



HCP TOOLKIT PAIN

*Aspirina[®], breaking the
vicious cycle between
pain and stress*

Link to all materials:
[Aspirin Pain HCP Toolkit](#)



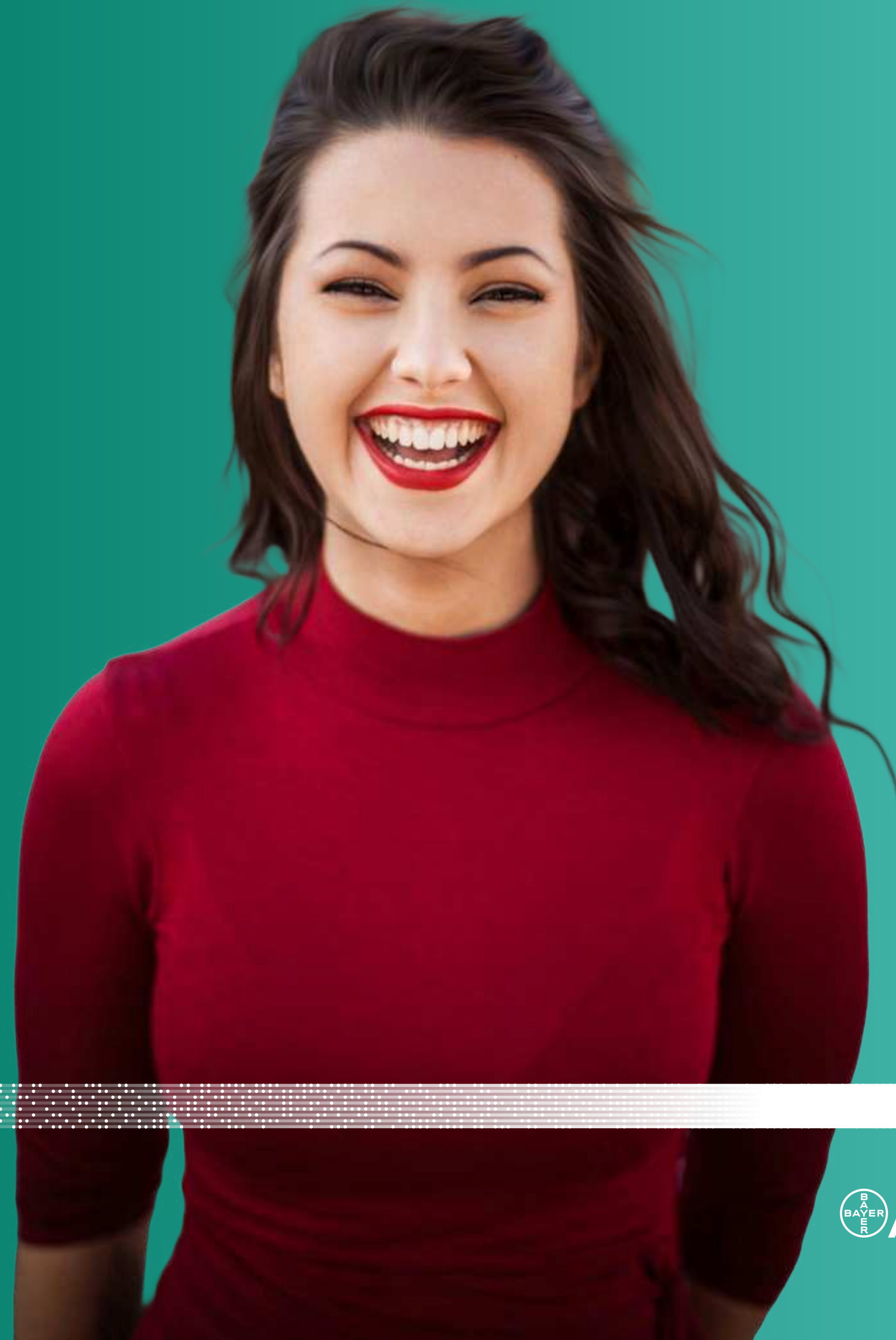
General Objective :

To enhance physician awareness about how pain and stress impact on the health and quality of life of the Latin American population.

The objective is to emphasize the importance of early detection and proper management of both conditions to prevent chronic pain-stress cycle.

The materials are arranged in the sequence:
Epidemiology → Pathophysiology → Specific conditions (headaches and musculoskeletal disorders).

→ holistic management → Aspirin® family as a specific treatment to break the cycle.



1) Executive summary

- A structured series of educational materials exploring the interrelationship between pain and stress in Latin America and their combined impact on health.
- Structured in four themes that tell a story of a two-way street (from the problem to the solution)
- Formats: infographics, mailings, WhatsApp messages, and visual aid

2) Audience and use

- Internal teams: marketing, medical marketing, sales and omnichannel teams
- **Final audience (by channel):**
 - Infographics: HCPs/education
 - Mailings: HCPs base according to segmentation. Brief introduction / key points with CTA (call to action) to redirect doctors to infographics
 - **WhatsApp:** short awareness / education messages with CTA to redirect doctors to the infographics
- Internal use: reference, replication in other countries and team onboarding

3) Storyline (how the story is told)

- Context and magnitude: The impact of pain and stress in Latin America.
- Mechanism: Pain-stress cycle and its pathophysiological implications
- Clinical relevance: common pathologies such as primary headaches and musculoskeletal disorders
- Closing message: Holistic, patient-centered management.

4) Content architecture (quick map)

Chapter	Focus	Format	# of assets
1.Impact of pain and stress in Latin America	Magnitude / relevance	Infographic, mailing, WhatsApp	3
2. Pain-stress cycle and pathophysiology	Mechanism / fundamentals	2 infographics, 2 mailings, 4 WhatsApp	8
3. Specific conditions	Clinical Application	2 infographics, 1 visual aid, 3 mailings, 3 WhatsApp	9
4. How to stop the vicious cycle	Comprehensive management	Infographic, mailing, WhatsApp	3
Total assets:			23



Chapter 1 — Impact of pain and stress in Latin America

Purpose: To dimension and raise awareness of the problem



Infographic

1.1 Impact of pain and stress in Latin America

Epidemiology; mutual provocation and perpetuation, and their health consequences. Holistic management to break the cycle.

[See material](#)



Mailing

1.1 Pain & stress a combination with a great social impact

Pain and stress are highly prevalent in Latin America. Their recurrence or persistence causes changes in the body.

[See material](#)



WhatsApp

1.1 Pain & stress , overlapping epidemics

Consequences of the coexistence of pain and stress on the individual.

[See material](#)

Chapter 2 — Pain-stress cycle: Pathophysiological effects on health

Purpose: Explain the vicious circle and the biological basis

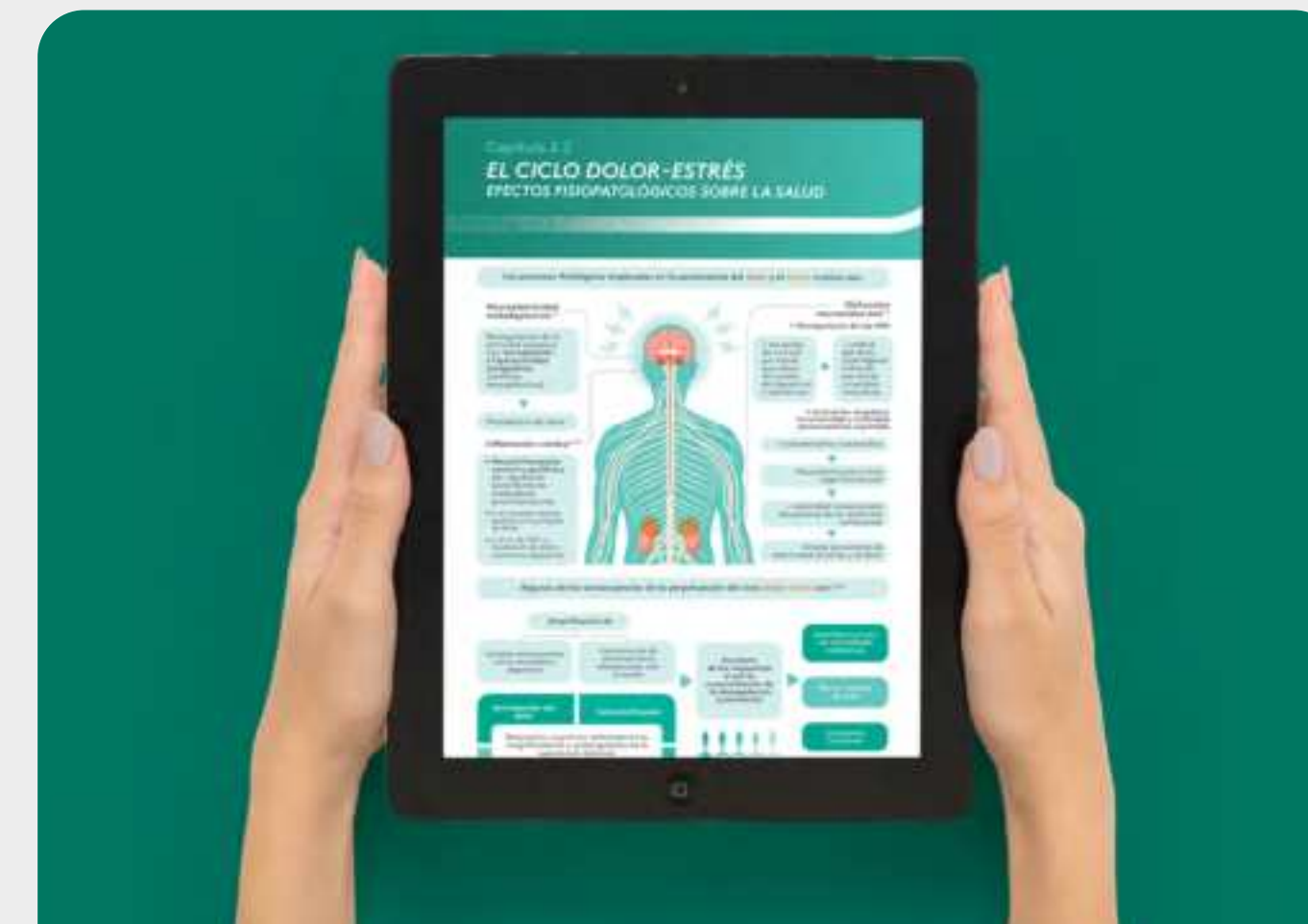


Infographic

2.1 Pain and stress cycle. Reciprocal pathophysiology

Pain catastrophizing as a stressor.
Allostatic load model and
vulnerability model of the pain-
stress relationship

[See material](#)



Infographic

2.2 Pain-stress cycle: Pathophysiological effects on health

Systemic alterations in the onset and
reinforcement of the cycle and its
consequences. See material.

[See material](#)

Chapter 2 — Pain-stress cycle: Pathophysiological effects on health

Purpose: Explain the vicious circle and the biological basis



Mailing

2.1 Pain and Stress: Proposed pathophysiological models

How stress causes pain.
Introduction to proposed models of pain-stress interaction.

[See material](#)



Mailing

2.2 The pain-stress cycle and its pathophysiological impact on health

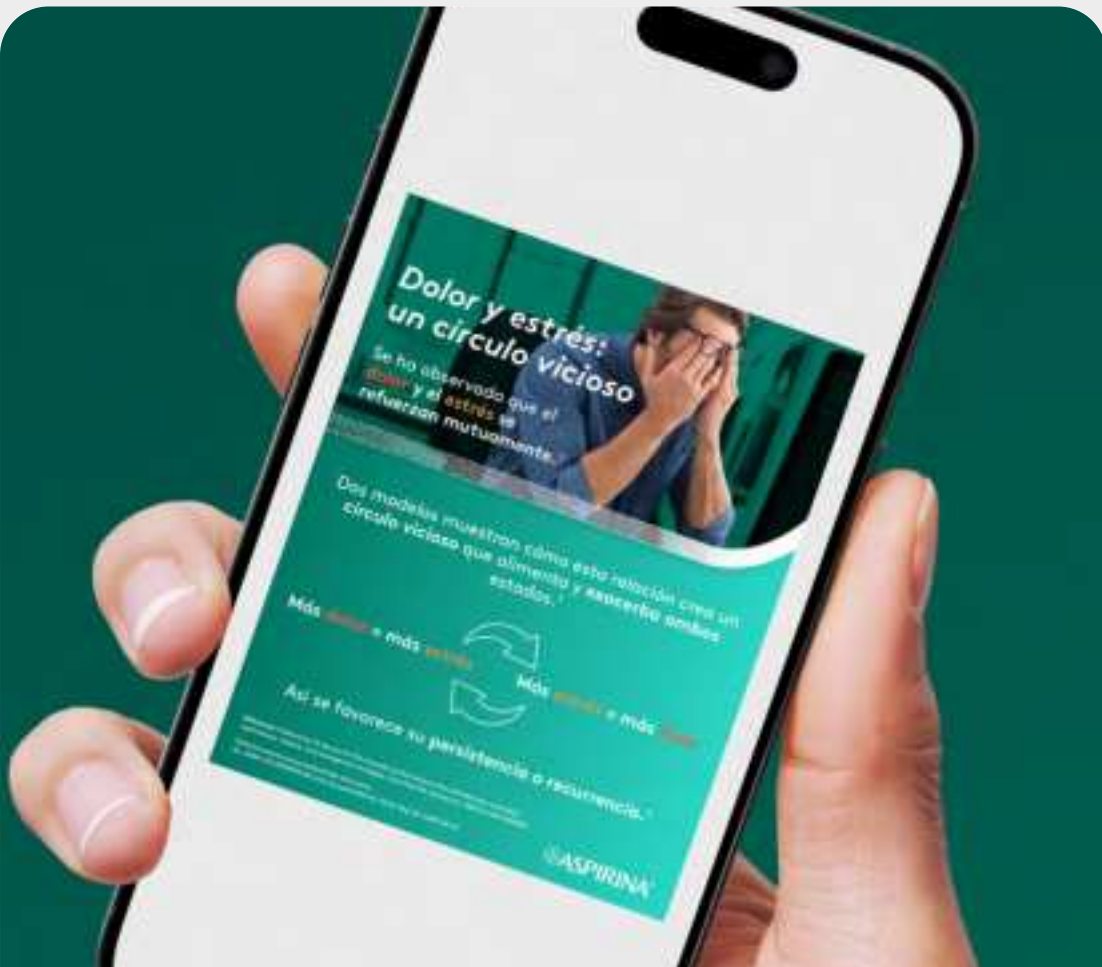
Brain alterations due to pain as a trigger for stress and more pain.

[See material](#)

Chapter 2 — Pain-stress cycle: Pathophysiological effects on health



Purpose: Explain the vicious circle and the biological basis

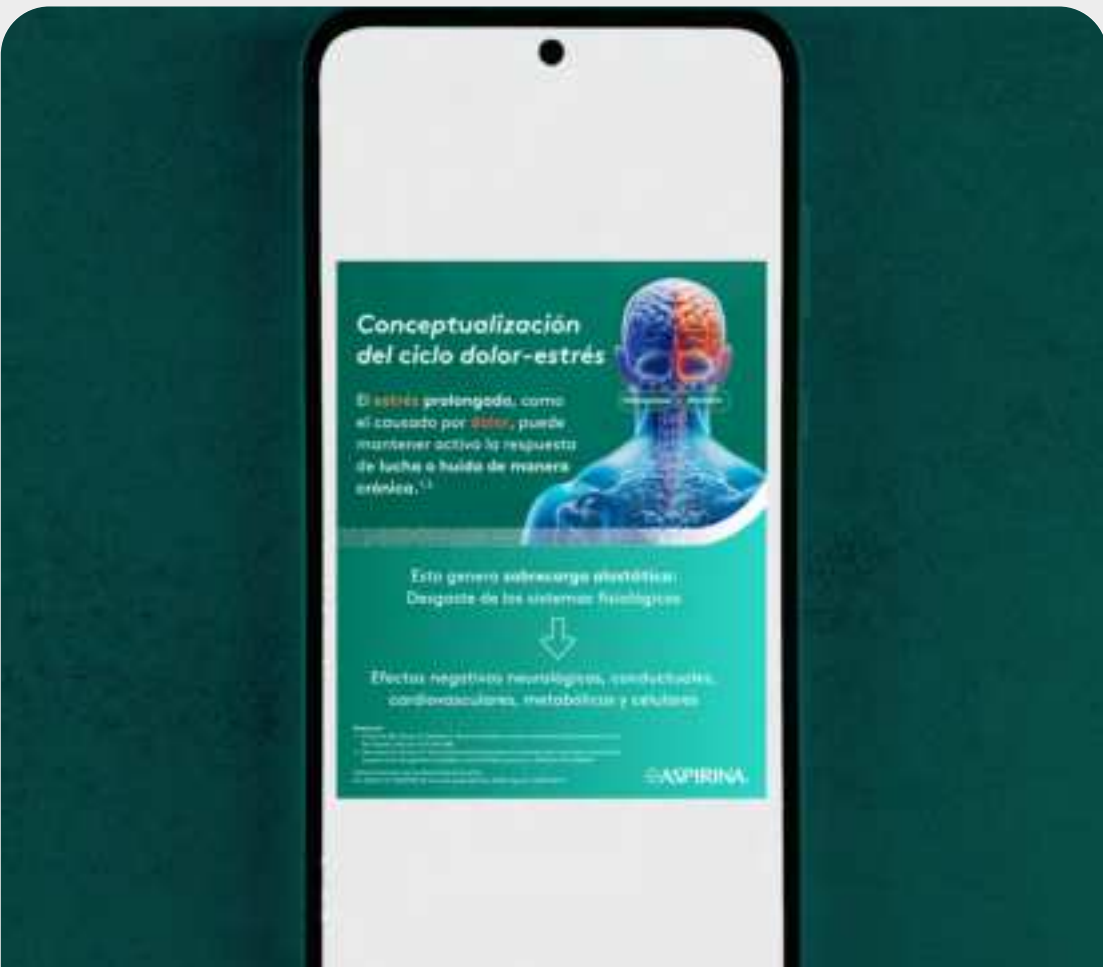


Whatsapp

2.1 Pain and Stress: A vicious cycle

Perpetuation and exacerbation of pain and stress.

See material



Whatsapp

2.2 Conceptualization the pain-stress cycle

The persistent fight-or-flight response to pain causes allostatic overload.

