CIGNA STRESSWAVES TEST

Harnessing AI technology to tackle stress

Cigna Global Health Benefits®

Cigna International and Ellipsis Health have partnered to create the Cigna StressWaves Test, an advanced artificial intelligence (AI) technology to detect stress in a user's voice. Completely free to the general public online at www.cignastresswaves com, it enables voice audio technology for stress to be available at an ambitious international scale.

The following explores the background to this technology and its potential including:

> Assessing the **health burden of stress** and its role as a serious disease risk factor

> Defining the **physiological impact of stress on speech**

> Establishing how decades of evidence identified **voice as a novel approach to reliably assess stress**

> Understanding how **AI enables analysis of stress from just 90 seconds of speech**

> Analyzing the associated opportunities within an increasingly digitalized world to **simply yet effectively predict and monitor mental well-being virtually**

Innovations like the Cigna StressWaves Test further support Cigna's drive to make health care affordable, predictable and simple.
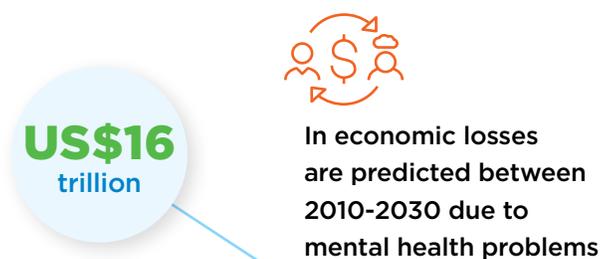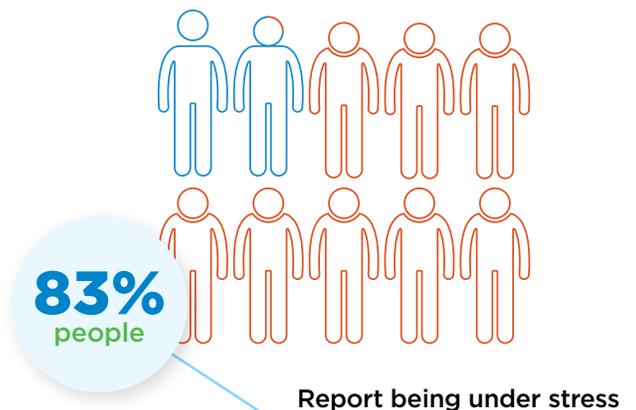
Understanding the burden of stress

Stress is often an outcome of the typical modern lifestyle, caused by factors including financial difficulties, workplace situations or personal relationships. Stress can result in a wide range of physical and emotional responses.[1] Today, it is the mental health condition, depression – often a result of prolonged or untreated stress – rather than a physical condition, which is the leading cause of disability worldwide.[2] An estimated 284 million people experienced an anxiety disorder in 2018, with an international prevalence of between 2.5-7% of the population, dependent upon country.[3] Unsurprisingly, high prevalence of stress results in significant economic losses; it is estimated that mental health problems will cost the global economy up to US$16 trillion in the period 2010-2030.[4]

Dealing with the COVID-19 pandemic and its restrictions has further exacerbated stress among the global population. The current evidence suggests that a psychiatric epidemic is occurring alongside the COVID-19 pandemic. Over the last 18+ months, people have grappled with anxiety about a raft of concerns: their personal safety and that of loved ones; related financial consequences including furlough and unemployment; and reduced access to essential resources such as health care, education and childcare.[5] These factors can have a severe negative impact on mental health across populations. Cigna's research, outlined in the recent Cigna 360 Well-Being Survey, found that 83% of people worldwide report being under stress.[6] As a global health services provider, Cigna is compelled to understand and respond to this pressing issue.

83%
people

Report being under stress

284M
people

Experienced an anxiety disorder in 2018

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In economic losses are predicted between 2010-2030 due to mental health problems

Physical impact of stress

Stress affects physical well-being through the disruption of numerous physiological pathways, including the immune, endocrine (hormone), and digestive systems.[7] When stress is experienced over a prolonged period of time, during which the individual usually feels they have little or no control, it is known as chronic stress. A wealth of evidence shows that this long-term stress is an established risk factor for several serious chronic conditions including stroke, heart disease, pain, asthma, depression, anxiety, and diabetes.[7,8]

Stress can have a defined impact on the vocal tract due to its complex nerve supply. Speech is produced through three processes; breathing, phonation – the opening and closing of the vocal folds to create vibration – and resonance, created partly by the muscles of the mouth, throat, and lips.[9] The stress response can affect each of these elements, and it is this neurological link that explains how emotions can result in distinct and often recognizable changes in the voice. Such changes are familiar to everyone who has heard the distress in a loved one's voice when they're suffering emotionally.[10]

The autonomic nervous system controls vital functions, including digestion, heart rate and breathing, and is generally out of conscious control. It consists of two main contrasting components; the parasympathetic nervous system, associated with relaxing systems, and the sympathetic nervous system, which prompts action. When a demand or threat is perceived, the "fight or flight" response is triggered, leading to defined physiological reactions to prepare the body for action. Hormones called adrenaline, noradrenaline and cortisol are released. Heart and breathing rates increase and blood pressure rises to pump oxygenated blood to the muscles.[1]

Voice analysis technology

Over the course of several years, software programs and AI have been used to develop technologies that can gauge stress levels from speech, often using smartphones and smart speakers. Numerous aspects of speech and acoustics, including tone, pitch, and length and number of pauses can be analyzed to assess stress, effectively creating a new indicator for depression and anxiety.[8] The **Cigna StressWaves Test** is unique in this field. It is the first and only stress analysis model to detect both these acoustic sounds and semantics – word choices and syntax patterns – in the voice.

