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PART ONE

Babies & Children

1. Controlled crying damages babies' brains

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In my clinical work with pregnant and postnatal mums experiencing anxiety and mood disorders, few issues are reported as consistently as sleep deprivation. Parents who spend the first year of their child's life (or longer) waking up regularly throughout the night to attend to their child are, not surprisingly, at a higher risk for depression and anxiety.

It's therefore understandable that parents want to know what can be done to help babies to sleep through the night. And with that interest comes strong opinions, best-selling books and even a 'baby whisperer', as it seems whispering is no longer just for horses.

In the midst of this clamour of advice is a good deal of controversy over a sleep technique for babies known as 'controlled crying'. Advocates claim it saved their baby's sleep and their sanity. Critics liken it to 'normalised abuse' and claim it can cause lasting psychological damage.

We need to start where very few critiques on the topic have started — with a definition of what controlled crying is, and what it is not.

Controlled crying (also known as 'controlled comforting') is when parents respond to their infant's cries and gently comfort them, then return at increasing time intervals to assist the infant to self-settle while knowing that the parent is still there. The key words there are 'respond and return'.

The recommended implementation of such a technique is after six months of age. By Piaget's theory of object permanence, this is the developmental stage when babies understand that an object (in this case the parent) still exists, even when it is out of sight.

Controlled crying is not 'extinction'. The extinction method is a dramatically termed technique that refers to leaving a baby to 'cry it out'. For example, when the infant cries at night, the parent shuts the door to the nursery and does not respond at all. The idea is that eventually the baby will understand that the parent is not returning and will self-settle.

In terms of controlled crying (not extinction), Australian researchers found that when mothers of infants aged six to 12 months used one of two interventions (controlled crying and 'camping out', where parents remain in the room while the infant returns to sleep before quietly leaving), not only was there a significant improvement in infants' sleep, there was also a significant reduction in maternal depressive symptoms compared with controls.

The research team followed up these mothers and infants at the age of six years, and found no difference in emotional or behavioural problems, sleep problems, attachment, parenting styles or maternal mental health between intervention and control groups.

Despite it being clear that extinction techniques were not used in this study, there was considerable controversy about these findings. A letter to the *British Medical Journal* (BMJ) where the original paper was published even compared the study to research conducted in Nazi Germany under Hitler.

More recently, critics of controlled crying such as Pinky McKay and Margot Sunderland have drawn attention to the long-term ill effects of controlled crying. McKay notes that babies who are left to cry are at risk of sensory deprivation and potentially long-lasting brain damage induced by early trauma, similar to what we know in psychological research as learned helplessness.

These critics are supported by a position paper against the use of controlled crying from the Australian Association for Infant Mental Health (AAIMH); however, this position paper has not been updated in almost 10 years and explicitly notes that its reference list does not include any studies on the impact of controlled crying on infants.

The evidence from both animal and human studies is very clear that severe stress such as emotional neglect and abuse in infancy does indeed induce long-lasting changes in the developing brain. And I can see the link between extinction techniques and emotional neglect.

But it's extreme to compare controlled crying, where the parent responds and returns, to emotional neglect such as that suffered by infants raised in Romanian orphanages. This confusion between extinction and controlled crying appears to be at the heart of the criticisms.

At the end of the day (literally), each family needs to work out what the best technique is to get their infant to sleep. Techniques such as controlled crying and camping out might help some families, but others will be very uncomfortable at the idea of not responding immediately to their infant.

Every baby is different, and suggesting there is one magic solution that will work for all babies, or that what worked for them will work for everyone, is not only misleading, but also confusing and distressing for mothers desperately seeking an answer and some sleep.

There's a wealth of mums, whisperers, angels, and child health nurses out there — listen to their advice and work out the right solution for you and your family.

2. Childhood vaccinations are dangerous

Fiona Stanley
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When I was an infant I had whooping cough and was ill for three months. I don't remember it, of course, but I know it was very distressing for my parents. I do remember later trips with my researcher father to his laboratory where he worked on a vaccine for polio, and to hospitals where infected children my own age were on iron lungs. That was very distressing.