Ver material

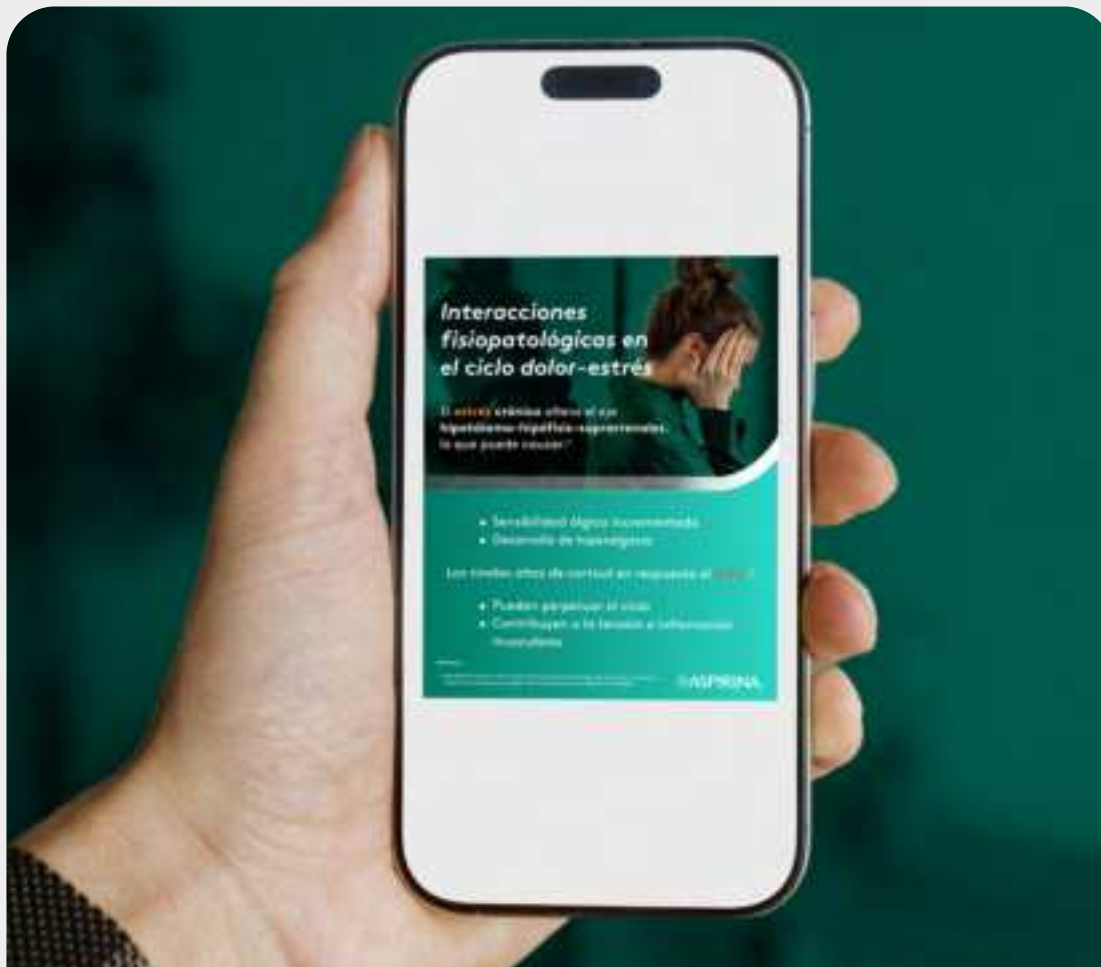


Whatsapp

2.3 Physiological mechanism underlying the pain-stress cycle

Pain and stress are not only psychological processes, but also physical ones.

Ver material



Whatsapp

2.4 Pathophysiological mechanisms pain-stress cycle

Altered cortisol metabolism contributes to the pain response.

Ver material

Chapter 3 — Specific conditions

Purpose: To bring the concept to prevalent pathologies



Infographic

3.1 Stress as a common pathway, in tension headache and migraine.

Epidemiology and related factors. Stress and allostatic load. How to break the headache-stress cycle.

[See material](#)



Infographic

3.2 Musculoskeletal disorders in the vicious cycle of stress and pain.

Psychosocial stressors that cause musculoskeletal pain. Conversion of acute to chronic pain and comprehensive treatment to break the cycle.

[See material](#)

Chapter 3 — Specific conditions

Purpose: To bring the concept to prevalent pathologies



Visual Aid

The pain and stress cycle, a major health problem in Latin America.

Overview / Guide:

Epidemiology and biopsychosocial factors. Pain management in the Latino population. Holistic management of the pain-stress cycle; Aspirin®, Cafiaspirina®, and Cafiaspirina® Forte for relief of headache, muscle pain, and neck/shoulder pain.

[See material](#)

Chapter 3 — Specific conditions

Purpose: To bring the concept to prevalent pathologies



Mailing

3.1 Stress as a common pathway in tension-type headaches and migraines

Epidemiology. Stress as a trigger for headaches and vice versa.

[See material](#)



Mailing

3.2 Musculoskeletal disorders within vicious cycle between pain and stress

Epidemiology. Mood disorders and perpetuation of pain.

[See material](#)



Mailing

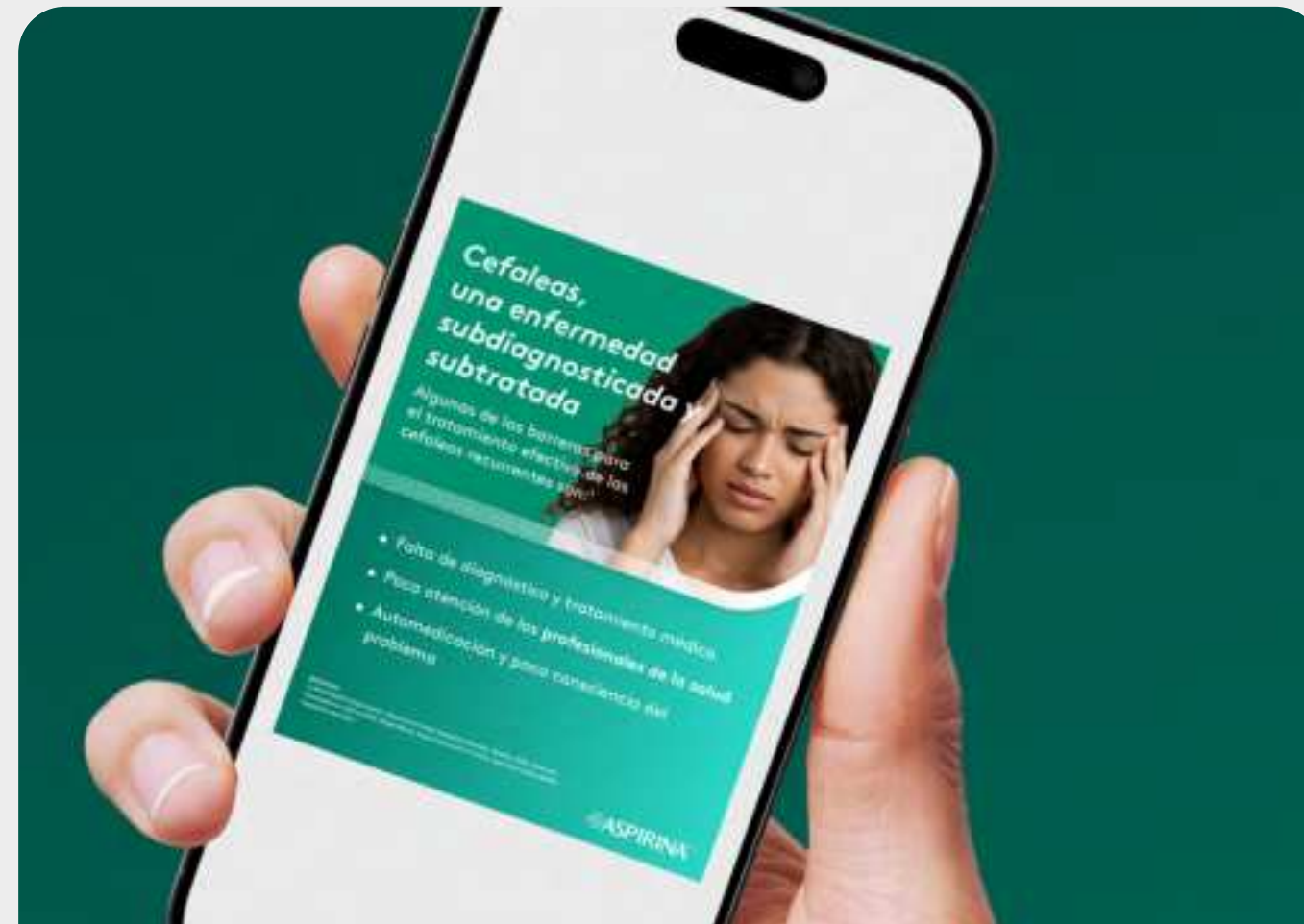
3.3 The role of the pain-stress cycle in recurrent primary headaches and musculoskeletal pain

Physiopsychosocial aspects in pain processing.

[See material](#)

Chapter 3 — Specific conditions

Purpose: To bring the concept to prevalent pathologies

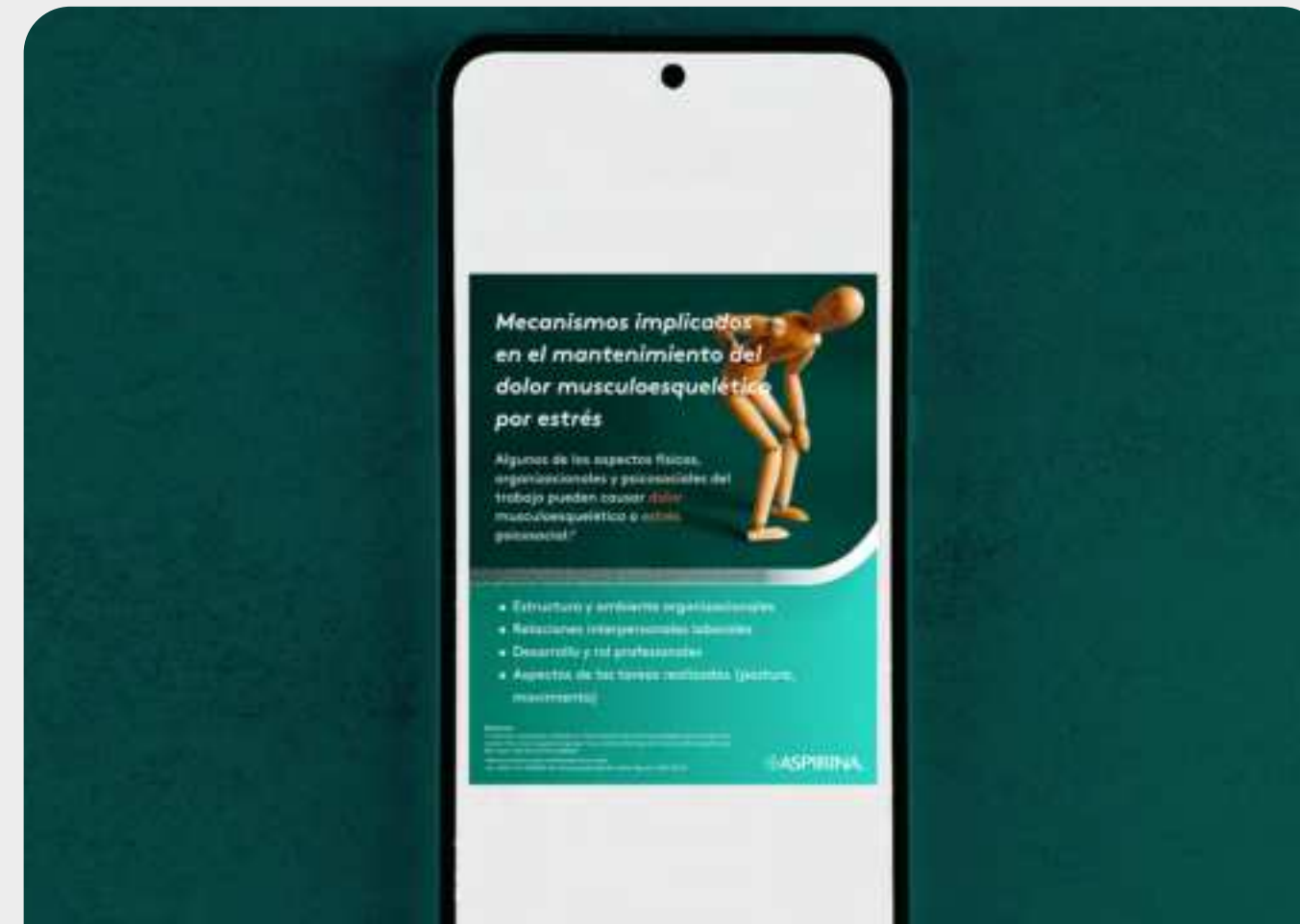


Whatsapp

3.1 Headaches: an under-diagnosed and under-treated condition

Main barriers to effective treatment.

[See material](#)



Whatsapp

3.2 Mechanisms underlying the persistence of stress-related musculoskeletal pain

Physiopsychosocial aspects of work that cause pain or stress

[See material](#)



Whatsapp

3.3 The pain-stress cycle:perpetuating headache and musculoskeletal pain

Triggering pain episodes in stressful situations.

[See material](#)

Chapter 4 — ¿Breaking the pain/stress cycle?

Purpose: To move from knowledge to patient-centered clinical action

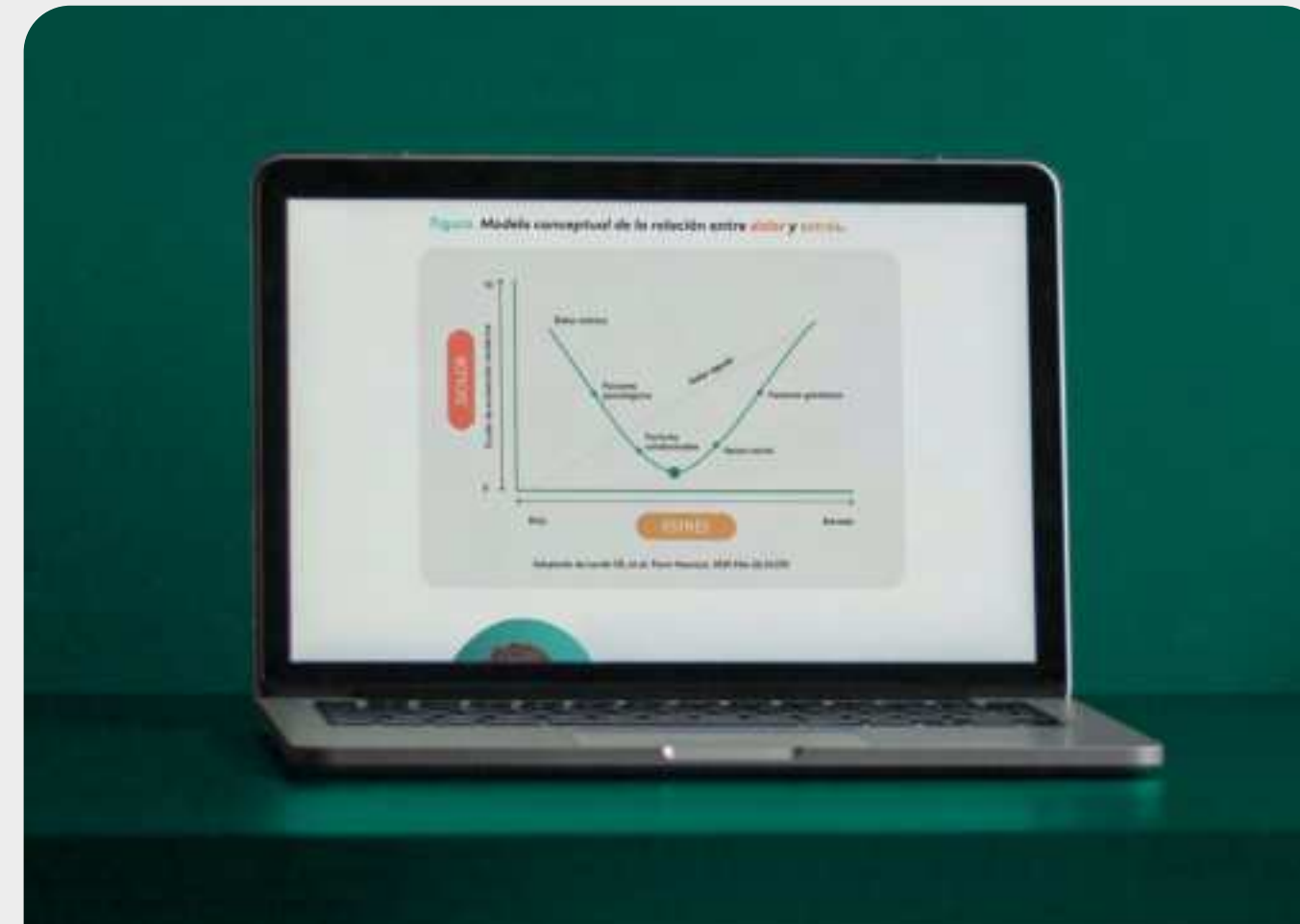


Infographic

4.1 Holistic, patient-centered management.

Cultural strategies for managing pain; non-pharmacological and pharmacological interventions: Aspirin®, Cafiaspirina®, and Cafiaspirina® Forte as first-line pain relievers due to muscle tension.

[See material](#)



Mailing

4.1 Comprehensive, patient-centered treatment

Pain as an emotional experience and patient education.

[See material](#)



Whatsapp

4.1 Coping with the pain-stress cycle in Latin America culture

¿Why do Latin Americans hide their pain? Implications for early diagnosis and treatment.

[See material](#)

6) Central message and tone

- L f z!dpodf qu!qbjolboe!tusf tt!n vw bmm!sf jogpsdf !f bdi !pui f s4 voef stuboejoh!ui jt!dzdrh!f obc rht!n psf !f ggf dujwf !jouf swf oujpot
- Tone: scientific-didactic, clear and actionable

7) Recommendations for use by channel

- Infographics: for e-details, medical conferences, and HCPs repositories
- Mailings: thematic sequences (2-4 sends) with CTA to resources
- WhatsApp: micro-messages ($\leq$ 200 characters) with a highlight key data or insight

8) Management and Access

- Location in Hub: [Project Path/Folder]
- Owners: [PM Name] · [Medical Writer] · [Design]
- Country/Region: XXX
- Status: Published/In Use

9) (Optional) suggested KPIs

- Mailing open rates, CTR, infographic downloads, e-detail interactions, WhatsApp reach (delivered/read), feedback HCP

10) Legal / compliance

- For internal use only
- References and regulatory notices aligned with each material and communication channel
- Brand: Aspirina® (Bayer)

IMPACT OF PAIN AND STRESS IN LATIN AMERICA

PAIN ► EPIDEMICS OF THE XXI CENTURY^{1,2} ◀ STRESS

1 in 5

people worldwide suffer from **pain**^{*3}

19.6 millions

million people limit their daily activities due to **pain**^{*3}

Prevalence latinamerica of chronic **pain** of **29.7 a 52.8%**⁴

• Greater impact of women and erderly.