Conditions like depression can affect the acoustics of speech. For example, pitch and variation in energy tend to decrease, while the number of pauses and aspirations (drawing breath) increase. Depression also has an impact on words chosen. Terms such as "always" and "never" and first-person pronouns including "I" and "me" become more frequent, while pronouns like "they" and "them" are used less often.

Unlocking voice through artificial intelligence.
Ellipsis Health

Developed by leading AI experts Ellipsis Health, the **Cigna StressWaves Test** builds upon over 20 years of research. The technology uses a combination of cutting-edge techniques to develop novel models, which detect both acoustic and word-based patterns in voice. These models are applied to one of the largest datasets of labeled anxiety speech in the world; more than 150,000 minutes, featuring over 15,000 adults aged from 18 to over 80 years. A dataset of this capacity ensures the **Cigna StressWaves Test** is robust and able to be used for different populations, accounting for varying accents and levels of English-speaking ability. Remarkably it also enables the tool to detect stress without needing an initial baseline reading from the user.

Belying the comprehensive research that underpins its development, the **Cigna StressWaves Test** is extremely simple to use. It functions via a widget, seamlessly but securely embedded into Cigna's web page without the need for a login. Users and Cigna members can therefore access the **Cigna StressWaves Test** through any device that has a microphone and is connected to the internet. Users are invited to answer open-ended, low-stigma questions for just 90 seconds, or longer if they wish. They are then provided with a visualization of their score and a rating from "Extremely Stressed" through to "Normal"; achieving an engaging, real-time assessment of their stress.

Reach of the technology

The **Cigna StressWaves Test** has enormous opportunity in scalability due to the interoperability of the technology. The ubiquitous use of smartphones and other electrical devices that have a microphone facilitates accessibility, especially given its simplicity and ease of use.

Harnessing voice as an indicator of stress is a pioneering step towards broader access; as to speak is easy, natural and doesn't require instruction or training. Assessment can be carried out remotely, and carries real-time information about an individual's current mental well-being.[11] Another area of potential therefore is in progressing digital health monitoring systems that could assess and reduce stress-related risk for diseases over a period of time. With wider availability, comes

greater responsibility however, and experts believe that importance must be placed on ethical considerations such as security of personal information.[8] **Cigna StressWaves Test** is compliant with both HIPAA and GDPR privacy regulations.

During the pandemic there was a rapid transfer to virtual medical appointments to limit infection, often sweeping aside any initial patient reservations about digital care. Now this barrier been lifted, people's willingness to engage with online health technology has been maintained, especially for aspects of metal health.[12] Since the tool is novel, engaging, simple to use and available free to the general public, it has all the capabilities to enjoy a wide reach.

"Stress and mental health issues have been pushed up the agenda in recent years. While this increased awareness is a positive change, the pandemic has created many new pressures in our lives. If stress goes unchecked, we may see dramatic consequences and that's why innovative health tools like **the Cigna StressWaves Test** are so important. By providing simple solutions at scale that are easy to use and accessible when the people need them most, we can encourage people to learn more about stress and seek professional help as appropriate."

Dr. Peter Mills, Associate Medical Director, Cigna Europe

Potential to tackle stress

Stress can manifest as a diverse range of symptoms, and people are not necessarily aware of the link between their psychological state and resulting physical signs.[1] Assessing stress levels easily could raise awareness and understanding of how stress is affecting individuals, especially if supported by strategies for dealing effectively with stressors.

The **Cigna StressWaves Test** provides a simple, cost-effective approach to screen a population for anxiety and depression risk. Through its accessibility, the **Cigna StressWaves Test** brings a proactive opportunity to help individuals understand their personal reaction to stress and empower them to seek support where necessary.

How Cigna can help

Try the Cigna StressWaves Test, available at **www.cignastresswaves.com**.

To explore Cigna's stress care resources, download the free **Body&Mind App**, which is available to all. Cigna customers have access to a global network of care providers, in addition to a comprehensive range of virtual mental well-being support including:

Global Telehealth: Consultations with a licensed doctor via a secure video or phone conversation, enabling convenient access to high quality health care.

Employee Assistance Program (EAP): Counselling and support are available on a wide range of topics; such as legal and financial issues, emotional health including relationships and family life, and substance misuse.
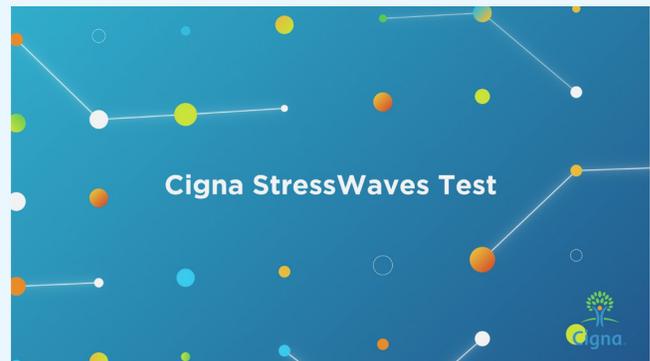
Digital Well-being Programs: A range of personalized programs to help make successful and long-lasting lifestyle changes. Accessible anytime, solutions include health assessments and targeted health improvement programs not only to build resilience, but to encourage activity, healthy eating, smoking cessation, and better sleep.

Cigna StressWaves Test

Together, all the way.®

🌳 **Cigna**

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