth	?	?
Time in hospital	?	?
<b>PARENT OUTCOMES</b>		
Parent mental health	✓	?
Parent-infant interactions	✓	?
Parent satisfaction/preferences	?	?
Maternal pain	?	?
Breastfeeding rates	?	?

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