



Brain
health

Stress & Anxiety



**Modern life can be a
source of stress and
anxiety...**

Stress and modern-day life

The frantic, full-on nature of 21st-century life can create stress, anxiety, and disrupted sleep patterns for many of us. The imperative to cram as many activities into the day as possible means people may struggle to slow down and relax.

Stress is one of our body's natural processes, helping us to push ourselves and maintain our performance during the day. It has helped to keep us sharp and alert for centuries. But just as with many things in life, too much stress is bad for our health. It can trigger anxiety and lead to many other health complications.

57%

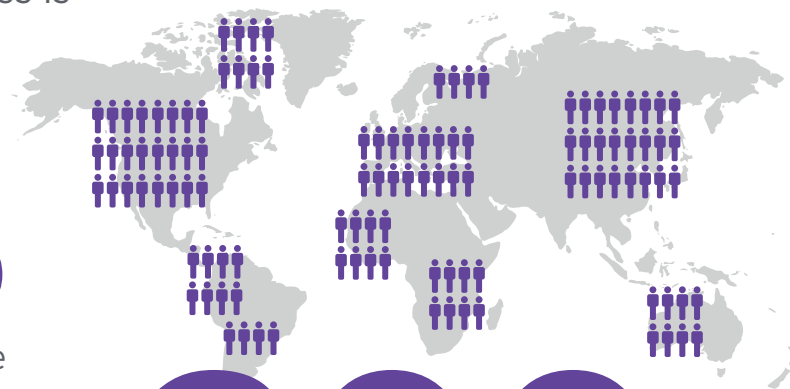
Of consumers worldwide say they suffer from feelings of **stress** (2019)¹

53%

Of consumers worldwide say they suffer from disrupted **sleep** (2019)²

300 million

People worldwide are affected by **anxiety**³



Increased awareness of mental health

Fortunately, the stigma that once surrounded mental health is fading fast. People recognise that health is a holistic proposition. That body and mind (and indeed gut) are all interrelated – one affects the other. Consumers are becoming ever more aware of their overall health and well-being.

Mental health is an issue for all ages, but younger people are particularly vulnerable. Social media, peer pressure, uncertainty about the future create a cocktail of factors that can trigger stress and anxiety. Indeed, 55% of US Gen Xers are taking steps to improve their mental health.⁴

The negative effects of mood tend to decrease with age. However, sleeping problems and health impacts causing stomach, head, and chest pain increase until mid-fifties.⁵

^{1,2,3}FMCG Gurus 2020; ⁴Innova Consumer lifestyle and attitudes study 2018;

⁵FMCG Gurus 2019; Innova Consumer lifestyle and attitudes study 2018

Solutions for stress and anxiety

'Functional' food and drink has become a huge market across the world. In the past year, 50% of global consumers have upped their consumption of food or drink that come with specific health claims¹. And almost 60% of consumers worldwide say they are interested in health products to reduce their stress levels².

People want nutritious functional food that is natural and non-addictive. That is readily available in handy formats that fit seamlessly with their everyday lives.

At the same time, there's more scientific evidence of the role of the gut microbiome not just in improving digestion and absorption of nutrients, but in systemic health and well-being.

So, could the gut-brain axis be a key to alleviating stress and anxiety?

Almost **60%** of consumers worldwide say they are interested in health products to reduce their stress levels²

Introducing Biotis™ GOS

GOS (or Galacto-OligoSaccharides) are unique, natural dairy derived ingredients that¹⁻⁷:

- May aid in building mental resilience
- Can support maintaining mental balance
- Can help to reduce feelings of stress and anxiety

The gut microbiota send signals to the brain by several means, and thereby can for example, impact mental well-being. Studies suggest that 'friendly' bacteria like *Lactobacillus* and *Bifidobacteria*, may reduce stress and anxiety symptoms, which could help people sleep better and create a virtuous circle of well-being. Biotis™ GOS has been shown to stimulate *Bifidobacteria* as present in the gut-microbiota¹⁻².