~ 40 millions

Mexicans live with pain (27%)³

Prevalence **almost double** in people > 65 years than in young people³

*In USA.

79%

of the world's adult population experiences some degree of **stress**⁵



Mexico, Peru, Argentina, Ecuador, Chile & Brasil report the highest **stress**⁶ levels



75%

of the **Mexicans** experience work-related **fatigue due stress**⁷

• Even higher than China and the United States

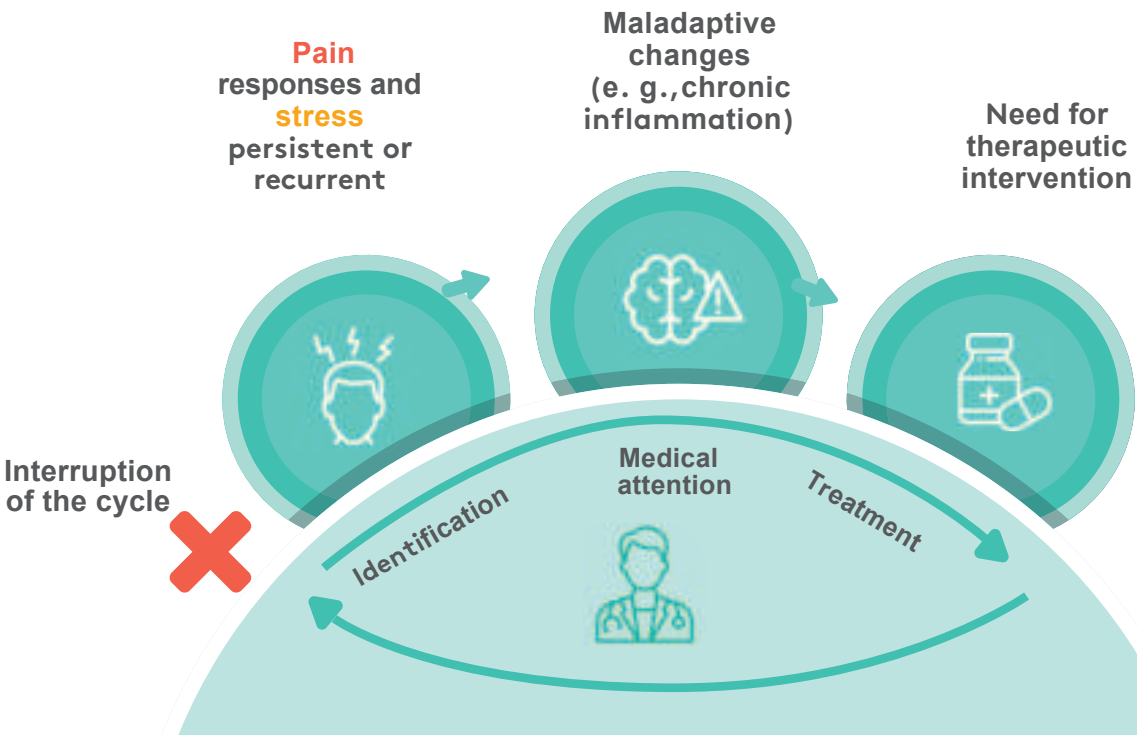


Stress can trigger musculoskeletal & cephalic **pain** due to muscular tension^{7,8}



In turn, **pain** is often accompanied by **stress/distress**⁹

Pain and **stress** share overlapping biological and psychological mechanisms.²



PAIN

STRESS

SYSTEMIC ALTERATIONS INDUCED BY
PAIN AND STRESS:^{2-4,7-9}



Neuroendocrine

Activation of the hypothalamic-pituitary-adrenal axis (HPA)



Metabolic

Gastrointestinal disorders



Psychological

Irritability
fatigue, sexual dysfunction,
lack of motivation



Hemodynamics

Increased heart rate and blood pressure



LONG TERM CONSEQUENCES:

Sleep Disorders:

- Insomnia

Mood Disorders:

- Anxiety
- Depression

Interpersonal difficulties
(social functioning)

Reduced of:

- Quality of life
- Productivity

Increased risk of :

- Addictions
- Obesity
- Cardiovascular Diseases

Holistic management of the **pain-stress** cycle includes:²

Non pharmacological Interventions

Lifestyle

- Healthy diet / weight control
- Physical activity
- Sleep Hygiene



Cognitive and behavioral

- Psychological interventions
- Relaxation/stress management techniques



Physiological

- Complementary and alternative approaches (eg.,massage, acupuncture)



Pharmacological strategies:
Anti-inflammatory analgesics



Aspirina®



Cafiaspirina®



Cafiaspirina® Forte

relieve **pain**
associated
with
stress¹⁰

- Headache & migraine
- Muscular
- Cervical or shoulder pain caused by muscle tension

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1. Fink G. Stress: Definition and History. Reference Module in Neuroscience and Biobehavioral Psychology. 2017:1–9.
2. Aboushaar N, Serrano N. The mutually reinforcing dynamics between pain and stress: mechanisms, impacts and management strategies. *Front Pain Res* (Lausanne). 2024 Nov 18;5:1445280.
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10. Bayer Consumer Health. Carta a Comisión de Autorización Sanitaria, COFEPRIS. “Justificación de claims para ASPIRINA® y CAFIASPIRINA®”. Bayer de México, S.A. de C.V. Ciudad de México, México; 2025.



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ASPIRINA®

Pain & stress, a combination with a great social impact

In Latin America,

almost

52%

of the population
suffers chronic **pain**¹

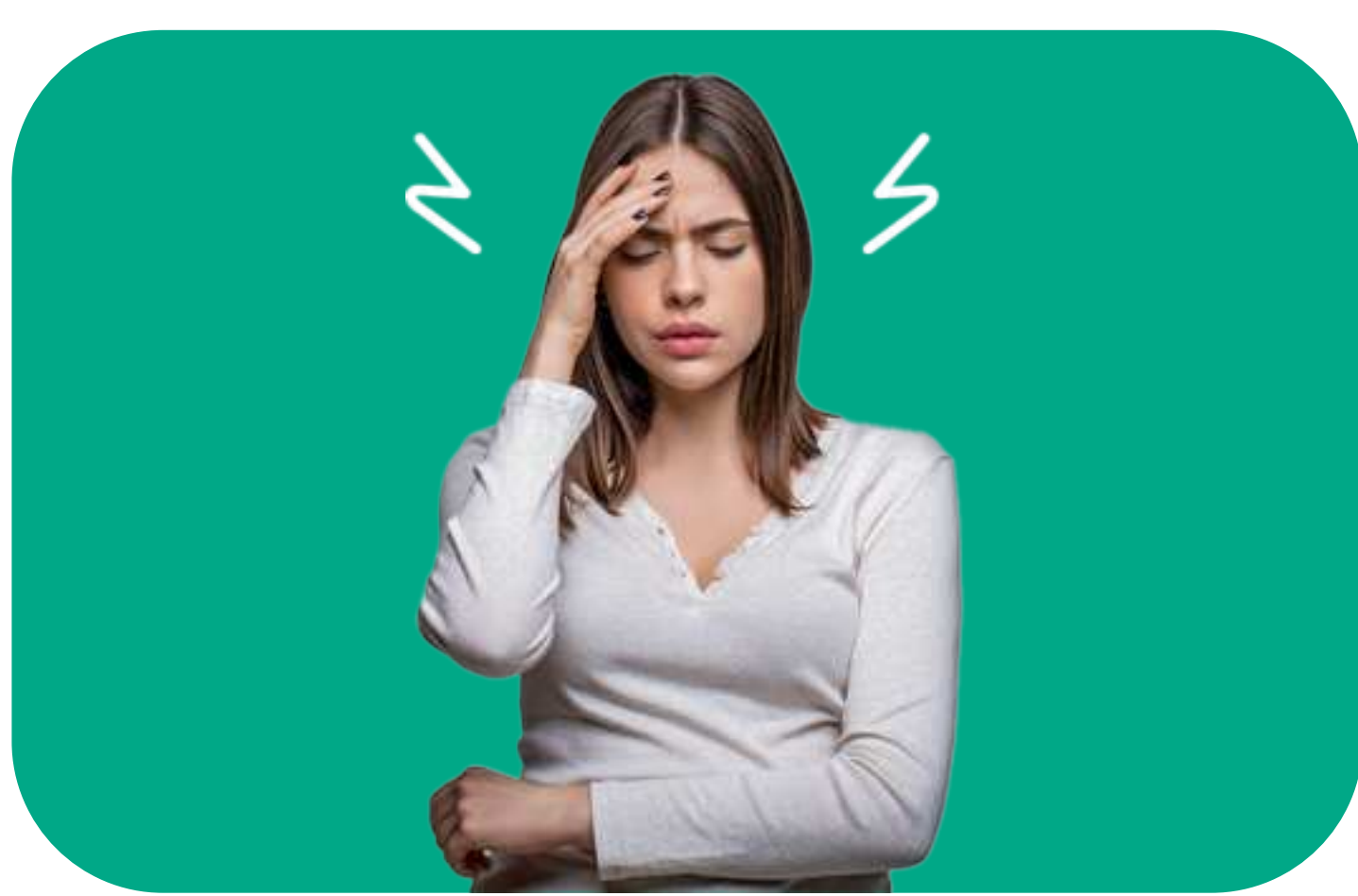
and

80%

experienced some degree
of **stress**²

The latin american countries most affected
by **stress** includes Peru, Argentina, Ecuador, Chile,
Brasil and **Mexico**.² Meanwhile, almost
30% of mexicans live with **pain**.⁴

Pain and **stress** significantly impact functioning,
well-being, and quality of life
for a large proportion of Latin Americans.⁵



These two entities maintain a **reciprocal relationship**: they not only reinforce each other, but also **exacerbate** one other through **vicious circle** involving patho-physiological, cognitive and social mechanisms that have adverse effects on health.^{4,5}



Among the **pathophysiological mechanisms**
The dysregulation of the hypothalamic-pituitary-adrenal system and the activation of the sympathetic nervous system are relevant.⁵



Among the **cognitive and social mechanisms**, **catastrophizing** plays a major role. It magnifies pain and feelings perception of helplessness, or inability to bear it, leading to functional limitations, sleep disturbances, substance use, socioeconomic deprivation, and lack of social support.⁵

The recurrence or persistence of responses to **pain** and **stress** cause **physiological changes**, such as maladaptive neuroplasticity, neuroendocrine dysfunction and chronic inflammation.⁵

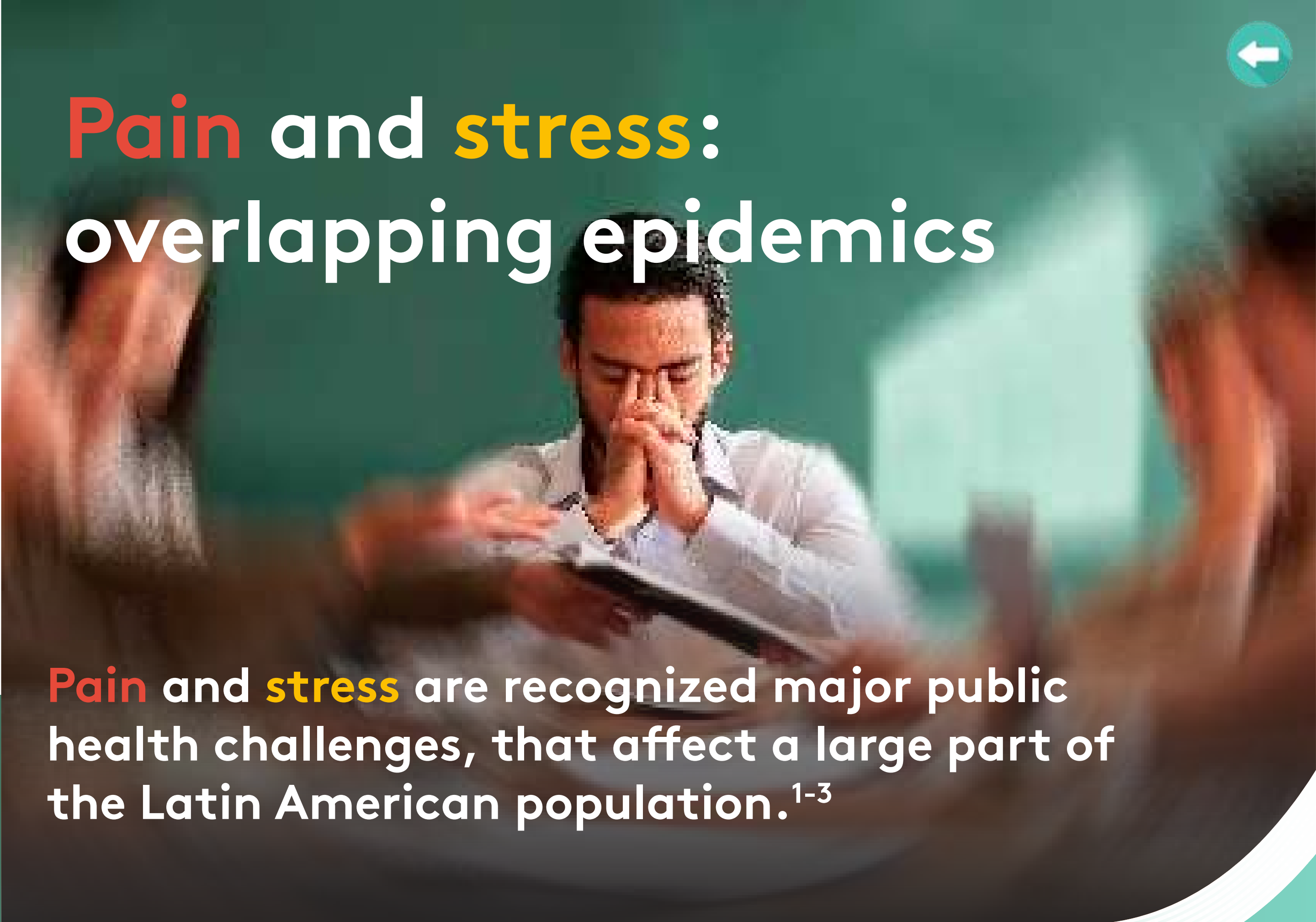
Learn more about the impact of **pain** and **stress** in Latin America by clicking here.

References:

- Guerrero-Liñeiro M, Santos García JB, Narváez Tamayo MA, et al. Map of pain education in Latin America: current state and perspectives. *Pain Manag*. 2023 Mar;13(3):193-199.
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- Aboushaar N, Serrano N. The mutually reinforcing dynamics between pain and stress: mechanisms, impacts and management strategies. *Front Pain Res* (Lausanne). 2024 Nov 18;5:1445280.

Material exclusivo para profesionales de la salud.

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Pain and stress: overlapping epidemics

Pain and **stress** are recognized major public health challenges, that affect a large part of the Latin American population.¹⁻³

Although distinct conditions, **pain** and **stress** often coexist. They share biological and psychological mechanisms that reinforce one another, leading to long-term consequences for physical and mental health, as well as significant healthcare costs and reduced quality of life.¹

References:

1. Aboushaar N, Serrano N. The mutually reinforcing dynamics between pain and stress: mechanisms, impacts and management strategies. Front Pain Res (Lausanne). 2024 Nov 18;5:1445280.
2. Demera-Chica AD; Alcívar-González ND, Cañarte-Murillo JR. El estrés y su relación con trastornos mentales en América Latina. J Sci MQRInvestigar. 2024;8(1):706-724.
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 **ASPIRINA®**

PAIN AND STRESS CYCLE

RECIPROCAL PATHOPHYSIOLOGY



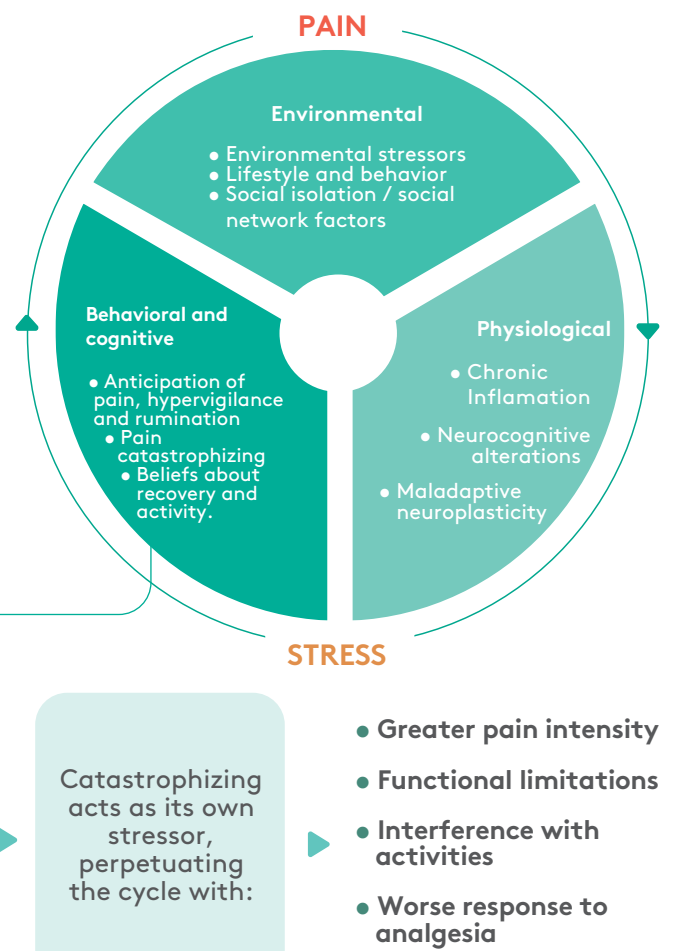
PAIN ►◄ STRESS

Pain and **stress** interact at multiple levels.¹

- Their mutual reinforcement can perpetuate a vicious cycle sustained by several mechanisms.¹

This vicious circle interferes with daily activities, reduces quality of life, and leads to functional limitation and disability.¹

Factors involved in mutual reinforcement between **pain** and **stress**:¹



Adapted from Aboushaar N, et al. *Front Pain Res (Lausanne)*. 2024 Nov 18;5:1445280.

Learn about the reinforcing dynamics between pain and stress here: [🔗](#)

Two models have been proposed to explain the reinforcement effects between **pain** and **stress**:¹

Allostatic load model^{1,4,5}

Pain perceived as a **stressor**



Repeated activation of **stress** responses

- **Allostatic overload** (due to deterioration/wear and tear)
- Inability to generate an adequate response to stress and stop it when it occurs

Homeostatic dysregulation

- Imbalance of the **fight** or **flight** response.
- The corticolimbic system cannot adapt and terminate the stress response.

