

## READING PASSAGE 3

You should spend about 20 minutes on **Questions 27-40**, which are based on Reading Passage 3 below.

### Sibling rivalry

#### How birth order affects your personality and health

My oldest sister is a typical firstborn: responsible, conscientious, the teacher when we played school, the director for our Christmas plays. My middle sister hung out with the cool crowd, always had a lot of friends, was a bit of a wild child. I defy all stereotypes of the attention-seeking, spoiled youngest child and epitomise a sweet, funny, good-natured human. Obviously.

For centuries, psychologists, philosophers and pretty much anyone with a family has argued that birth order shapes personality. It goes something like this: firstborns are reliable and hard-working. Middle children are rebellious but friendly. Last-borns are more outgoing and doted on. Only children are wiser than their years, perfectionists and spoiled.

I can almost hear the cries of indignation. If this doesn't square with what you know about yourself, or in fact most people, you aren't alone. Despite their popularity, there has been almost no solid evidence to support these stereotypes.

That isn't for lack of trying. Psychologists have long sought insights into the way birth order shapes us, but recent research has shown the studies to be so flawed that they are almost meaningless. Now, though, the largest birth order analysis yet aims to set the record straight.



Meanwhile, there is an urgent reason to turn our attention to birth order: we are starting to appreciate how it may influence physical and mental health – not least because some cells in our bodies harbour our older siblings' DNA rather than our own. Regardless of the stereotypes, birth order has profound effects.

So how much of our personality, success and health can we blame on being an oldest, youngest, middle or only child?

It was 19th-century polymath Francis Galton, the youngest of nine siblings, who first suggested that birth order might matter, after discovering that firstborns were overrepresented among English scientists. He theorised that oldest sons get more parental attention and thrive on it. Fifty years later, Austrian psychotherapist Alfred Adler, the second of six children, suggested that older siblings were more privileged, but also “power-hungry conservatives”, prone to feelings of excessive responsibility and anxiety. He also suggested that middle children were expert negotiators and considered youngest children to be pampered, irresponsible and lazy, due to being overindulged by their parents.

In 1995, Frank Sulloway, now at the University of California, Berkeley, revitalised the debate by proposing his “family niche” theory for birth order effects: this says that siblings’ personalities vary because they each take on a different role within the family dynamic, which reduces competition and facilitates cooperation. For example, in childhood, simply by being older, the firstborn tends to be physically bigger, so might become more aggressive or use their size to their advantage. They are also able to please adults by acting as a surrogate parent to their siblings, which increases their conscientiousness.

Later-born children can’t, or have no need to, fill the same niches, so look for alternatives. This may require them to develop greater imagination than older siblings, but makes them more self-conscious as a result. In this way, says Sulloway, birth order isn’t a direct cause of, but a proxy for, the family dynamics that mould your personality.

There was only one problem with his proposal: nobody could prove it was right. Over the next two decades, many studies that tried to elucidate exactly which personality traits were driven by birth order found contradictory results. “The literature was a huge mess,” says Julia Rohrer at the University of Leipzig, Germany. “So many of the associations that were found were cherry-picked.”

The studies didn't account for the huge amount of confounding factors, like the fact that an older child is likely to be more conscientious purely because this trait increases with age. On the other hand, later-born children exist only in larger families, and parents who choose to have lots of kids are inherently different to those who have just one. Many studies didn't account for socioeconomic factors, the age gap between children or how old the parents were when they had them. And when associations were found, they would hold only within very specific circumstances – for older brothers, or for three-child families, or for people with younger sisters exactly two years apart. "Basically if you analyse data in enough ways, you'll find something," says Rohrer, "but these are just false positives there by random chance."

*"Birth order studies have been so flawed that they are almost meaningless."*

To clear up the confusion, in 2015 Rohrer and her colleagues analysed data from 20,000 children across the UK, US and Germany – the biggest data set used up until then. After taking into account all of the confounding factors that had plagued previous studies, they found that birth order had almost no influence on personality whatsoever. The only genuine effect they could find was an association with birth order and intellect – and even that was tiny, equating to a drop in IQ of about 1 to 2.5 points between the oldest and youngest child.

That is nothing, says Rohrer. It is about the same difference that you would expect to get if you took an identical IQ test on different days. "It's interesting that we reliably see this association, but it's not something that you can detect in everyday life," she says.

This would have been the final nail in the coffin for the birth order effect, had Sulloway not spent the best part of the past two decades trying to take the field one step further. To address the doubts swirling around earlier research, he created three new personality surveys that would allow him to better control for confounding factors.

He saw four major issues to address. First, people's perception of their own personality differs depending on who they think about themselves in relation to. You may see yourself as deferential to your parents, but domineering compared with younger siblings, for instance. So in all three questionnaires, he asked participants to also rate another person, such as a sibling, romantic partner or friend, to help tease these complexities apart.