I mention this because today people don't see such diseases. They aren't frightened about whooping cough or polio. In contrast, 100% of parents in Western Australia had their children vaccinated against polio when the vaccine was made available in 1956. Why? They were scared of their kids getting polio, a terrible disease reflected by its other name, infantile paralysis.

Because today's parents don't have first-hand experience with dangerous infectious diseases they can be misled by myths about the supposed dangers of childhood vaccination: for instance, whooping cough vaccine causes brain damage; the measles, mumps and rubella (MMR) vaccine causes autism and vaccination causes cot death or sudden infant death syndrome (SIDS).

There is no truth to any of these claims. We in Australia have some of the best population data in the world on vaccination outcomes in children and it's absolutely clear these myths are just that, myths.

The whooping cough myth started in the 1974 in the United Kingdom when some parents claimed that after being vaccinated their children were diagnosed with neurological disorders, what they called 'brain damage'.

In fact, it was a coincidence. The first signs a child has a genetic or other brain disorder occur at about six months of age. The vaccine is given at two, three and four months, hence the incorrect assumption that the latter caused the former.

I was a student in the United Kingdom at the time. It was disastrous that the medical and epidemiological professions didn't respond after the kids were shown on television with the claims that vaccine caused brain injury. The government paid compensation, reinforcing the false vaccination–brain damage association.

As a result, the rate of vaccination dropped from 81% to 31%, triggering the most horrendous epidemic of whooping cough. In one year, 21 children died and thousands were hospitalised with severe pneumonia and, sadly, brain damage from the infection.

The fear of the disease influenced parents to vaccinate again and immunisation rates went back up and disease incidence went down. But it's a tragedy that it took an epidemic to prove that vaccination is protective. Several major studies also demonstrated clearly that whooping cough vaccines were protective against brain damage and not causing it.

The misguided belief that vaccination causes SIDS is also a case of myth by coincidence. The peak age of SIDS is four months, following vaccinations given from two to four months. The timing of the two events is associated in people's minds, despite study after study showing no connection.

Instead, the research shows SIDS is linked strongly to lying babies on their face or having their head covered with bedding or toys. Other risk factors include smoking, not breastfeeding, overcrowding and overheating.

The myth that the MMR vaccine causes autism is particularly naughty. It was started in 1998 by a scientist who published the claim in a widely reported paper in *The Lancet*.

Again, vaccination rates fell precipitously and outbreaks of measles, mumps and rubella occurred. It was revealed the scientist had undeclared conflicts of interest and had engaged in scientific misconduct. The paper was retracted, but the damage was done.

Such myths demonstrate why it's absolutely crucial that medical researchers obtain solid laboratory data about new and combination vaccines, test them rigorously and obtain very good surveillance and monitoring data. The public must have confidence that the research is done and done well.

That's why the Australian Academy of Science has just released a booklet — *The Science of Immunisation: Questions and Answers* — which explains the basics of vaccination and debunks common myths about vaccines and vaccination. It draws on expertise from a broad sector of the Australian science community, from virology and immunology to my field of epidemiology.

I urge all Australians to get the truth about the myths. Vaccination is a wonderful development in public health. It has prevented enormous suffering and millions of deaths worldwide. The benefits of vaccination outweigh the very small risk of unwanted side effects. Just ask the parents of 1956.

3. The MMR vaccine causes autism

Rachael Dunlop
University of Technology, Sydney

Few medical myths have spread as feverishly and contributed to so much preventable illness than the theory that the triple

measles, mumps, and rubella (MMR) vaccine might be linked to autism.

The tale was first suggested by Andrew Wakefield at a 1998 press conference following the publication of his now discredited (and retracted) *Lancet* paper.

The paper itself didn't address such a connection but Wakefield raised concerns with journalists and called for a boycott of the MMR vaccine.

'I can't support the continued use of these three vaccines, given in combination,' he said, 'until this issue has been resolved.'

Wakefield said the vaccine should instead be broken into single components and given at yearly intervals.

We now know Wakefield had good reason to discredit the MMR: he had a patent for a single measles vaccine and he was being paid by lawyers who were assembling a case against MMR manufacturers.