¹Johnstone N et al, 2019; ²Schmidt K et al, 2015; ³Burokas A et al, 2017; ⁴Walton et al, 2018; ⁵Shadid R et al, 2007; ⁶Codagnone MG et al, 2019 ⁷Schaafsma et al, 2020



Final language determined by customer pending regulatory and legal review. Not validated with consumers. These potential health benefits should not be considered health claims. They should be considered as potential leads that might be developed into health claims complying with the local legal requirements. This information is intended for Business to Business customers only, not for consumers.

The gut-brain axis

The gut microbiota plays an important role in the bi-directional communication between the gut and the brain via the so-called gut-brain axis. The central nervous system impacts gastrointestinal function and the gut microbiota, but the gut microbiota can also affect the central nervous system through several direct and indirect pathways.

Pathways that underly the communication of the gut microbiota with the brain include:

01. Immune

Interaction of the gut microbiota with immune cells stimulates the production of **cytokines** that circulate to the brain.

02. Neural

Interaction of the gut microbiota with enteroendocrine cells creates **neuroactive molecules** that interact with the **vagus nerve**, signalling the brain.

03: Endocrine

The gut microbiota produces **metabolites** like neurotransmitters and SCFAs which can circulate to the brain.

By targeting the gut microbiota, you could exert a positive impact on the gut brain axis and, thus, on mental well-being, reducing stress and anxiety.



The effect of Biotis™ GOS

A clinical research study¹ has been conducted, which showed that:

- Taking Biotis™ GOS positively affected the gut microbiota, especially with regard to increasing the levels of beneficial Bifidobacterium.
- Participants who took Biotis™ GOS became less anxious, especially those who previously had high levels of anxiety.
- There was also a change in overt behavioural response towards emotional stimuli among the study group².

¹Johnstone et al 2019; ²The study group comprised 64 females aged 17-24, taking a four-week course of Biotis™ GOS or a placebo (maltodextrin).

How you can position Biotis™ GOS*

Biotis™ GOS offers many opportunities in a marketplace hungry for solutions to stress and anxiety.



It's aimed at

Consumers (mainly women) looking for convenient, natural solutions that reduce feelings of stress and anxiety.



It's effective

Biotis™ GOS is rich in non-digestible galacto-oligosaccharides that stimulate beneficial bacteria in the gut-microbiota, that can support lowering feelings of stress and anxiety.



It's versatile

Biotis™ GOS is available as a syrup or powder that can easily be incorporated into all kinds of functional food and drink formats. It's heat and acid stable, suitable for instant, spoonable or ready-to-drink concepts.



It has multiple actions

Biotis™ GOS supports digestive health while it may also support reducing feelings of stress and anxiety.



It can be a preventative...

Taken as a **daily habit** it may help you build mental resilience before a stressful period.



...or a curative

Biotis™ GOS can also be taken to potentially help cope **during given periods of stress**, for 14-21 days.

Why Biotis™ and FrieslandCampina Ingredients?

Biotis™ is an exciting new brand from FrieslandCampina Ingredients, which represents a whole new era of ingredient science.

We're opening up new opportunities for our customers by tapping into our world-leading experience in infant, performance and medical nutrition to create fresh, innovative Health Benefit Solutions that work with the body's natural processes throughout life.

Biotis™ GOS is just one of a suite of natural, non-addictive ingredients we've developed to help people stay healthy and vital at all life stages.

*Above potential claims are based on scientific studies^{1,2}, however final language to be determined by customer pending regulatory and legal review. Not validated with consumers. These potential health benefits should not be considered health claims. They should be considered as potential leads that might be developed into health claims complying with the local legal requirements. This information is intended for industrial customers only and not intended for consumers. Reference ¹Johnstone N et al, 2019 under review; ²Schaafsma, A et al, 2020 to be published



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