Maladaptive persistent **pain** state



Vulnerability model (stress-disease model)^{1,4,6}

Persistent or **recurring pain** perceived as a **stressful**, unpredictable, or uncontrollable

- Smaller hippocampal volume → risk factor for increased stress hormones levels.

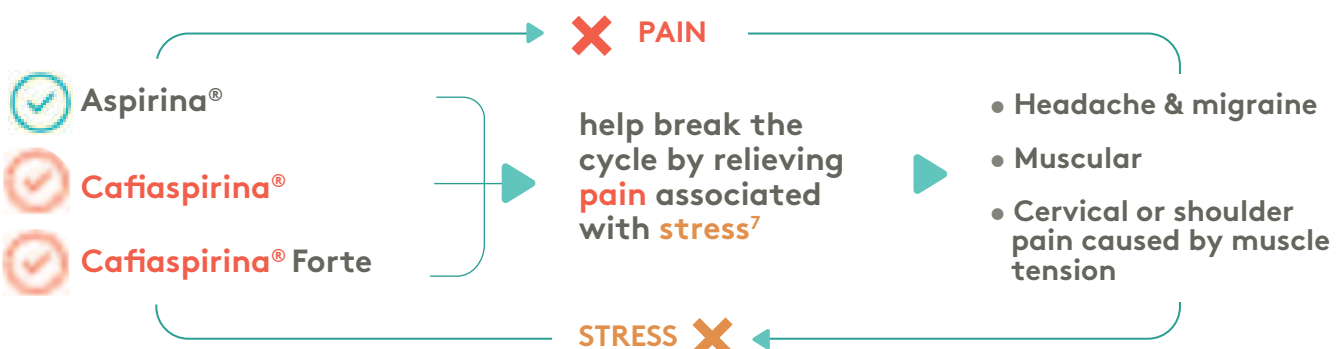
Sustained **maladaptive endocrine** response to stress

- Higher basal cortisol levels
- Changes and reinforcement of parahippocampal gyrus responses

Greater **vulnerability to pain**

Stronger responses to phasic **pain** and persistent **pain**

To avoid perpetuating the **pain-stress** cycle, timely and holistic management is recommended, considering the patient's cultural background, beliefs and values, by integrating pharmacological and non-pharmacological strategies.^{1,2}



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1. Aboushaar N, Serrano N. The mutually reinforcing dynamics between pain and stress: mechanisms, impacts and management strategies. *Front Pain Res (Lausanne)*. 2024 Nov 18;5:1445280.
2. Ahn H, Jackson N, An K, et al. Relationship between acculturative stress and pain catastrophizing in Korean Americans. *J Immigr Minor Health*. 2021 Aug;23(4):741-746.
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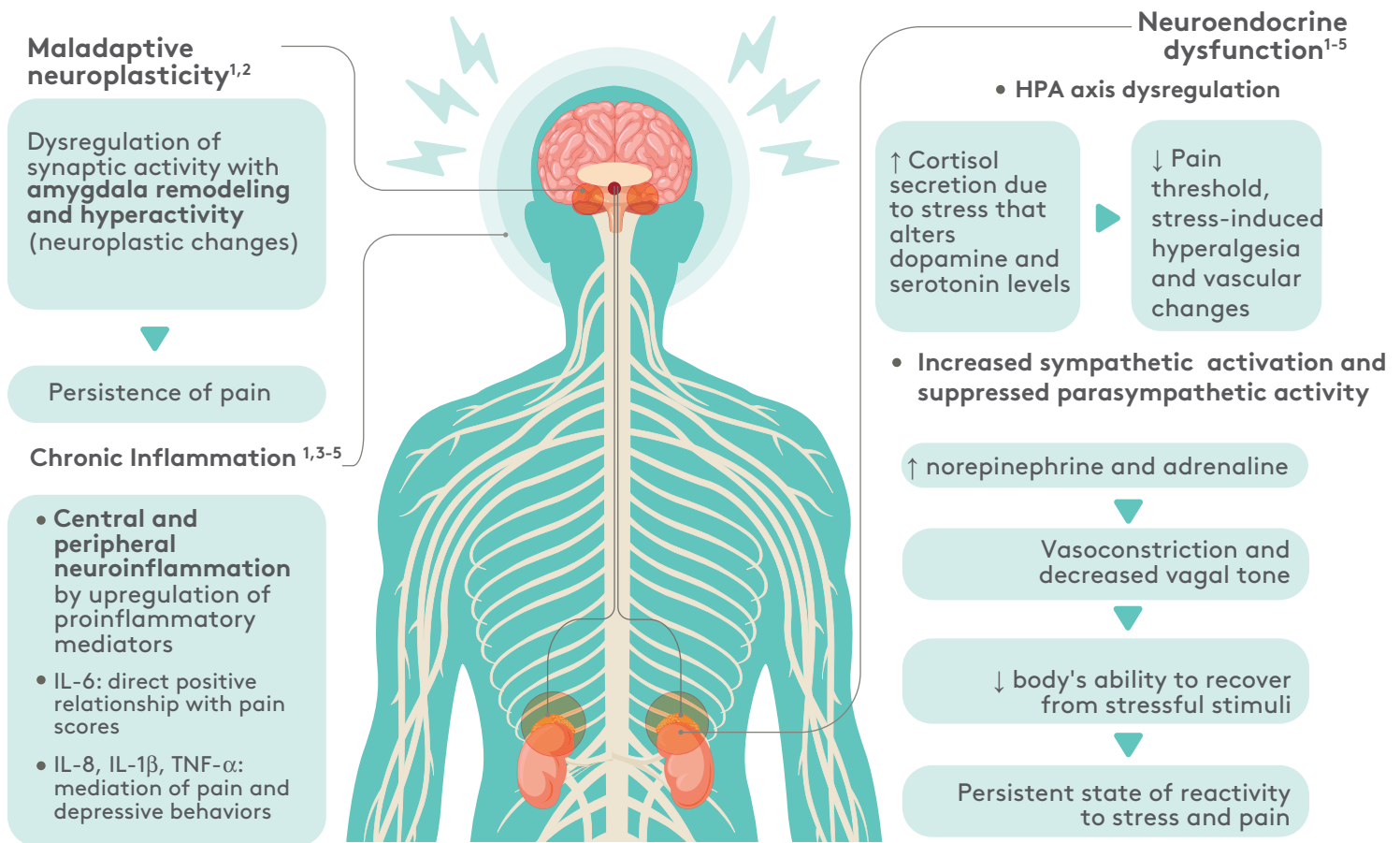
ASPIRINA®

PAIN AND STRESS CYCLE

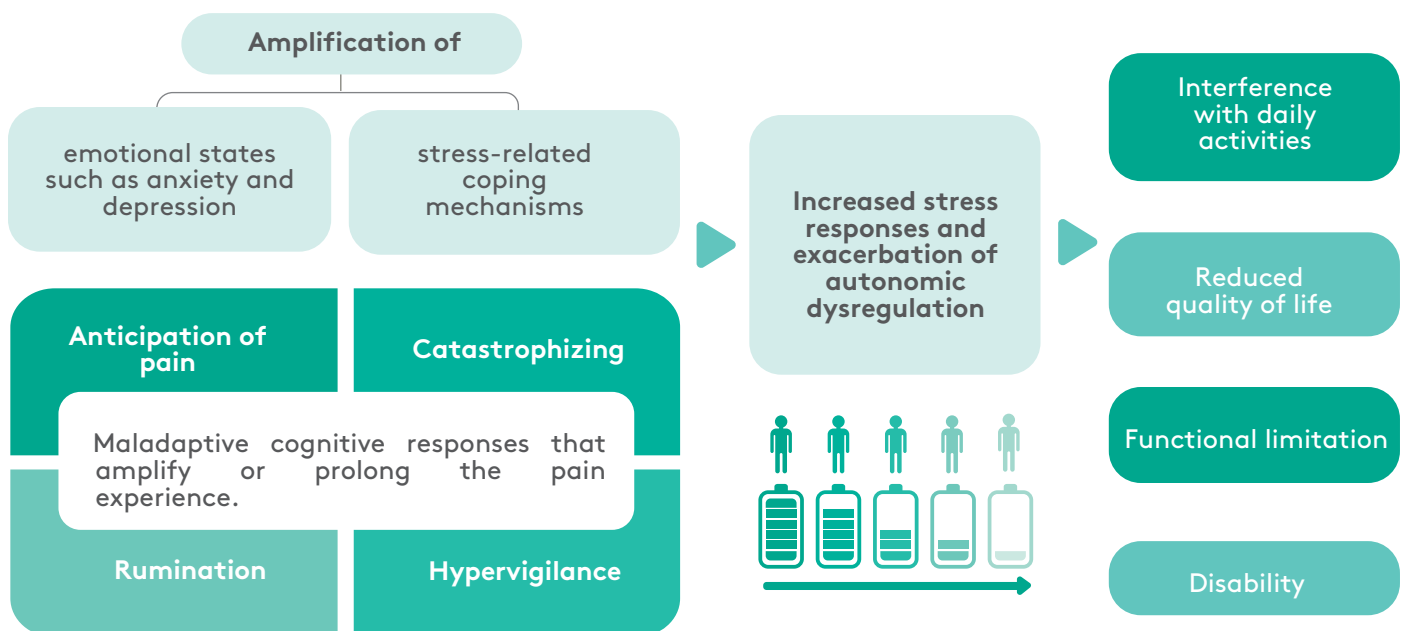
PATHOPHYSIOLOGICAL EFFECTS ON HEALTH



The physiological processes underlying in the persistence of chronic **pain** and **stress** include:



Consequences of perpetuating the **pain-stress** cycle include:^{1,2,6}



HPA, hypothalamic-pituitary-adrenal; IL, interleukin; TNF- α , tumor necrosis factor alpha

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Pain and Stress cycle

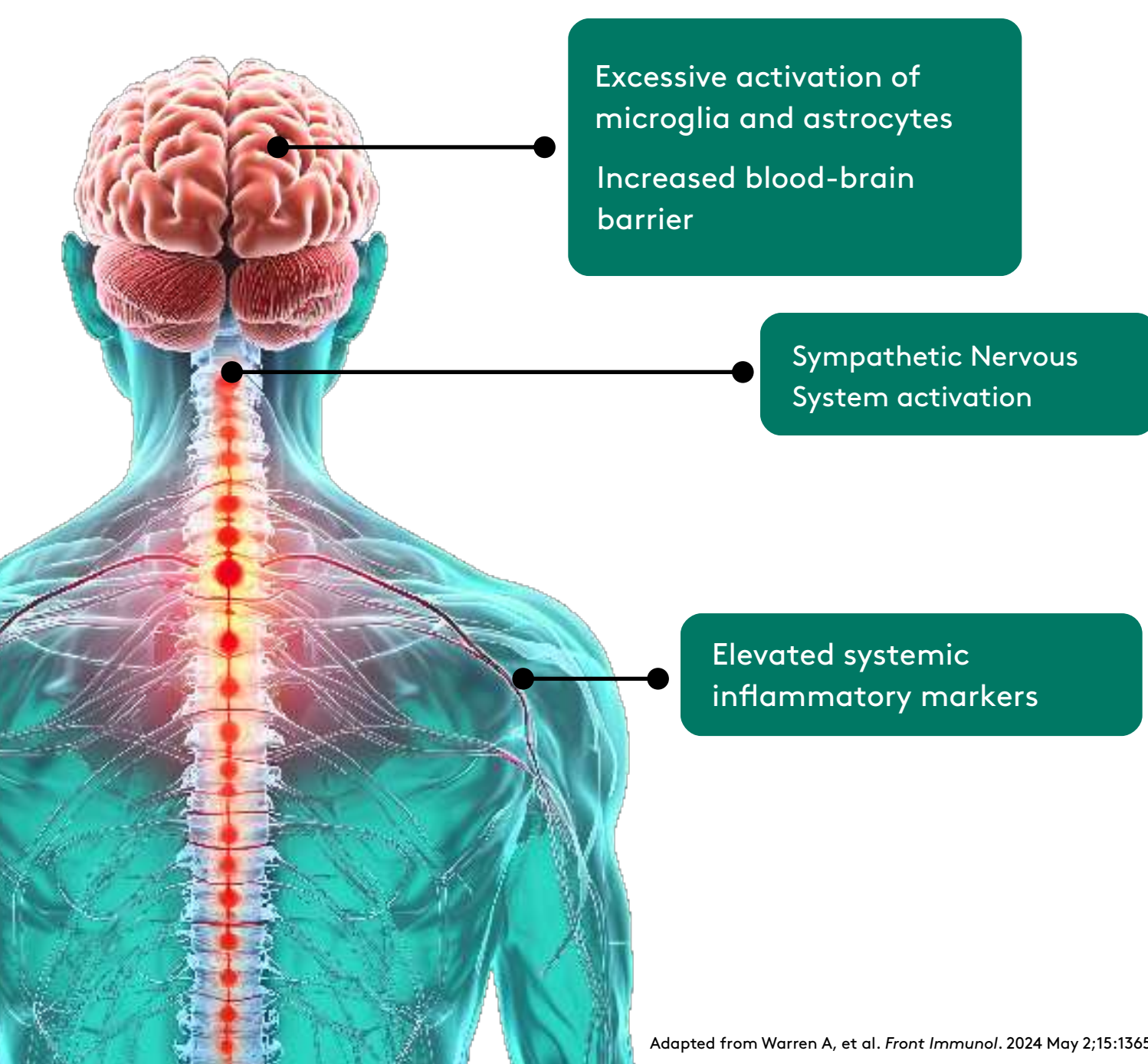
Proposed pathophysiological models

Pain and **stress** have been shown to mutually reinforce each other.¹

The chronic stress response, driven by dysregulation of the HPA (hypothalamus-pituitary-adrenal) axis and sympathetic overactivity, profoundly affects inflammatory processes across multiple systems (Figure).^{2,3}

It is common for stress in situations involving chronic pain to exacerbate the intensity of the patient's symptoms.²

Figure. Chronic stress response.



To explain the reciprocal interaction between **pain-stress, two models have been proposed:¹**

Allostatic load



It refers to the wear and tear that the body presents due to repeated exposure to **stress**.⁴ The body is unable to generate an adequate response to **stress** and to stop it when it happens.²

Of vulnerability



Proposes **stress** as a heuristic construct to link epidemiological, psychological, and biological factors into a model of **stress** and disease.^{1,4}

Learn more about proposed models of **pain-stress interaction by clicking here.**

References:

1. Aboushaar N, Serrano N. The mutually reinforcing dynamics between pain and stress: mechanisms, impacts and management strategies. *Front Pain Res (Lausanne)*. 2024 Nov 18;5:1445280.
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The pain-stress cycle and its pathophysiological impact on health

In patients with chronic or recurrent **pain**, a maladaptive **stress** response, has been described, characterized by:

- Elevated basal levels of endogenous steroids
- Altered plasticity of the corticolimbic circuit (particularly in pathways regulating **pain** and emotion)

These alterations act as recurring stressors that activate continuously the **stress** response.¹

Pain-related responses in the hippocampal gyrus combined with basal cortisol levels mediate the association between hippocampal volume and the intensity of chronic pain.²

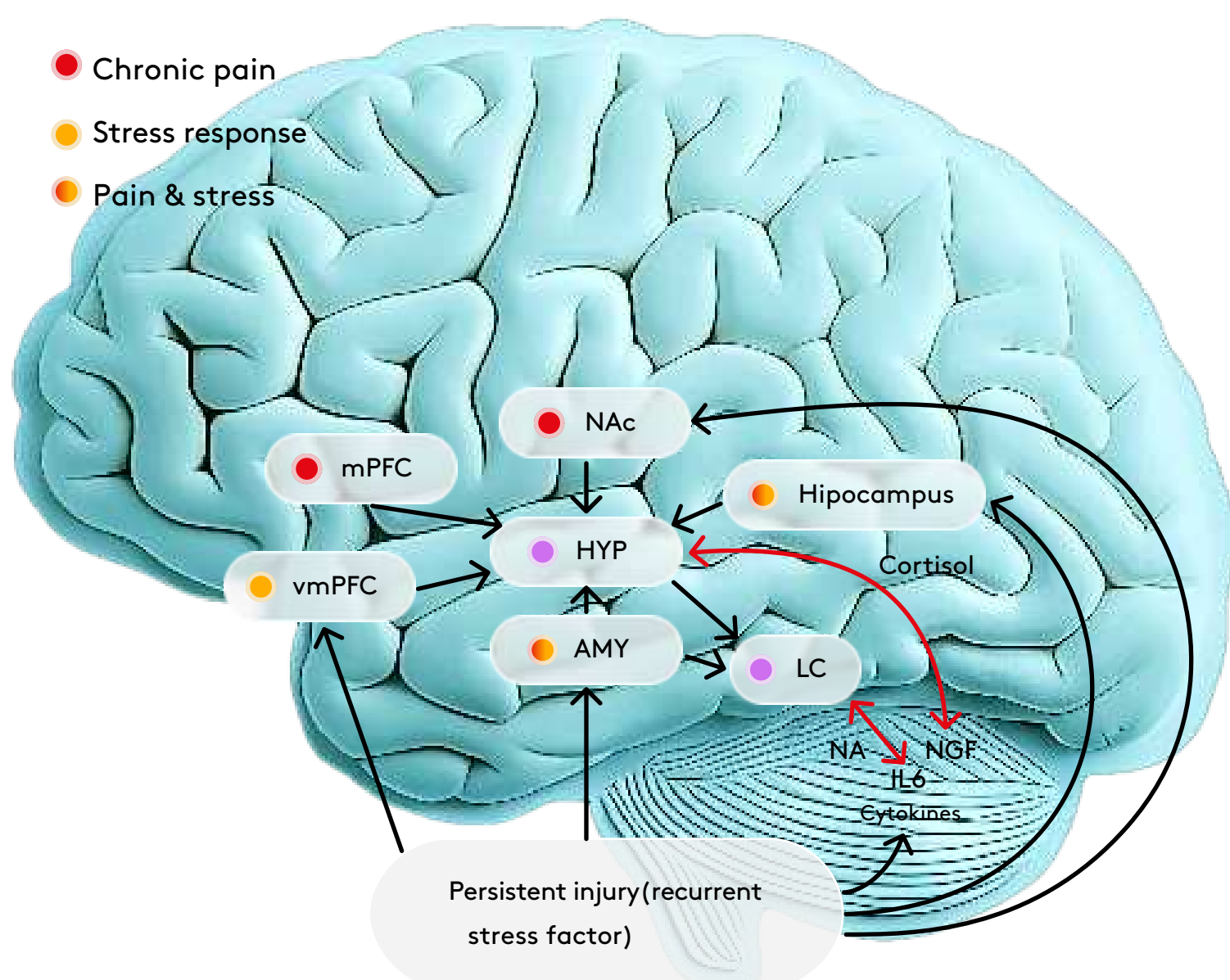
These changes in the corticolimbic circuit alter the performance of the **hypothalamic-pituitary-adrenal axis** and associated behaviors.