None of these conflicts of interest were revealed when *The Lancet* paper was submitted for publication — if they were, it would never have been published. As the editor of *The Lancet* noted, Wakefield's paper was 'fatally flawed'.

Further investigation published this year in the *British Medical Journal* revealed what Wakefield did wasn't just bad science, but deliberate fraud.

Wakefield was struck off the UK medical register in 2010 for 'callous, unethical and dishonest' behaviour. But the damage had already been done.

A drop in MMR vaccination rates led to inevitable outbreaks of preventable disease.

The episode also prompted research on possible links between MMR — and vaccines, in general — and autism. Now, 13 years after Wakefield's paper was published, we have considerable evidence that MMR is not linked to autism.

One of the largest single studies to look for a link came from Denmark and covered all children born from January

1991 through December 1998. The study examined a total of 537,303 children, 82% of whom had been vaccinated for MMR.

It found no association between vaccination and the development of an autistic disorder.

More evidence comes from Japan, which stopped using the trivalent vaccine in 1993 over safety concerns with the anti-mumps component of the MMR formulation.

A study of more than 30,000 children found autism cases continued to rise even after the MMR was withdrawn and replaced with single vaccines, providing strong evidence that the MMR vaccine was not implicated.

Most recently, the United States Institute of Medicine completed an exhaustive review in August 2011 of all the scientific literature and concluded there was no causal relationship between MMR vaccine and autism.

So science has rejected such a link, but what have the courts found?

The US Court of Federal Claims (Vaccine Court) was established in 1988 as a no-fault system for litigating vaccine claims.

In 2007, the court began to hear the 'autism omnibus' trials — a class action of almost 5,000 lawsuits attempting to demonstrate MMR played a causal role in the development of autism.

The group put forward the best three cases as a trial and the decision was handed down in 2010.

Judge Hasting wrote of one case: 'Considering all of the evidence, I found that the petitioners have failed to demonstrate that … the MMR vaccine can contribute to causing either autism or gastrointestinal dysfunction.'

Patricia Campbell-Smith, special master on another case, said: 'The petitioners' theory of vaccine-related causation is scientifically unsupportable.'

This myth has been well and truly busted.

Science still doesn't know exactly what causes autism, but researchers are continuing to look.

In the meantime, it's important that parents get accurate information about vaccines so they can protect their kids from preventable disease and avoid getting taken in by expensive and dangerous quack therapies.

Who knows, if we hadn't been sent on a wild goose chase by the nefarious research of Andrew Wakefield, we might be closer to understanding this syndrome.

4. Infant teething causes fevers

Mike Morgan
University of Melbourne

Any parent can tell you that infant teething makes for a trying time. Restless nights, feeding problems and irritability can all be part and parcel when an infant's baby teeth erupt through their gums.

Baby teeth (also known as milk or deciduous teeth) begin to form very early in the pregnancy — about eight weeks after conception. By the time the baby is born, all 20 teeth are present in his or her jawbone.

These teeth begin pushing up through the gum tissue when the child is around six months old. By age three, most children will have their full set of baby teeth.

Deciduous teeth allow the child to begin the process of digestion by grinding solid food up before it's swallowed.

They also reserve the space for the child's adult teeth and if extracted early — due to dental decay, for instance — the resulting space loss can cause misalignment or crowding of permanent teeth.

Children's symptoms during teething vary greatly. Some won't react at all, but most will develop swollen gums, red cheeks and will dribble excessively.

Parents often blame a range of illnesses on teething. A study from the Royal Children's Hospital in Victoria found that 70% to 85% of Australian parents believed teething caused a wide variety of health problems, including fevers.

But several studies that followed children through the teething process found no measurable change in temperature on the day a tooth erupts or in the three days leading up to this.

The fever myth has a lot to do with the age that teething takes place. The six months to three year age range is also associated with an increase in minor infections such as colds or bouts of the flu, which can cause a fever.

Fevers occur when the child's temperature rises above 38°C and can be the sign of a infection. If your child has a temperature of 39°C or above, this could indicate a serious infection so see your health professional immediately for advice.