Second and third: people don't always answer honestly on quizzes, and also tend to acquiesce to questions – so they might say they are both talkative and quiet, for instance, when answering different questions. Research shows that people give more realistic answers if they have previously had to think about moral conundrums. So Sulloway's team began one survey with 40 questions about participants' moral attitudes. They also rated people on acquiescence and accounted for this in the final analysis.

Finally, you need a lot of data. "And that's why it took 18 years to complete," says Sulloway. This year, after collecting almost 500,000 responses from participants in six English-speaking countries, he was able to analyse the results, which will be submitted for publication later this year.

Like Rohrer, Sulloway's team found a consistent, if small, increase in intelligence in firstborns compared with younger siblings. But unlike her work, his latest analysis suggests that there are real, identifiable effects of birth order on personality. Previous research has confirmed that genetics explain up to 50 per cent of the variation between our personalities. Sulloway and his colleagues found that age and gender contribute 5.5 and 10 per cent, respectively. Birth order, on the other hand, was more modest, accounting for about 4.1 per cent of the variation between personalities. "This is still a pretty impressive effect," says Sulloway. "Especially where the importance of birth order has long been doubted."

The effect size is smaller than that found by previous, disputed studies, but the new study identified many of the same trends: oldest kids are more likely than their siblings to have an assertive personality and high self-esteem, but also score highly on being moody and tense. Youngest children tend to like making people laugh and are more likely to be extroverts, but can also be self-conscious and get nervous easily. Middle children have the most agreeable traits, such as being trusting and cooperative, but are the least likely to be assertive or talkative. An only child tends to be more neurotic, but with relatively high self-esteem.

*"The youngest child typically has six months' less education and earns less than the oldest sibling."*

How much stock should we put in these latest findings? Sulloway concedes that siblings can express the same broad traits for different underlying reasons. But he argues that it is important to try to understand what's going on because birth order carries a lot of psychological weight. "People use birth order to rationalise why they are different from their siblings. They magnify its influence, but it's important to know that some of that influence is real," he says.

Rohrer believes that Sulloway's family niche theory is elegant, but says even his latest analysis still resembles a study in which you "interact everything with everything and see what sticks".

It may be easier to pin down how birth order affects other areas of life, such as education, career and income. Last year, economist Sandra Black at the University of Texas, Austin, and her colleagues analysed data on 1.4 million children in Norway and found that as the size of a family increases, the youngest children suffer educationally and economically. In a three-child family, the youngest child typically has about six months' less education and earns 2.8 per cent less over their lifetime than their oldest sibling.

"We don't know exactly why it occurs, but it might be to do with the first child having more attention and alone time with the parents," says Black. If that is the case, there may be a way to mitigate against it. In one small study, Douglas Downey at Ohio State University found that Mormon families tend not to see such large birth-order effects, possibly because they have more support from their community. This buffers against any negative effects as resources are diluted with increasing family size.

Beyond soaking up more than a fair share of your parents' attention, older siblings can have an effect on you even before you are born. In 1992, Ray Blanchard at the University of Toronto, Canada, discovered that the more older brothers a boy has, the more likely he is to be gay. "There's been overwhelming evidence showing the same association since then; I think the finding is pretty much beyond doubt now," he says.

Increasing levels of antibodies in the mother's immune system may be the answer. Antibodies protect us against foreign molecules, but can also be produced against fetal cells. Last year, Blanchard's team found that women who are pregnant with boys produce an antibody that targets a protein only found in male fetuses. Mothers who had gay sons with older brothers had the highest level of this antibody, followed by mothers of gay sons without older brothers, then mothers who had heterosexual sons. The protein targeted by these antibodies sits on the surface of brain cells and is involved in how they communicate with one another.

It may be possible that these antibodies build up in the mother's body and at high concentrations have an effect on brain development, influencing sexual orientation. If you assume a causal relationship between having an older brother and being gay, says Blanchard, then the proportion of gay men who can attribute their sexual orientation to their birth order is between 15 and 29 per cent.

Birth order may influence our health simply by affecting our exposure to certain hormones or microbes. For instance, some cancers are less common among younger siblings, possibly because there are greater oestrogen levels in the umbilical cord in first pregnancies. For firstborns, being exposed to more oestrogen in the uterus could contribute to greater risk of cancer at a later date.