- The release of stress hormones (endogenous steroids) exerts both adaptive and maladaptive effects on the plasticity of key brain structures (Figure):
 - Amygdala: threat detection and emotional reactivity
 - Hippocampus: regulation of anxiety and encoding of new memories
 - Hypothalamus: feedback control of hormonal response (steroid hormones)
 - Prefrontal cortex: processing decision-making, affective processing, and neuroendocrine regulation

Figure. Corticolimbic circuit in responses to pain and stress.

Maladaptive responses to stress

→ *Persistence of chronic pain*



AMY, amygdala; HYP, hypothalamus; IL6, interleukin 6; LC, locus coeruleus; mPFC, medial prefrontal cortex; NA, noradrenergic pathway; NAc: nucleus accumbens; NGF, nerve growth factor; vmPFC, ventromedial prefrontal cortex.

Adapted from Vachon-Presseau E. *Prog Neuropsychopharmacol Biol Psychiatry*. 2018 Dec 20;87(Pt B):216–223.

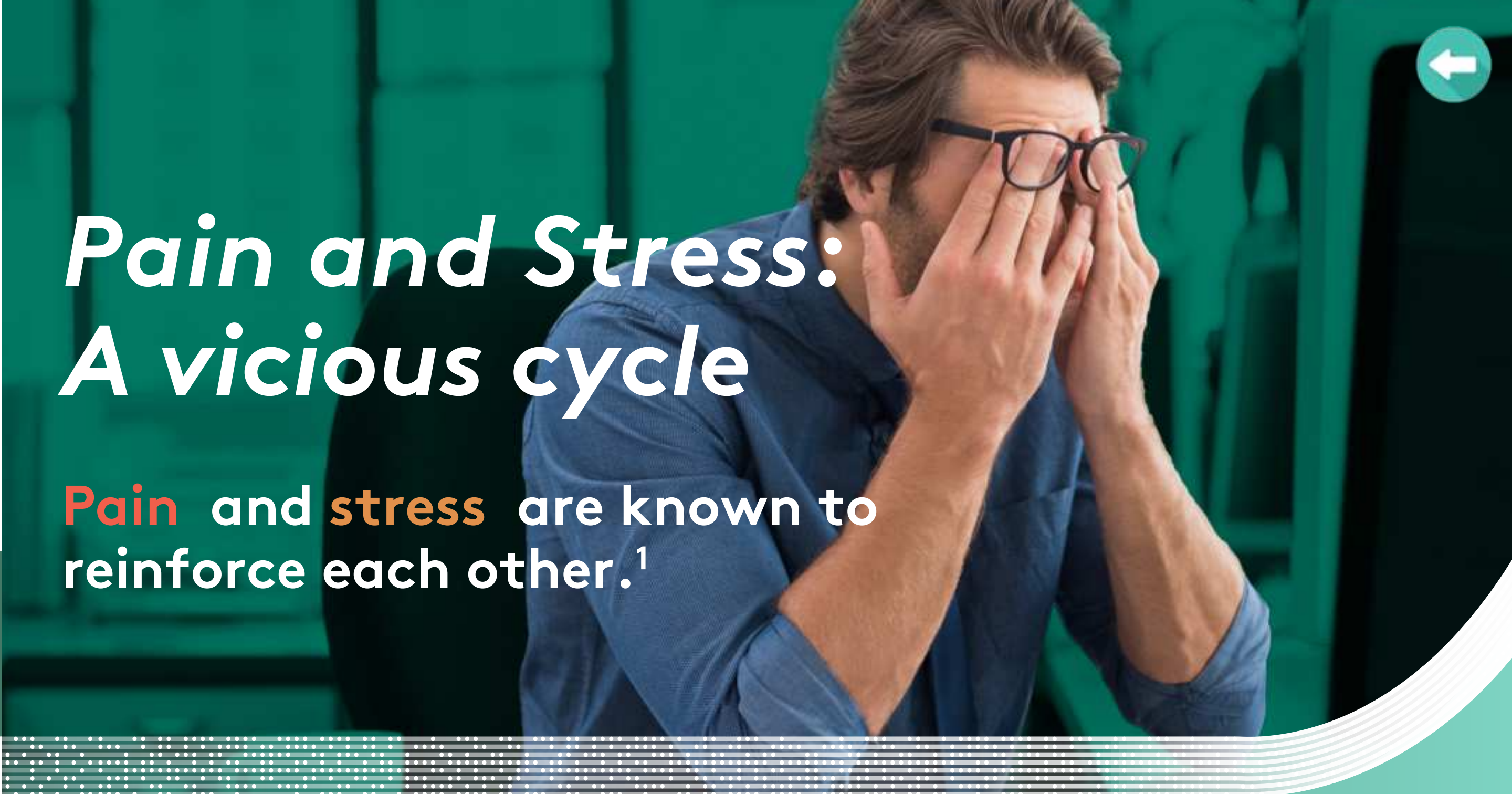
Learn about the other pathophysiological mechanisms involved and their consequences for health by clicking here.

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Pain and Stress: A vicious cycle

Pain and **stress** are known to reinforce each other.¹

Two models demonstrate how this interaction creates a vicious cycle that amplifies both conditions.¹

More **pain** = more **stress**

More **stress** = more **pain**

This cycle contributes to the persistence and recurrence of both conditions.¹

References: 1. Aboushaar N, Serrano N. The mutually reinforcing dynamics between pain and stress: mechanisms, impacts and management strategies. *Front Pain Res* (Lausanne). 2024 Nov 18;5:1445280.

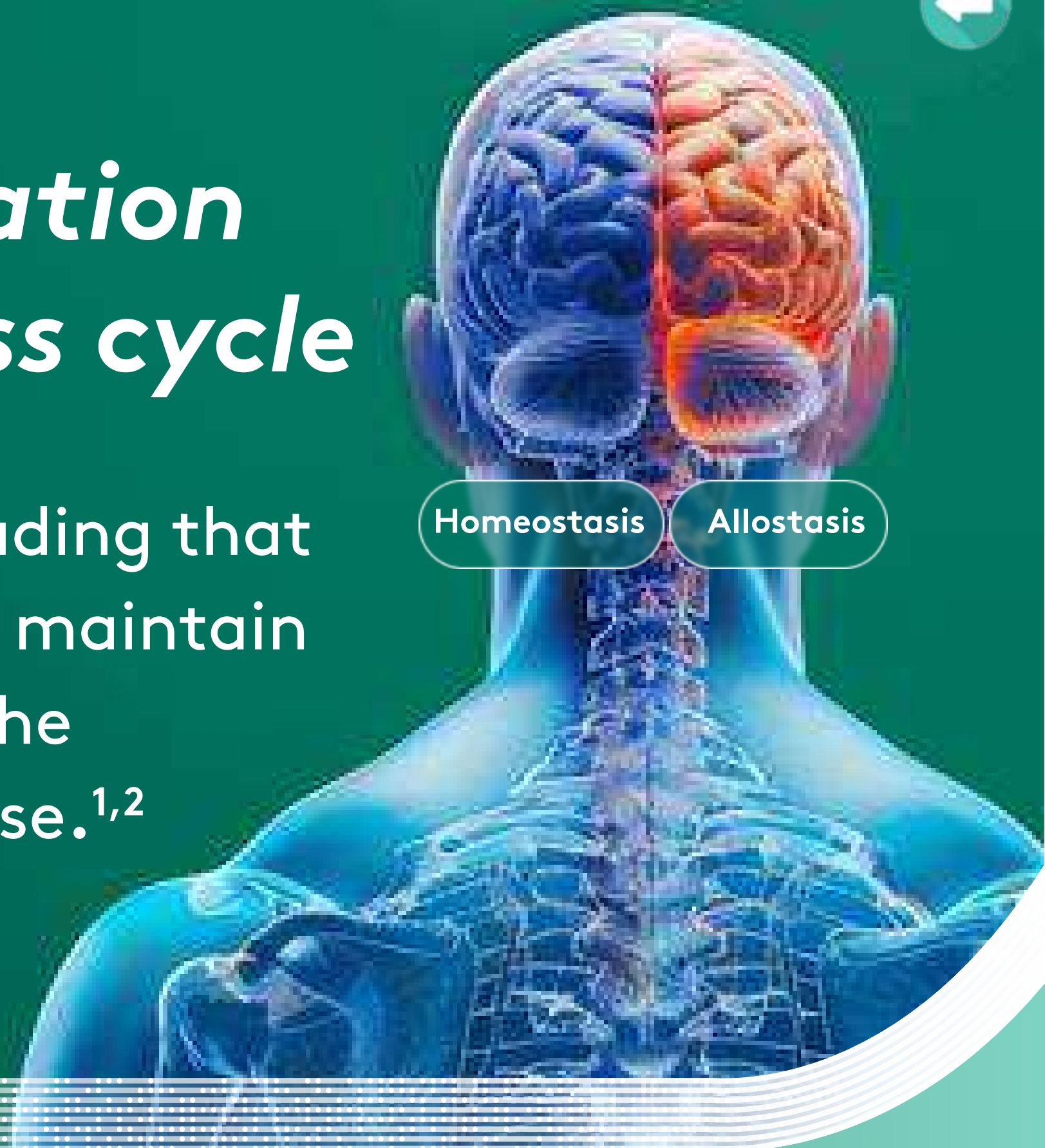
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Conceptualization the pain-stress cycle

Prolonged **stress**, including that triggered by **pain**, can maintain chronic activation of the **fight-or-flight** response.^{1,2}



This leads to allostatic overload,
driving physiological wear and tear



Negative neurological, behavioral,
cardiovascular, metabolic and cellular effects

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1. O'Connor DB, Thayer JF, Vedhara K. Stress and health: a review of psychobiological processes. *Annu Rev Psychol*. 2021 Jan 4;72:663-688.
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Physiological mechanism underlying the pain-stress cycle

The reinforcing relationship between **pain** & **stress** is not purely psychological, it involves biopsychosocial mechanisms:¹

- Brain physiological alterations
- Neuroendocrine dysfunction
- Inflammatory mechanisms

Together, these factors **negatively** impact **health and quality of life.**¹

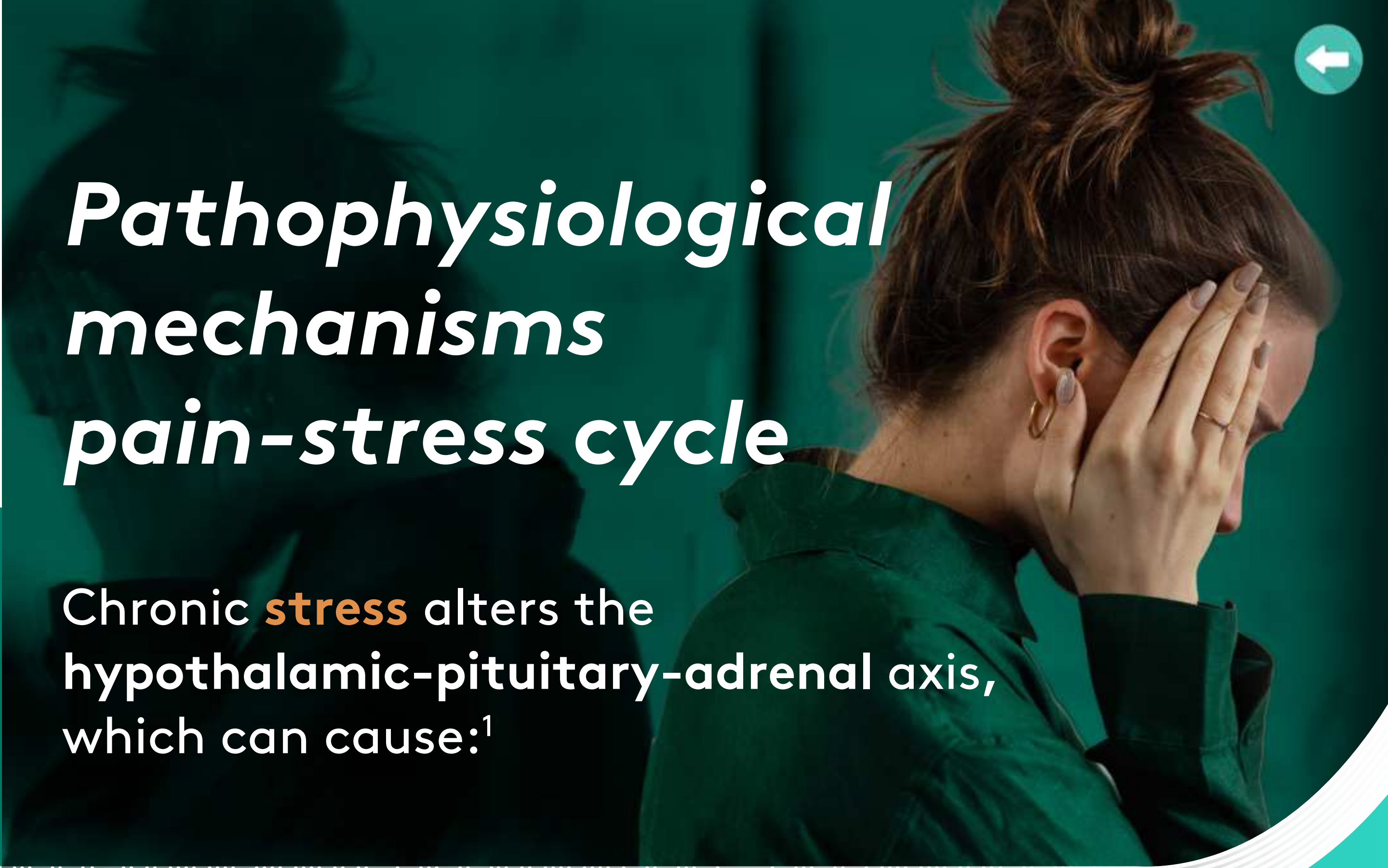
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Pathophysiological mechanisms pain-stress cycle

Chronic **stress** alters the
hypothalamic-pituitary-adrenal axis,
which can cause:¹

- Increased pain sensitivity
- Development of hyperalgesia

Elevated cortisol levels in response to **pain**:¹

- Perpetuate the pain-stress cycle
- Contribute to muscle tension and inflammation

References:

1. Aboushaar N, Serrano N. The mutually reinforcing dynamics between pain and stress: mechanisms, impacts and management strategies. *Front Pain Res (Lausanne)*. 2024 Nov 18;5:1445280

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Chapter 3.1

STRESS AS A COMMON PATHWAY, IN TENSION HEADACHE AND MIGRAINE



Tension-type headache and **migraine**, two of the two of the most prevalent primary headaches.

Both conditions can develop at any age between 5 and 80 years.^{1,2}

They impact all races, socioeconomic levels, and geographic areas.¹

They cause significant disability, impaired quality of life, and substantial economic burden.¹

Factors associated with primary headaches in Latin America:²

- Female
- Caucasian
- Emotional co-morbidities, such as depression and anxiety
- Overweight/obesity
- Back pain

The Latin American prevalence of primary headaches is

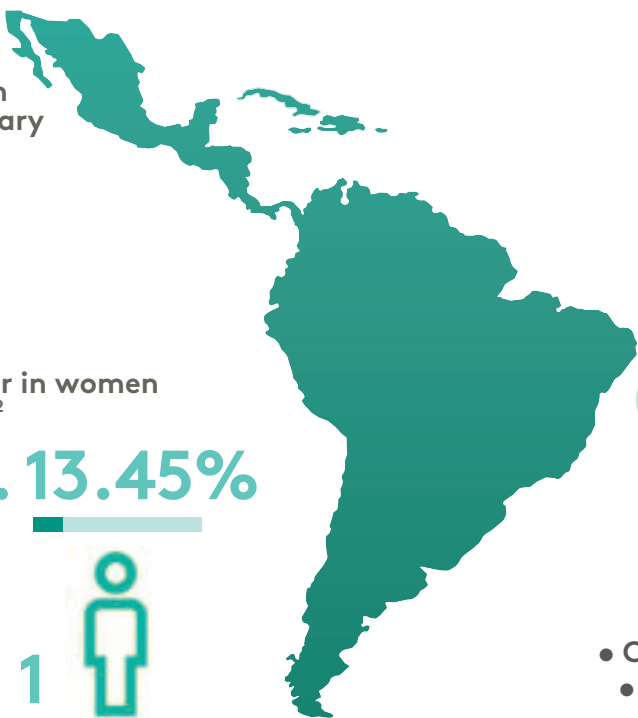
41.43%²

Prevalence is higher in women compared to men.²

25.25 vs. 13.45%



2 : 1



Triggering factors:^{3,4}

- **Stress**, (a trigger in nearly **70%** of migraine patients)
- Sleep disturbances
- Muscle tension
- Chronic emotional tension
- Inadequate posture

DIFFERENCES IN PAIN PATHWAY: TENSION-TYPE HEADACHE AND MIGRAINE^{4,5}



TENSION-TYPE HEADACHE

- Impaired central pain inhibitory networks
 - Increased sensitivity to **stress-related pain**
 - **Muscle nociceptors** (Myofascial structures through the trigeminal ganglion and dorsal horns of the spinal cord **C1-C4**)
 - Hypersensitivity of **pericranial muscles** and tendon insertions