So what's the best way for parents to deal with a teething child?

It's normal for the child to be a little uncomfortable and these minor symptoms usually subside within a week. They may benefit from biting on something hard and smooth, such as a teething ring.

Teething gels, which contain topical anaesthetic, can be applied on the baby's gum to ease teething pain. But avoid using them before feeding because they can numb the baby's tongue and can make sucking difficult.

It's worth keeping in mind that some of the baby teeth will stay in their mouth until around until the age of 12 years before naturally falling out (or exfoliating).

So as soon a child's first tooth emerges, you can gently brush their teeth to protect them from decay. Use a clean,

damp face washer or a soft toothbrush and low fluoride toothpaste each day.

The infant teething process might result in a few dark circles under the eyes of new parents, but rest assured the adult teething process will involve fewer tears. Unless, of course, the tooth fairy fails to show.

5. Play Mozart to boost your baby's IQ

Michael Vagg
Deakin University

What parent can pass up the chance to boost their child's intelligence by putting on some nice classical music?

The popular idea that IQ scores can be raised by listening to Mozart is a case study in how a cultural meme can be created almost overnight, if the right societal and economic factors are in place.

This particular juggernaut started rolling in 1993 with a fascinating piece of speculative research by Frances Rauscher, Gordon Shaw and Katherine Ky. The researchers had a small group of university students listen to the first 10 minutes of Mozart's Sonata for Two Pianos in D Major (better known to musicians and scholars by its technical handle 'K448') and then asked them to complete tasks involving judgement of time and space (known as spatio-temporal reasoning).

The researchers wanted to test the idea that by priming particular networks of nerve cells in the brain with the music, they could temporarily improve the functioning of that area. And to their surprise, they found the students scored better on

the tests after listening to K448. The benefits lasted for around 10 minutes after the music had stopped.

There are many limitations to the study but it was a thought-provoking and original finding, especially given the researchers' attempt to describe the strength of the effect. Rauscher and her colleagues compared the increase in performance to a gain of several points in one of the subscales of a popular IQ test.

The researchers chose K448 for very specific reasons to do with the way they were modelling brain function. It appears they were on to something, as follow-up studies have confirmed that in some children with severe epilepsy, listening to K448 every day can reduce the rhythmic firing of some of the affected brain cells, reducing the chances of a seizure over the long term.

More recent studies with functional magnetic resonance imaging (fMRI) scans have also supported the idea that there may be something specific to this piece of music in its ability to activate the brain.

Short-term lab results in adults don't translate to long-term changes in children.

On the basis of the original 1993 research, there has never been any reason to believe that short-term results of a laboratory test in adults would translate to accelerating the development of a child's brain. But the phenomenal public over-reaction to this interesting but highly technical paper gave birth to the belief that just listening to classical music makes children smarter.

A detailed but readable account of what happened next is given here but, in short, scientific researchers have been reluctant to make conclusions about the effect of K448 on the brains of listeners while others identified a juicy business opportunity.

Promoting the idea of a 'Mozart effect' makes good business sense because royalties don't have to be paid to long-

dead composers if you sell recordings of their music. There are many orchestras happy to license their performances of well-known pieces for minimal fees.

All that is left is to trick out the music CD with a catchy name such as Baby Mozart, Lovely Baby Music or, simply, Mozart For Babies, and combine with a winning marketing strategy. Conscientious parents have lapped it up and truckloads of CDs have walked out of warehouses around the world. An entire industry of music-related mental enhancement has been born.

Gordon Shaw, co-author of the original paper, wrote a book to try to correct the record but the promotional hype has intensified anyway.

Much stronger and more convincing evidence suggests children should be taught to play music instead of just listening to it. Early musical training has been clearly associated with improved speech and language development in children and can improve performance in non-musical tasks.

So if you want to boost your child's IQ, don't just play your child classical music while you go off and do something else. Get her singing, practising and performing music herself if you really want to help her shine.