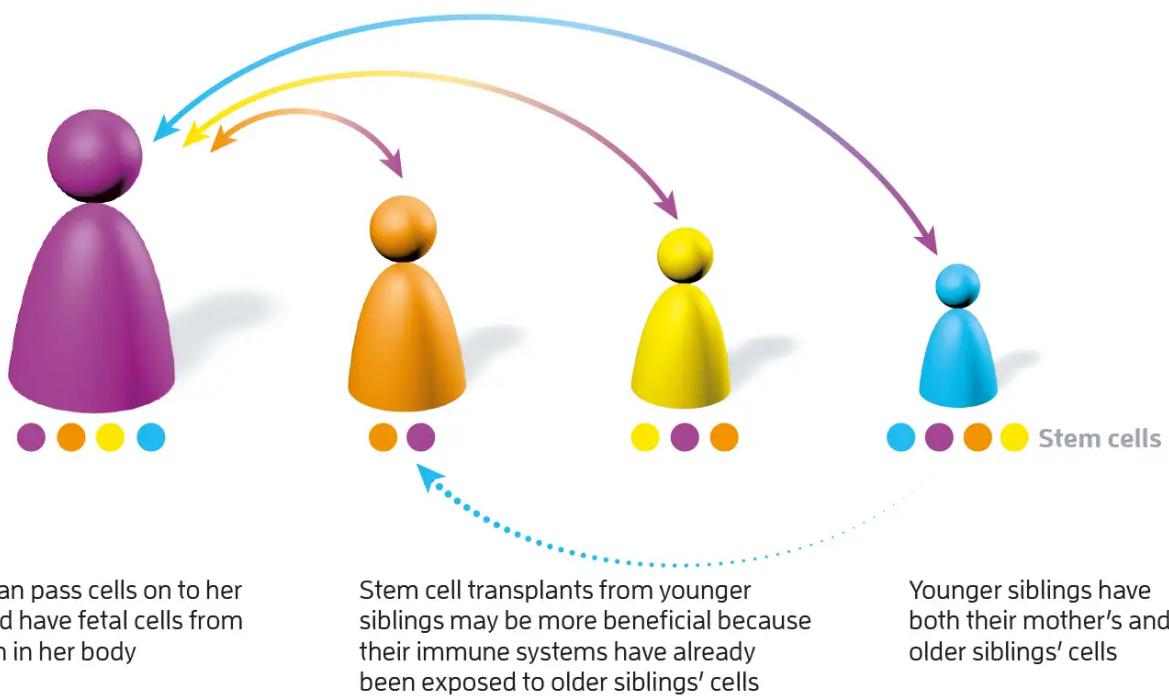
## **Health risks**

On the other hand, later-borns are at increased risk of schizophrenia because viral infections associated with the condition are frequently introduced into families by young, snotty toddlers. So a pregnant woman who has young children around is at higher risk of these infections and their adverse effect on her fetus.

Our siblings can influence our health in other surprising ways too. Those of us with older brothers and sisters actually have their cells floating around inside us. We now know that fetal cells can circulate in the mother's blood for decades after they give birth, because the cells travel across the placenta and into the mother during pregnancy. Likewise, a mother's own cells float into her child. This is called microchimerism. These donor cells act like stem cells, incorporating themselves into every tissue so far studied, including the spleen, liver, heart and brain, where they can stay for the remainder of our lives. Because these cells travel in both directions, we can be colonised by cells originating from older siblings and even from aunts, uncles and grandmothers. We are all, in other words, human chimeras.

## The siblings within

We carry cells from our mother and our older siblings inside us. These might have significant effects on our health



The presence of our siblings' cells may mark the start of the first battle for our parents' undivided attention. David Haig at Harvard University suggests that these tiny aliens move from fetus to mother to prevent the rapid conception of another child. This would enhance the fitness of the first child, by decreasing competition for maternal care. Fetal cells are found in higher numbers in the lining of the uterus and in breast tissue of recently pregnant women. Haig suggests that the cells may prevent a new conception by boosting lactation and thereby suppressing a woman's menstrual cycle, as well as by interfering with ovulation and implantation of an embryo.

Each fetus modulates the mother's immune system, and she then passes these modifications onto future children via microchimerism, influencing their immune systems, says Lee Nelson at the Fred Hutchinson Cancer Research Centre in Seattle. The effect can be life-altering. Recently, it was found that people who needed a blood stem cell transplant as a treatment for blood cancer had better survival rates and a reduced rate of relapse if they were a firstborn child who received a transplant from a younger sibling. Simply put, the younger siblings' immune systems have already encountered the firstborn's cells either directly through microchimerism, or indirectly because the older child's cells have already modified the mother's immune system, and these changes are passed on in future pregnancies (see "The siblings within", left). Essentially, the transplanted cells that the older sibling receives are more similar to their own native cells and this confers some benefit.

A better understanding of birth order's influence could even lead to therapies for deadly diseases. The presence of microchimeric cells in blood has been associated with decreased risk for breast cancer, for instance, and increased risk for colon cancer. It may also influence survival in certain kinds of brain tumour. "There are more positive reasons for microchimerism than negative," says Nelson. She says that if we understood the biological effects of birth order better, we may be able to target inherited cells that cause harm, or improve immune therapies based on observations of the protective effects of birth order. "People haven't realised how important birth order and the biology associated with it is," she says, "until now."

## References

Thomson, H. (2019, July 17). *Sibling rivalry: How birth order affects your personality and health*. New Scientist.

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