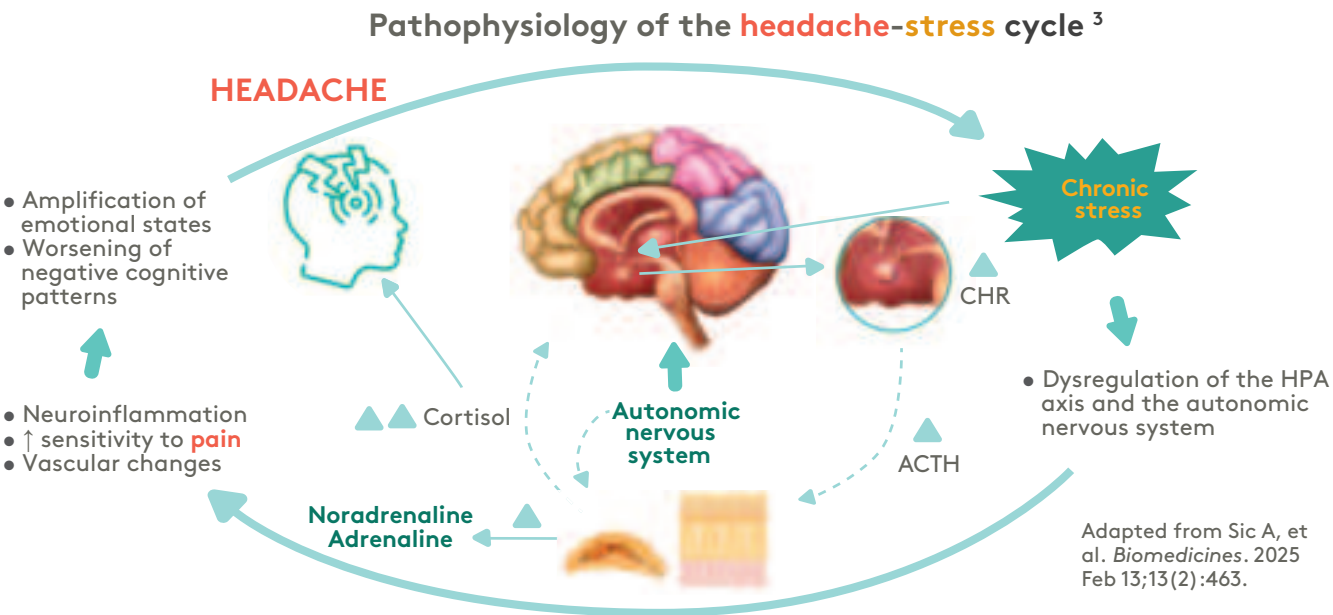
MIGRAINE

- Activation and sensitization of first-order trigeminovascular neurons (meninges and vasculature)
- Dorsal root ganglia **C1-C2**
- **Nociceptors** in the anterior 2/3 of the **dura mater**, skin and muscles of the face

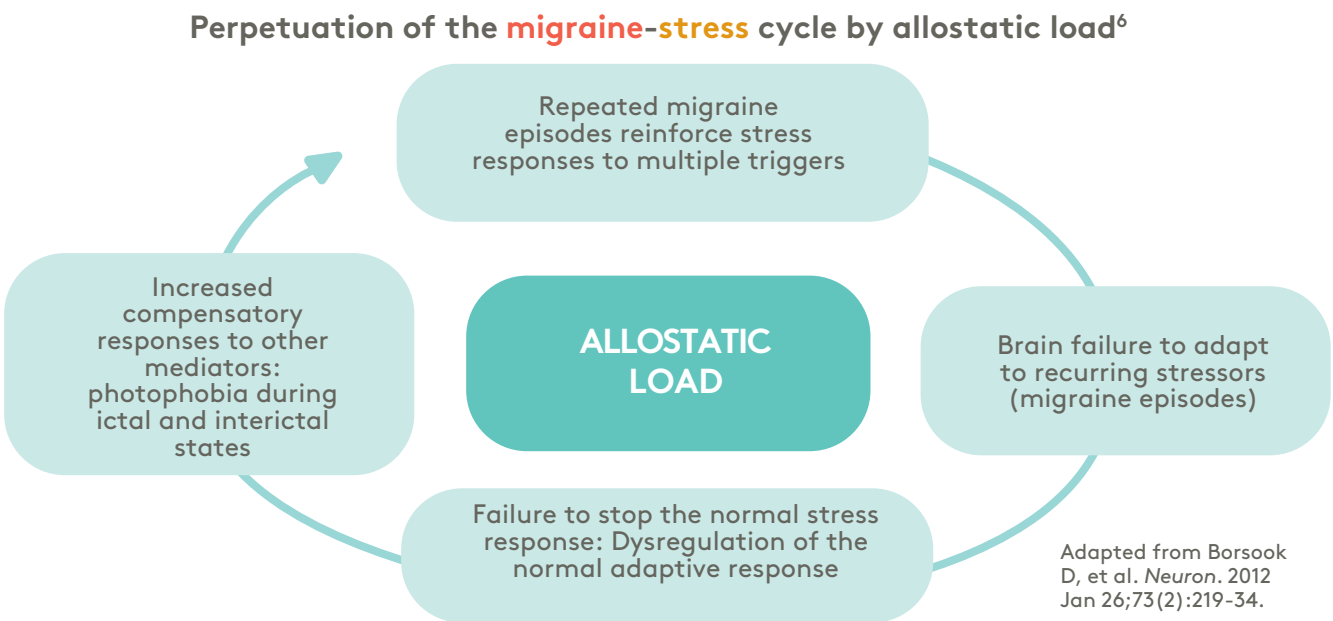
*Tension-type headache and migraine cover 90% of primary headaches.²



THE EXPERIENCE OF RECURRENT HEADACHES BECOMES A SOURCE OF STRESS, CREATING A VICIOUS CYCLE³



HIGHER STRESS LEVELS ARE ASSOCIATED WITH INCREASED FREQUENCY AND SEVERITY OF MIGRAINE SYMPTOMS⁴



A LARGE PART OF THE POPULATION AFFECTED BY HEADACHES:¹

- Do not seek medical consultation, as headaches are episodic and often not perceived as serious
- Lack of effective diagnosis or care
- Self-medication



BREAKING THE HEADACHE-STRESS CYCLE, REQUIRES A COMPREHENSIVE APPROACH INCLUDING:^{1,3-5}

- PATIENT EDUCATION**
 - Identifying and reducing triggers, such as **stress**
- LIFESTYLE MODIFICATIONS**
 - Hydration, balance diet and weight control, regular exercise, and healthy sleep habits
- ANALGESICS, NSAIDS**
 - **Aspirina®** with or without **caffeine**-first line of treatment for tension headache and acute migraine episode

ACTH, adrenocorticotrophic hormone; NSAID, non-steroidal anti-inflammatory drug; CRH, corticotropin-releasing hormone; HPA, hypothalamus-pituitary-adrenal.

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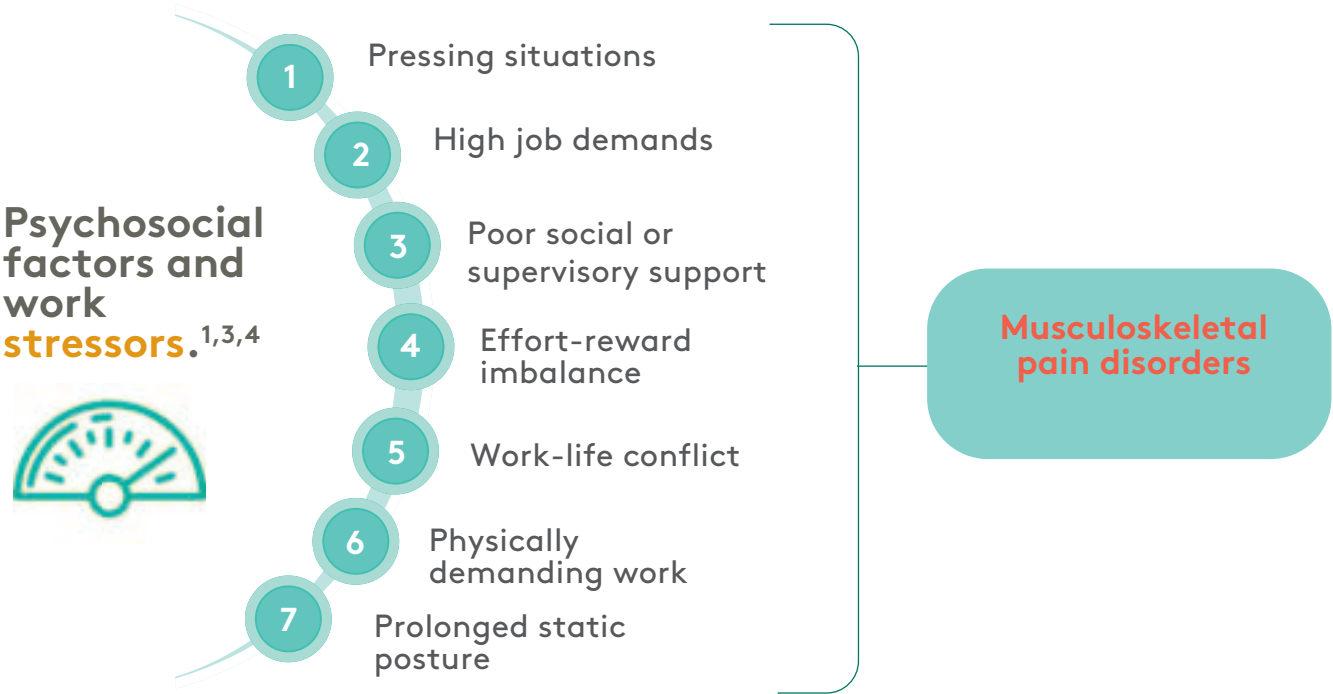


Chapter 3.2

MUSCULOSKELETAL DISORDERS IN THE VICIOUS CYCLE OF PAIN AND STRESS

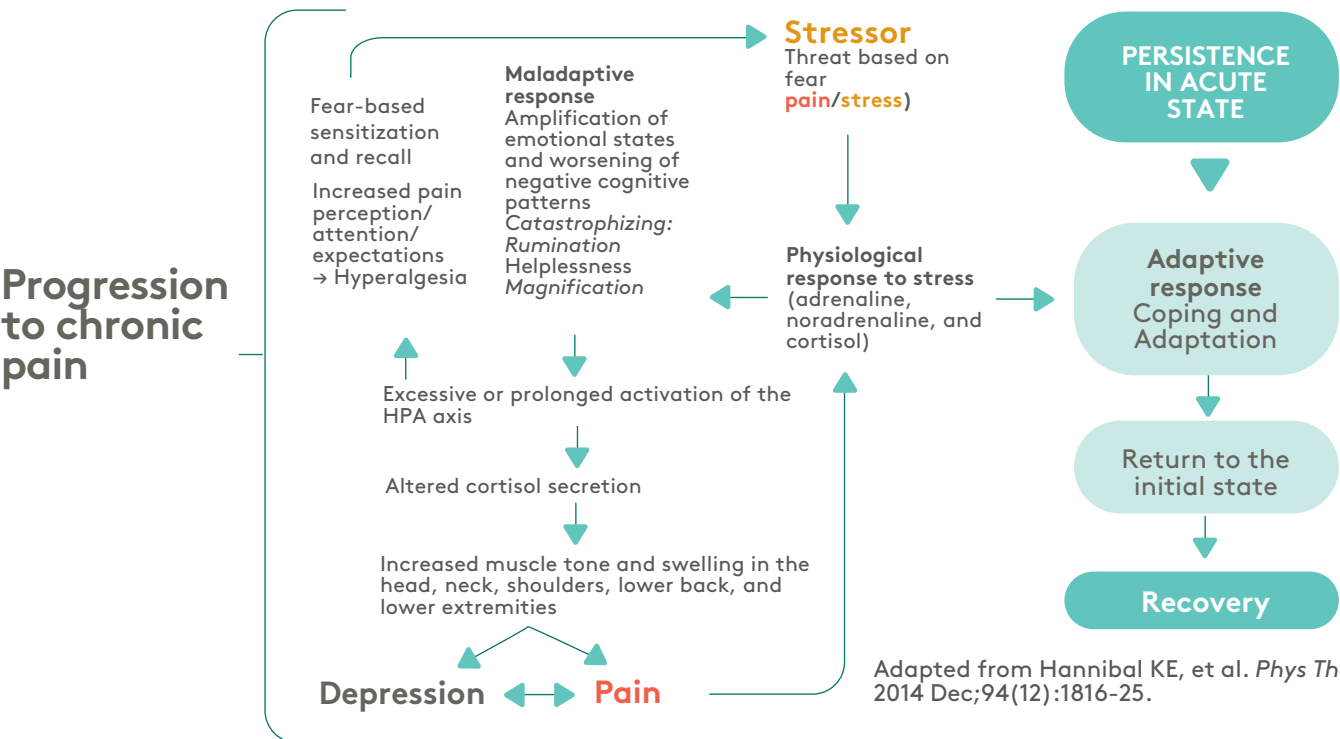
Musculoskeletal conditions, such as neck pain, low back pain, and osteoarthritis, are among the most prevalent occupational diseases in today's working population.^{1,2}

- Individuals exposed to work-related stressors are at greater risk of developing these conditions compared to those who are not.²
- Physiological factors are closely linked to these conditions and contribute to their chronicity.²



THE DEVELOPMENT AND PERPETUATION OF MUSCULOSKELETAL PAIN DUE TO STRESS ARE ALSO RELATED TO:^{3,5-9}

- Mood
- Cognitive functioning
- Pain-related behaviors





Musculoskeletal dysfunction, when combined with sustained stress, can trigger or perpetuate pain, delay healing, and contribute to disability.⁵



Adaptation, reappraisal, and effective coping with pain and stressors can reduce cortisol secretion and help prevent chronic or recurrent pain.

GIVEN THE MULTIPLE FACTORS INVOLVED IN THE COMPLEX INTERACTION BETWEEN PAIN AND STRESS, IT IS IMPORTANT:

1. **Identify the cause of pain, as well as the presence of stress and maladaptive coping strategies,** which influence the experience of **pain**.⁵
2. **Apply a coordinate, patient-centered, and comprehensive treatment strategies** to prevent persistent pain.^{3,6,10-12}



Environmental/lifestyle: healthy diet and weight control, regular physical activity, sleep hygiene.



Psychological: biofeedback, psychotherapy, mindfulness, Cognitive behavioral therapy (CBT).



Social: Participation in support groups.



Biomedical: relaxing breathing, yoga, physiotherapy, massage, and correction of posture related to stress



PHARMACOLOGICAL TREATMENT, SUCH AS NONSTEROIDAL ANTI-INFLAMMATORY DRUGS.

ASPIRINA WITH OR WITHOUT CAFFEINE HELPS RELIEVE STRESS-ASSOCIATED PAIN, INCLUDING MUSCLE, NECK, OR SHOULDER PAIN.

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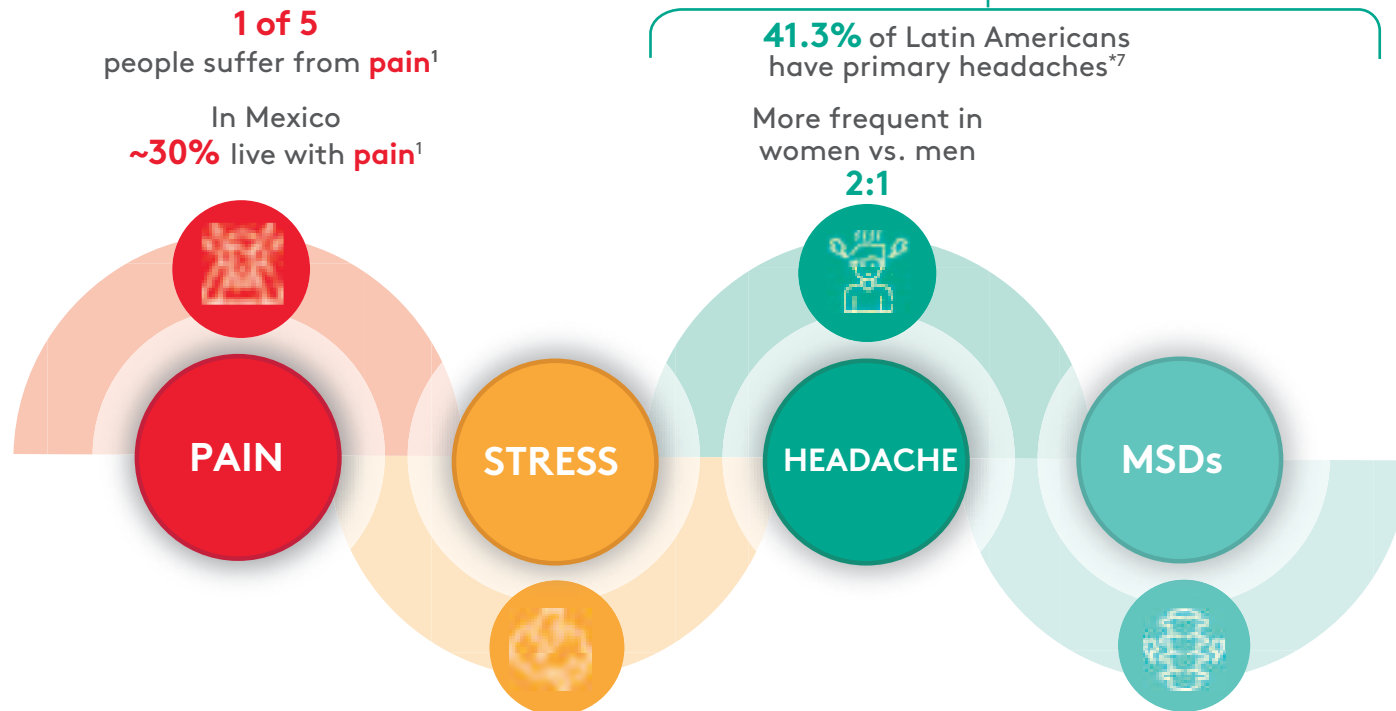


**THE PAIN-STRESS
CYCLE, A MAJOR
HEALTH PROBLEM IN
LATIN AMERICA**



PAIN-STRESS CYCLE AND ITS PSYCHOSOCIAL IMPACT

Primary headaches and painful musculoskeletal disorders (MSDs) are highly prevalent.*4-6



*Tension type headache
or migraine.
MSDs painful
musculoskeletal
disorders.