6. Don't worry, kids will grow out of their 'puppy fat'

Louise Baur
University of Sydney

Picture this common scenario: A mother is worried about the size of her 13-year-old daughter, who appears quite a bit heavier than the other students in her class. But the mother is

reassured by her friend that it's only puppy fat and her daughter will grow out of it. So no efforts are made to examine, and potentially alter, the girl's diet or levels of physical activity.

So is 'puppy fat' a true phenomenon? Do young people who are overweight during puberty usually grow out of it?

Let's consider the evidence.

A 2010 study that monitored the weight status of 900 children in Victoria found those who were carrying excess weight in primary school were likely to still be carrying the excess weight in later high school.

The children were first seen between the ages of five and ten, and was followed up eight years later. One in five of the students were persistently overweight or obese in both mid childhood and adolescence, with some additional young people developing excess weight for the first time in their teen years.

If excess weight in adolescence wasn't associated with any health problems, there wouldn't be cause for concern. But adolescents who are overweight or obese are more likely to have a range of risk factors for heart disease and related problems, just as they are in adulthood.

In a NSW study of almost 500 school students aged 15 years, overweight or obese boys were more likely to have elevated blood pressure and cholesterol, abnormal levels of insulin (suggesting a form of pre-diabetes) and poor liver function, than boys whose weight was in the healthy range.

Similar findings were found among adolescent girls, although they weren't as pronounced.

Overweight and obese boys are at greater risk of heart disease and diabetes.

These health problems, just like excess weight in childhood, don't just go away. Adolescents who are overweight or obese, or who have risk factors for heart disease, tend to retain these health problems into their middle age.

A recent Finnish study found teen body mass index (BMI) and disease predictors such as high blood pressure correlated

strongly with their risk of obesity-related disease at age 30 to 45.

Given all this, it's clear the popular concept of 'puppy fat' as being just a transient phenomenon is a myth. And Australian children have grown increasingly overweight and obese over the past two to three decades.

What, then, should be our response?

Well, extreme measures such as mandating extra PE classes for overweight students or forcing parents to attend healthy lifestyle programs isn't the answer. But we can't ignore the often lifelong health problems obesity brings.

Instead, we need to provide supportive environments for all young people, whatever their weight status. Within the home, we need to encourage parents to provide a healthy food and activity environment.

If a young person does have a weight problem, then this needs to be handled sensitively, with parents supporting teens, rather than forcing them, to make healthier lifestyle choices.

Parents should try not to nag adolescents about what they're eating, as this can put the defences up. But it's a good idea to keep tempting foods such as soft drink, chocolate, biscuits and cakes away from the house. (If they are there, they will be eaten!)

There are some great resources available to assist parents through this process, but if you remain concerned about your teen's weight, consider a medical review by a youth-friendly GP.

More broadly, all of us should be advocating for changes to the environment that make healthy choices — around what you eat and how active you are — the easy choices for everyone.

We shouldn't be dismissive of the consequences of excess weight, and especially obesity, in young people. Instead, we need to put to death the myth of puppy fat and address the factors that promote unhealthy weight gain.

7. Food additives cause childhood behavioural disorders

Philip Button
RMIT University

Contemporary processed foods contain many additives, largely to meet consumer expectations for great tasting products that are aesthetically pleasing all year round. If we did not have all these expectations, many additives could be eliminated from our manufactured foods.

Any component added to food that doesn't contribute to its nutritional profile can be described as a food additive. And in many cases, these additives allow us to improve the quality, safety and functionality of processed foods.

Take yoghurt, for example: milk fermented under ideal conditions will not always form a thickened product, characteristic of what we know as yoghurt. To ensure a consistently thickened product that meets customer expectations, pectin is added as a thickening agent, and consumers are happy.

So additives may form part of our everyday diets. But do they affect the behaviour of our kids or cause behavioural problems such as Attention Deficit Hyperactivity Disorder (ADHD)?

In two seemingly landmark studies published in 1975 and 1976, Dr Benjamin Feingold drew a link between food additives and behavioural disorders such as hyperkinesis or minimal brain dysfunction (the precursors to ADHD).

This research started decades of debate on the topic and led many parents to switch their kids to the Feingold diet, omitting foods with artificial colours, flavours and preservatives.

But immediately after those publications, various investigations in 1978, 1980 and 1981 refuted the link between childhood hyperactivity and food colouring. The authors concluded that even when administered at high levels, food additives, and particularly food colouring, did not alter kids' behaviour.

Now this is where it starts to get complicated. A 2007 *Lancet* study involving almost 300 children investigated the effects of six artificial colours and preservatives, known as the Southampton Six:

- tartrazine yellow (E102)
- quinoline yellow (E104)
- sunset yellow (E110)
- azorubine (E122)
- ponceau (E124)
- allura red (E129).

The researchers found the combination of additives increased hyperactivity in toddlers and school-aged children. But there was a key limitation to the study: the researchers were unable to determine the effects of any specific additive; just that one or more of the six additives (perhaps in specific combinations, or specific doses) had a negative effect on behaviour.

Most recently, a review summarising 35 years of research in this area concluded that artificial colours and flavours, including the Southhampton Six, did not cause ADHD. But in a particular subgroup of children with ADHD, a diet free from artificial food colours could improve their symptoms.

These groups of children are younger (more likely to be pre- or primary-school age rather than in high school), have allergies or have irritability and sleep problems. Parents of children in these groups should therefore consider removing food additives from their child's diet to test whether their symptoms can be alleviated. This can be attempted in parallel with, or as substitution to, drug-based therapy.

Finally, last year Food Standards Australia New Zealand (FSANZ) — the government regulatory body responsible for determining a product's safety — concluded that the scientific evidence, including the Southampton study, did not demonstrate a link between consuming food additives and hyperactivity.

So what should we take from these studies and reviews? We still have much to learn about the effects of artificial colours and flavours, but so far, the research has found no causal relationship between food additives and behavioural disorders in children.

8. Sugar makes kids hyperactive

Tim Crowe
Deakin University

Any parent would tell you that seeing children fuelling up on sugar-laden cake, lollies and soft drinks at a birthday party is a sure-fire recipe for a bunch of rampaging hyperactive kids.

The connection between sugar and hyperactivity is one of the most popular food-behaviour myths going around, yet it is one that has been well and truly busted by science.

Where there's sugar, there must be hyperactive kids — or so says conventional wisdom.

Science says otherwise. An abundance of published randomised controlled studies have been unable to find any difference in behaviour between children who ate sugar (from lollies, chocolate or natural sources) and those who did not.

Even studies that included children with attention-deficit/hyperactivity disorder (ADHD) could not detect any meaningful difference between the behaviour of children who ate sugar compared with those who did not.

The most important aspect of all these myth-busting studies is they used a study design where the researchers (or parents) and the children were unaware of whether they were consuming a product containing sugar or a non-sugar substitute.

It is only when you introduce an intentional bias into the experiments — and allow the parents to know what food their child was given — that the real culprit behind the myth emerges.

When parents believe their child has been given a drink containing sugar, they consistently rate their child's behaviour as more hyperactive, even if the drink did not contain any sugar.

So why do kids seem so hyperactive when they consume an abundance of sugar?

It all comes down to the context. When kids are having fun at birthday parties, on holidays, and at family celebrations, sugar-laden food is frequently served.

It's the fun, freedom and contact with other kids that makes them hyperactive, not the food they consume.

But that doesn't mean hyperactivity should be ignored. ADHD is a serious behavioural and developmental disorder that can impact on the child's academic performance and family life.

As such, extreme hyperactivity should be investigated by an appropriate health professional. Simply removing sugar from the child's diet isn't going to reduce their hyperactivity.

In fact, eliminating whole food groups in an attempt to treat hyperactivity is an extreme approach that can do more harm than good.

Growing children have different nutrient needs to adults, so eliminating whole foods groups — without a valid medical reason — can affect their growth, overall health, and even later-life food preferences.

Having too much sugar, especially if it is coming from drinks, has been linked to excess weight gain and dental problems in kids. So even with the sugar equals hyperactivity myth busted, there are valid reasons to restrict how much kids consume.