~80% present some degree of
stress **estrés**²
In Mexico
75% fatigue related to work³

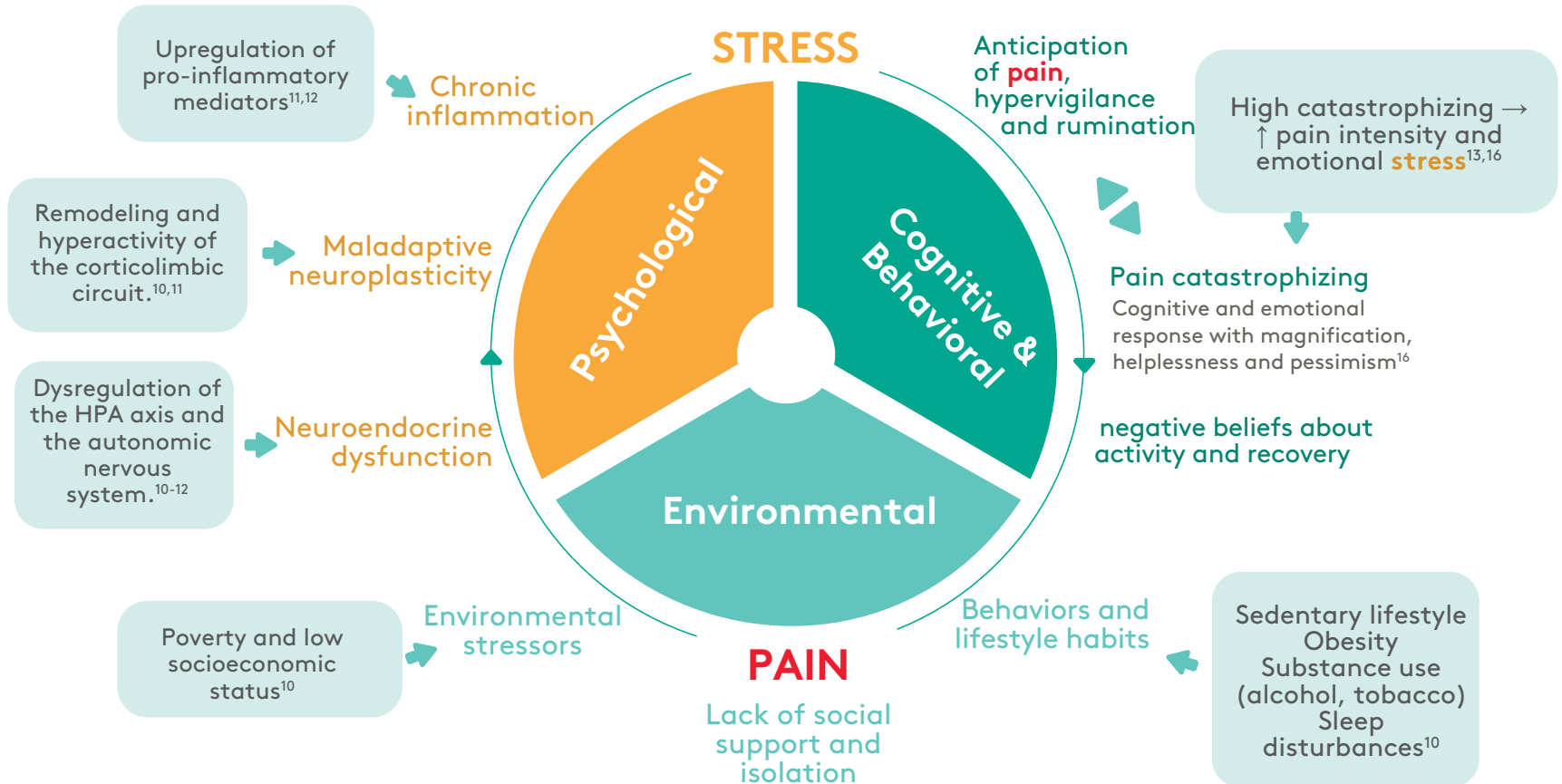
>50% of serious
occupational diseases are
related with MSDs*^{5,6}

Pain can cause **stress**/
distress⁸



Stress is one of the causes of
musculoskeletal and tensional-
type **headache**^{3,9}

THE DEVELOPMENT AND PERSISTENCE OF HEADACHE AND MUSCULOSKELETAL PAIN RELATED TO STRESS INVOLVE MULTIPLE FACTORS:¹⁰⁻¹⁶



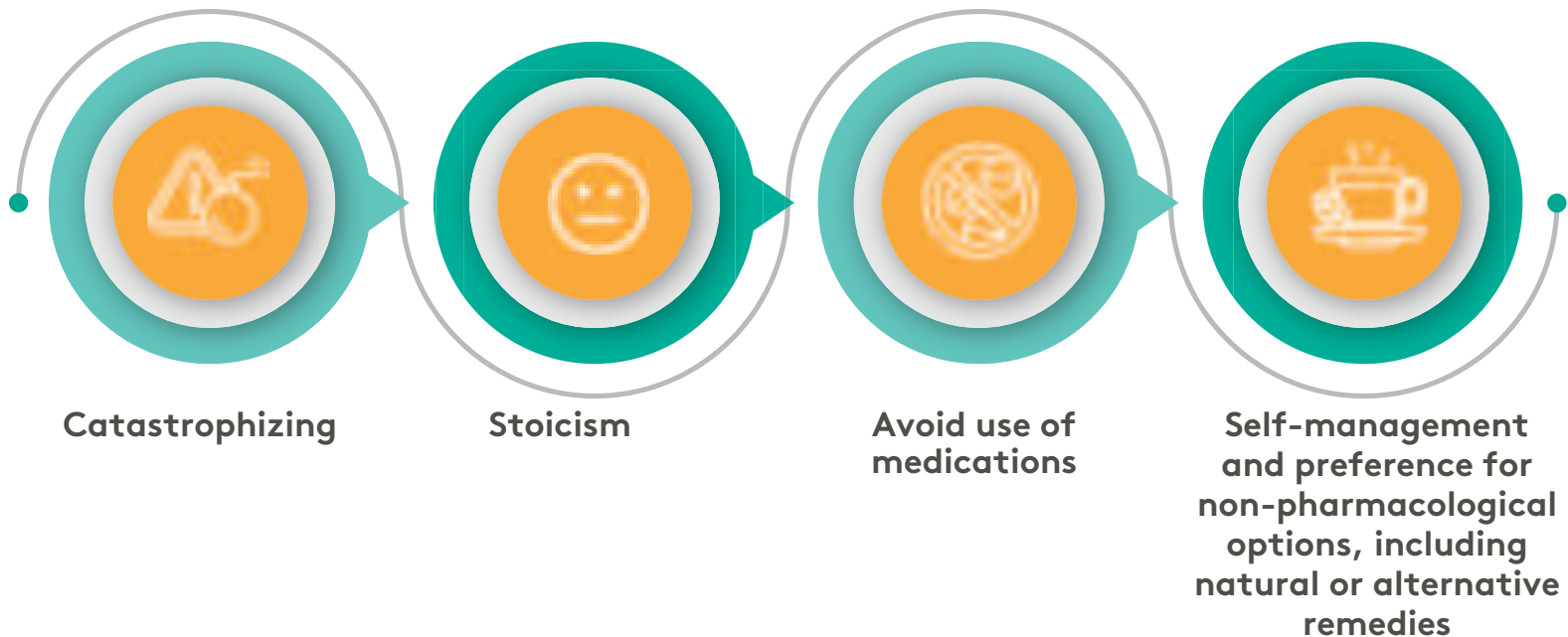
HPA, hypothalamus-pituitary-adrenal.

Adapted from Aboushaar N, et al. *Front Pain Res (Lausanne)*. 2024 Nov 18;5:1445280.

THE **PAIN-STRESS** CYCLE HAS DETRIMENTAL EFFECTS ON MULTIPLE DIMENSIONS OF LIFE:^{10,11}

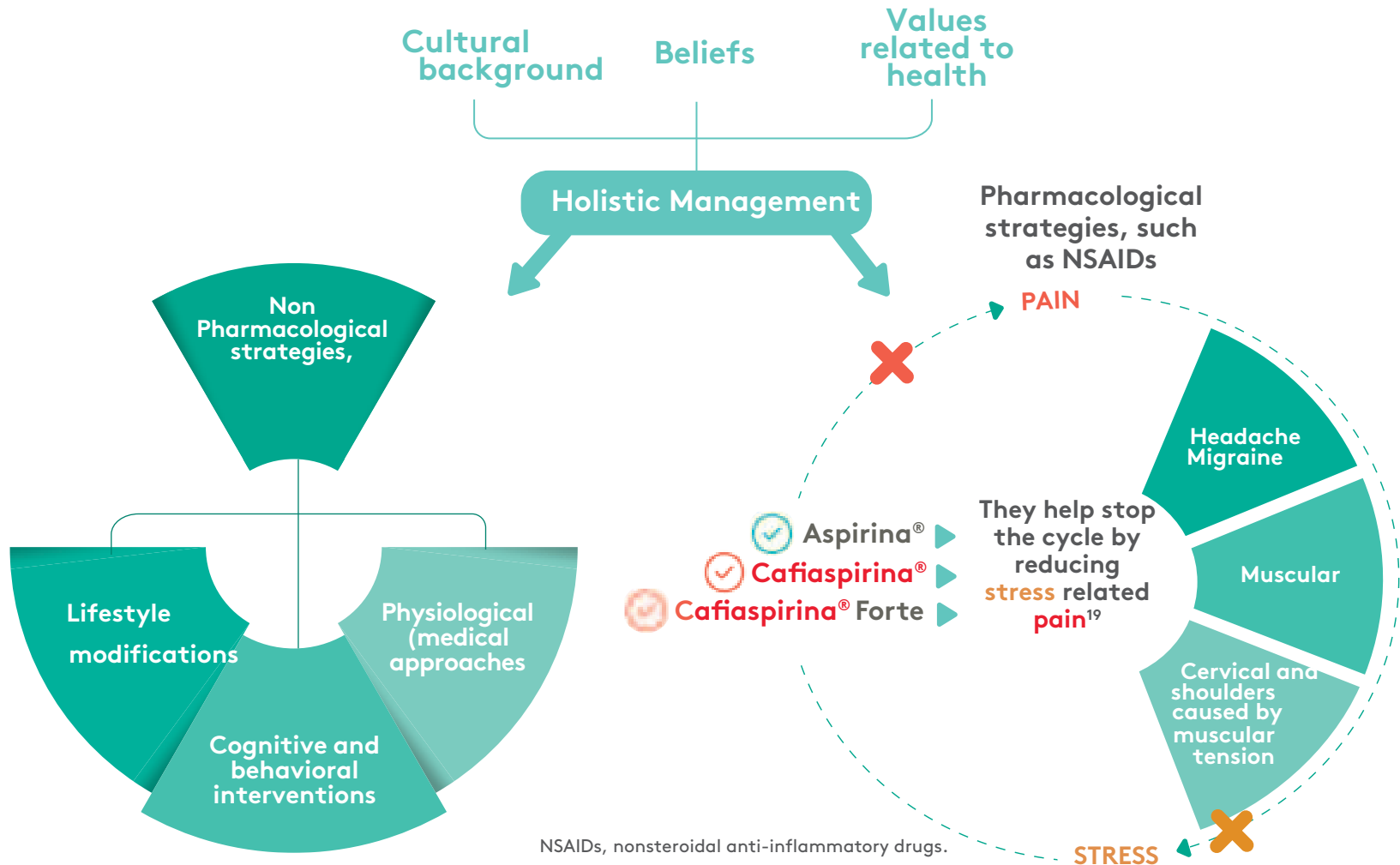
- Physical health
- Mental well-being
- Overall quality of life

Coping strategies for **pain** in the Latin America population:^{17,18}



Latin America patients often perceive a lack of understanding, credibility, or empathy, from their healthcare professionals regarding their **pain**.¹⁸

TO AVOID PERPETUATION OF THE **PAIN-STRESS** CYCLE ,TIMELY AND PATIENT-CENTER HOLISTIC MANAGEMENT IS RECOMMENDED.^{10,16}





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Stress as a common pathway in tension-type headaches and migraines

Tension-type headache and migraine are highly prevalent conditions that generate considerable individual and socioeconomic burdens.^{1,2}

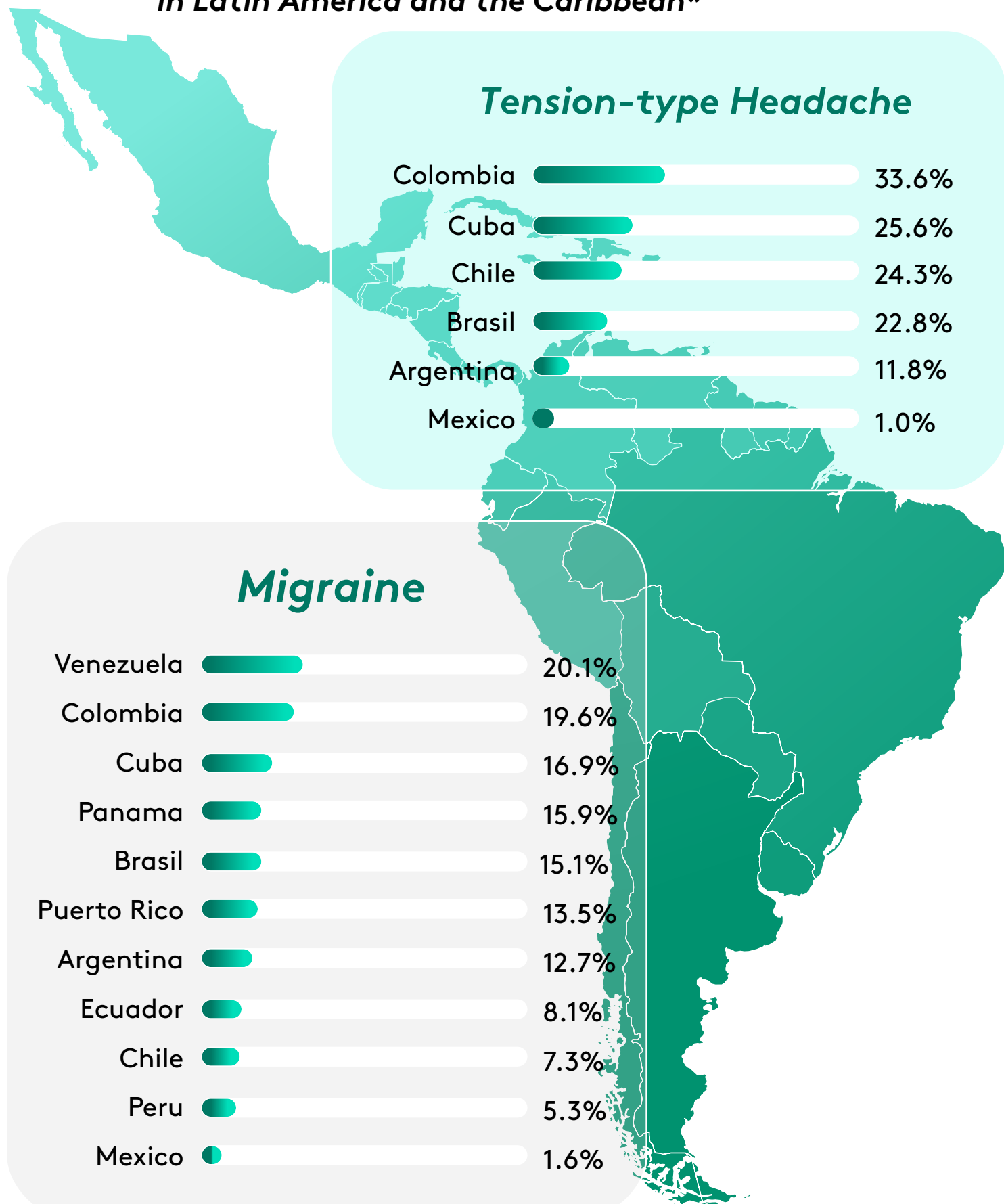
Among young people, headaches are:²

4.º Disability Adjusted Life Years (DALYs)

2.º Years lived with disability (YDLs) cause

In Latin America, prevalence is similar to global levels, affecting just over 40% of the population, with notable variations between countries (Figure).^{1,3}

Figure. Prevalence of tension-type headache and migraine in Latin America and the Caribbean*



* Data up to March 2021.

Adapted from Pacheco-Barrios K, et al. *Cephalalgia*. 2023 Jan;43(1):3331024221128265.

Chronic **stress** plays a key role in the onset and progression of headaches. Recurrence of headaches acts as an additional stressor, perpetuating the **pain-stress** cycle.⁴



Among, first-line pharmacological options, Aspirin® with or without caffeine, stands out as effective for both tension-type headache and acute migraine attacks.⁴

Discover the **pain-stress link. Click to learn more.**

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Musculoskeletal disorders within vicious cycle between pain and stress

Neck , low back, and shoulder pain are common musculoskeletal disorders (MSDs) (Figure). They represent the second most common cause of disability, accounting for up to **21.3%** of total years lived with disability.³

They represent a high economic burden due to treatment costs, reduced productivity and employment problems.^{1,2}

Figure. Age-standardized annual incidence of MSDs in Latin American and Caribbean countries per 100,000 inhabitants.*



* Data up to 2017.

Adapted from Kazeminasab S, et al. *BMC Musculoskelet Disord.* 2022 Jan 3;23(1):26.



Psychological factors are closely linked to MSDs.^{1,3}

Chronic **pain** is associated with alterations in brain regions involved in emotional **pain** modulation, and may contribute to the development of anxiety and depression.⁴



Risks factors such as anxiety and depression, somatization, poor sleep quality, alcohol use, and maladaptive cognitive patterns can predict the development of chronic **pain**. These factors alter nociceptive processing at cortical, spinal, and brainstem levels, promoting central sensitization and **pain** amplification.²⁻⁴

Discover the role of stress in musculoskeletal **color. Click here.**

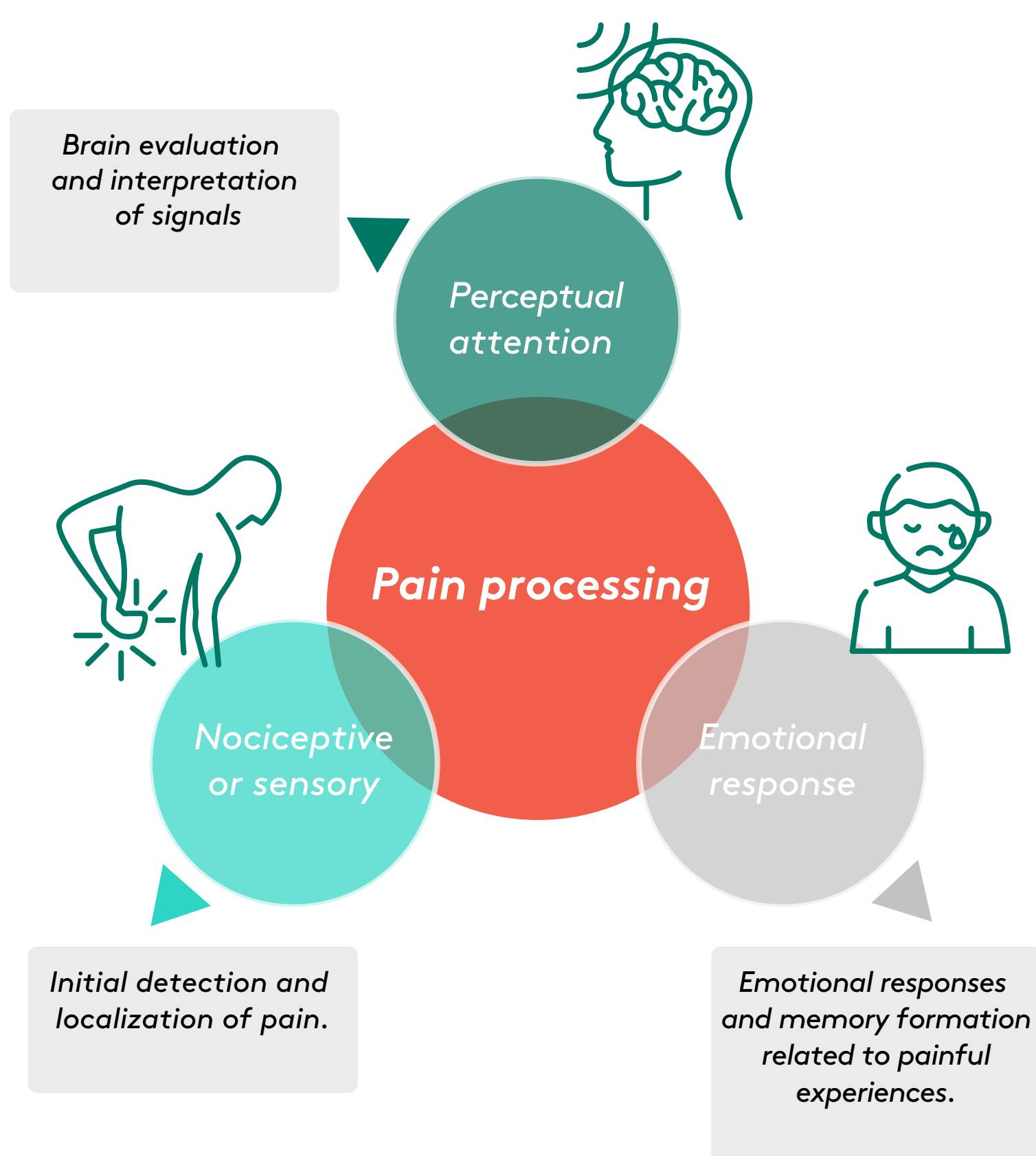
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The role of the pain-stress cycle in recurrent primary headaches and musculoskeletal pain

Physiological, psychological, cognitive, behavioral, and social factors interact to shape the individual experience of **pain**, its impact on health and well-being (Figure).¹

Figure. **Pain Matrix**¹



Acute **pain** can progress into persistent pain. This stage offers a critical window that represents a critical intervention phase to prevent progression to chronic **pain**.¹

Prolonged or recurrent **stress**, when perceived as unpredictable or unmanageable, can trigger painful conditions such as headaches or musculoskeletal **pain**.¹

Both recurrent or persistent **pain** and **stress** exacerbate each other, creating a vicious cycle..¹



Given the multiple factors involved in the **pain-stress** interaction, holistic, patient-centered management should include:

- The heterogeneity of **pain** types and their causes
- The individual contextual nature of the **pain** experience

This approach helps identify clinical and psychological factors that may hinder recovery (e.g., catastrophizing) or promote the development of persistent **pain**.¹

¿How to break the **pain-stress** cycle today?
Find out how here.

References:

1. Aboushaar N, Serrano N. The mutually reinforcing dynamics between pain and stress: mechanisms, impacts and management strategies. *Front Pain Res* (Lausanne). 2024 Nov 18;5:1445280.

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Headaches: an underdiagnosed and undertreated condition

Barriers to the effective treatment to recurrent headaches include:¹

- Lack of diagnosis and medical treatment.
- Limited attention from healthcare professionals.
- Self-medication and low awareness of the condition.

References:

1. World Health Organization. Migraine and other headache disorders. Ginebra, 2024. [Internet]
Consultado en abril de 2025. Disponible en <https://www.who.int/news-room/fact-sheets/detail/headache-disorders>

Mechanisms underlying the persistence of stress-related musculoskeletal pain

Work-related physical, organizational,
and psychosocial factors may trigger
musculoskeletal **pain** and **stress**:¹

- Organizational structure and work environment
- Workplace relationships
- Professional role and development -opportunities
- Task-related factors (posture, movement)

References:

1. Vinstrup J, Sundstrup E, Andersen LL. Psychosocial stress and musculoskeletal pain among senior workers from nine occupational groups: Cross-sectional findings from the SeniorWorkingLife study. *BMJ Open*. 2021 Mar 29;11(3):e043520.

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The pain-stress cycle: perpetuating headache and musculoskeletal pain

Humans have the capacity to modify their perception of what we consider stressful and how we respond to it.¹



However, exaggerated responses to potentially stressful situations, such as painful episodes, can trigger physiological processes that reinforce fear-based memories.¹

References:

1. Hannibal KE, Bishop MD. Chronic stress, cortisol dysfunction, and pain: a psychoneuroendocrine rationale for stress management in pain rehabilitation. *PhysTher*. 2014 Dec;94(12):1816-25.

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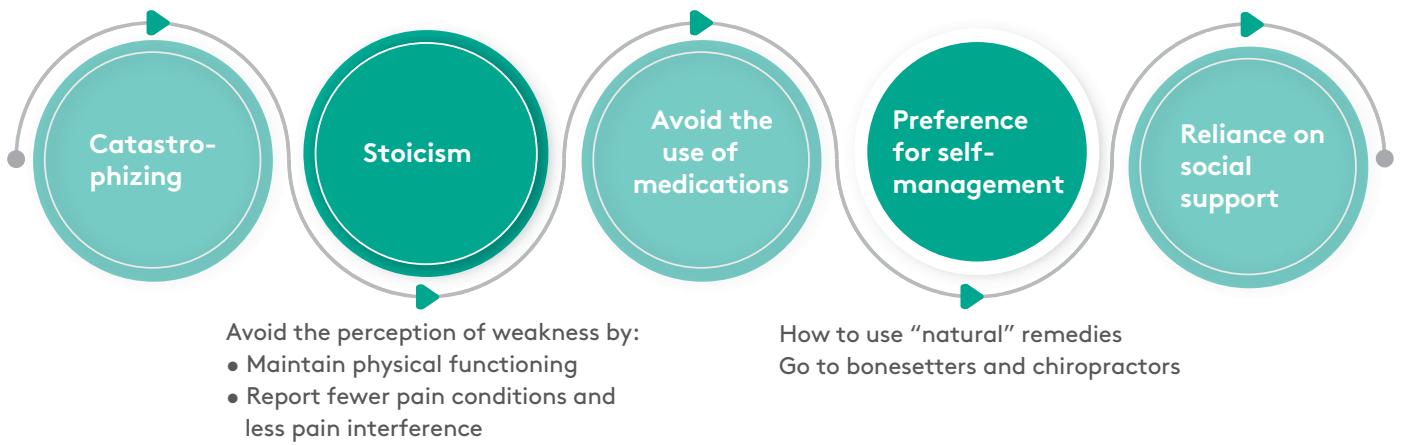
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¿BREAKING THE PAIN-STRESS CYCLE?

HOLISTIC, PATIENT-CENTERED MANAGEMENT

The onset, recurrence, and chronicity of headache and musculoskeletal **pain** associated with **stress** are influenced by both physical and psychosocial factors involved in the pain experience of each patient..¹⁻³

COPING WITH **PAIN** IN THE LATIN AMERICAN POPULATION:^{4,5}

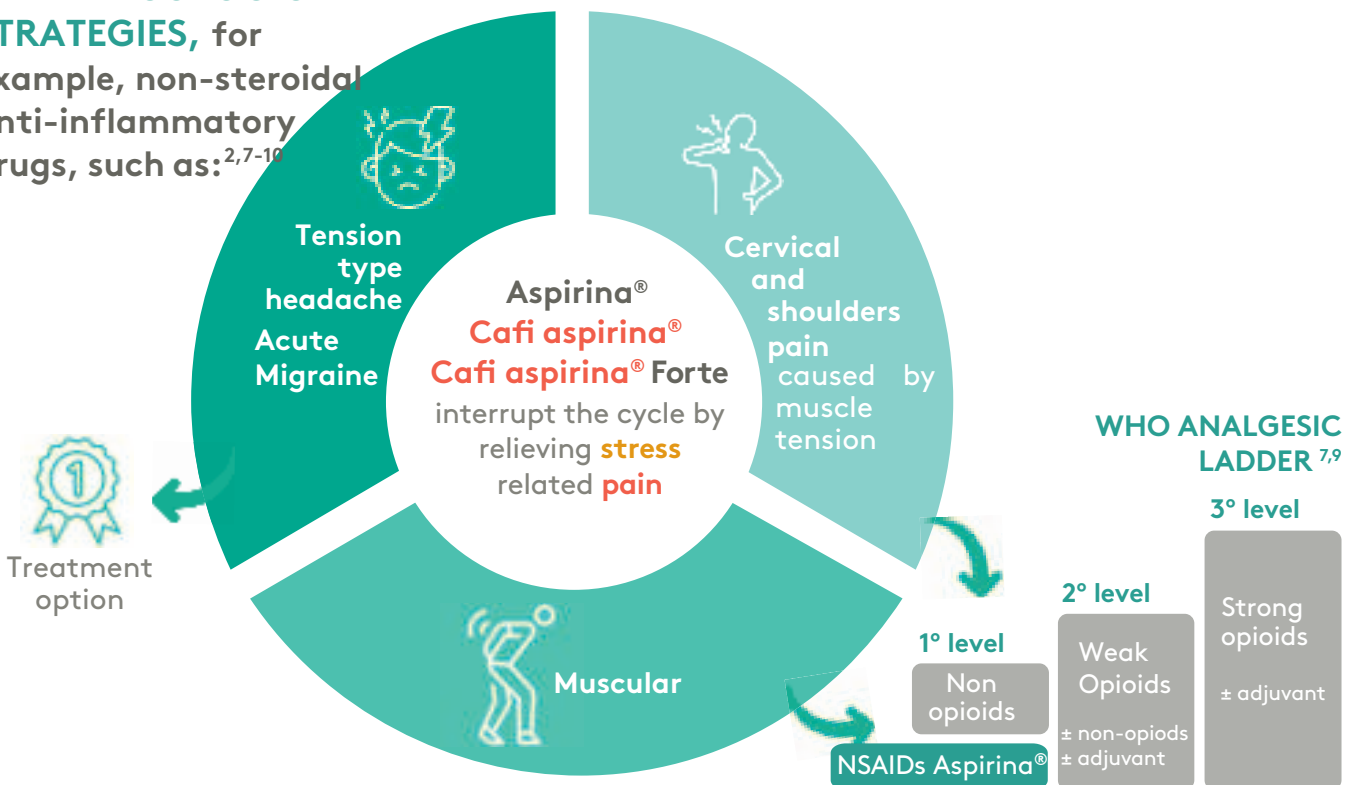


Preventing the perpetuation of the **pain-stress** cycle, requires comprehensive, timely, and patient-centered management, including:^{1,6}

NON-PHARMACOLOGICAL STRATEGIES¹



PHARMACOLOGICAL STRATEGIES, for example, non-steroidal anti-inflammatory drugs, such as:^{2,7-10}



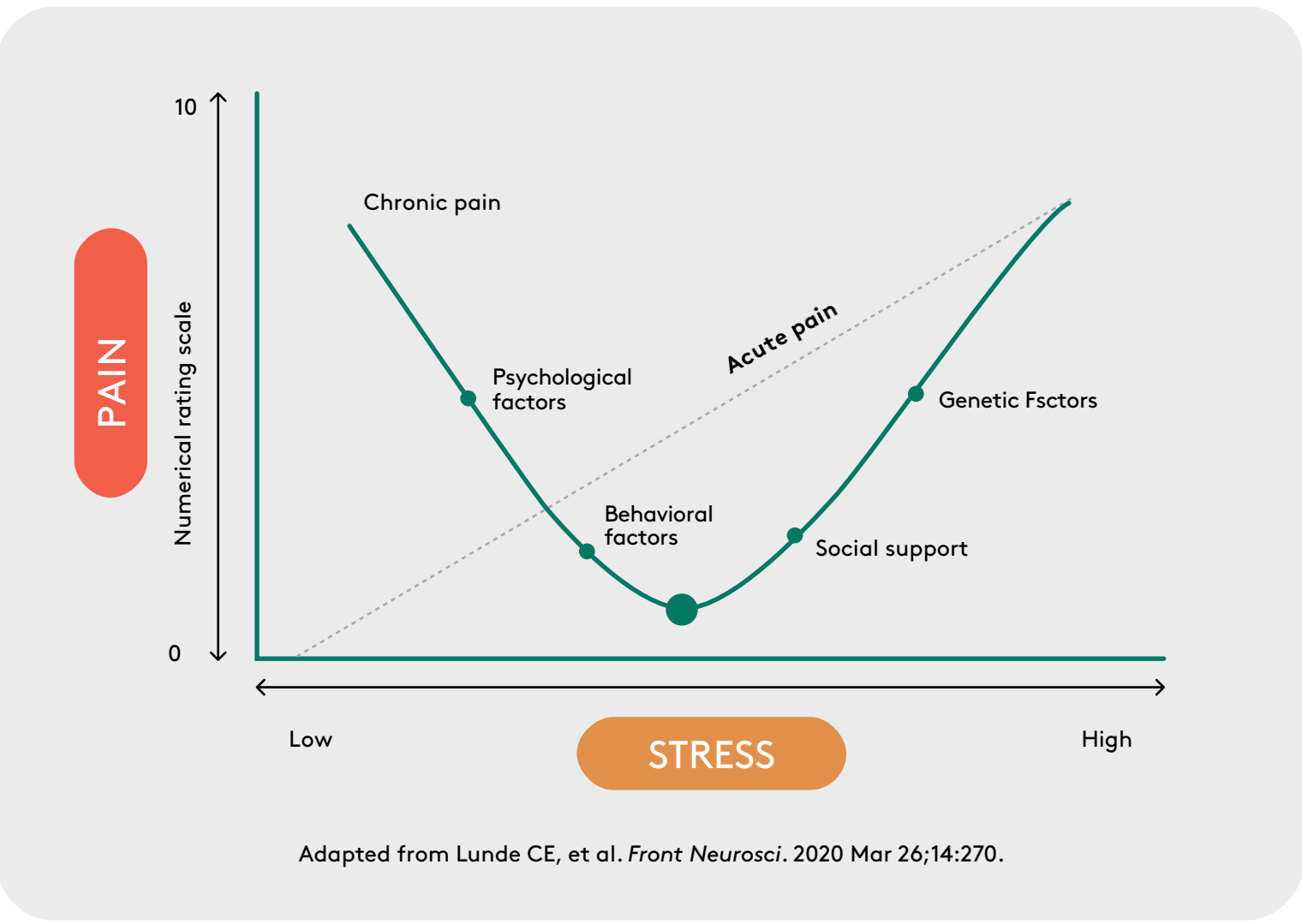
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1. Aboushaar N, Serrano N. The mutually reinforcing dynamics between pain and stress: mechanisms, impacts and management strategies. *Front Pain Res* (Lausanne). 2024 Nov 18;5:1445280.
2. Sic A, Bogicevic M, Brezic N, et al. Chronic Stress and Headaches: The Role of the HPA Axis and Autonomic Nervous System. *Biomedicines*. 2025 Feb 13;13(2):463.
3. Crofford LJ. Psychological aspects of chronic musculoskeletal pain. *Best Pract Res Clin Rheumatol*. 2015 Feb;29(1):147-55.
4. Campbell LC, Andrews N, Scipio C, et al. Pain coping in Latino populations. *J Pain*. 2009 Oct;10(10):1012-9.
5. Meints SM, Cortes A, Morais CA, Edwards RR. Racial and ethnic differences in the experience and treatment of noncancer pain. *Pain Manag*. 2019 May;9(3):317-334.
6. Ahn H, Jackson N, An K, et al. Relationship between acculturative stress and pain catastrophizing in Korean Americans. *J Immigr Minor Health*. 2021 Aug;23(4):741-746.
7. Rabah-Heresi E. Guías del dolor FEDELAT. Federación Latinoamericana de Sociedades de Dolor. La Paz, Bolivia; 2023. [Internet] Consultado en abril de 2025. Disponible en <https://fedelat.com/guías-del-dolor/>
8. Onan D, Younis S, Wallsgatnik WD, et al. Debate: differences and similarities between tension-type headache and migraine. *J Headache Pain*. 2023 Jul 21;24(1):92.
9. Médecins Sans Frontières (MSF). Clinical guidelines – diagnosis and treatment manual. Pain. Ginebra, Suiza; 2025. [Internet] Consultado en abril de 2025. Disponible en <https://medicalguidelines.msf.org/en/viewport/CG/english/pain-16689104.html>
10. Bayer Consumer Health. Carta a Comisión de Autorización Sanitaria, COFEPRIS. “Justificación de claims para ASPIRINA® y CAFIASPIRINA®”. Bayer de México, S.A. de C.V. Ciudad de México, México; 2025.

Breaking the stress-pain cycle? Comprehensive, patient-centered treatment

The **pain-stress** relationship is bidirectional, exacerbating each other (Figure).^{1,2}

Figure. Conceptual model of the relationship between **pain** and **stress**.



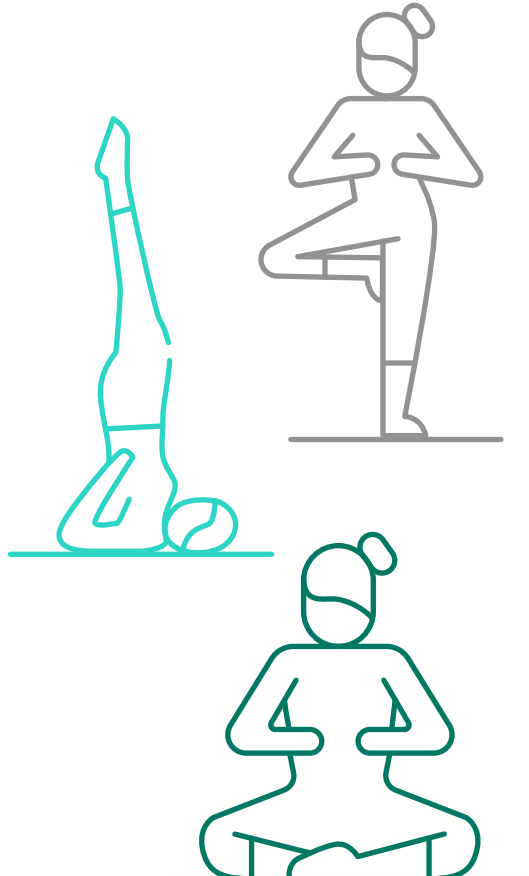
Pain is an emotional experience. Therefore, it is important to understand how each person regulates their emotions and how this influences their perception of **pain** and **stress**.³

Patient education regarding these strategies can help the individual to:

- Managing your maladaptive perceptions and responses
- Establish or maintain healthier coping strategies
- Regain control over your **stress** responses and reduce symptoms
- Improve pain perception and reduce **pain**

Stress management techniques and psychological interventions that may help break the **pain-stress** cycle include:^{2,4}

- Relaxation exercises: deep breathing and progressive muscle relaxation
- Cognitive behavioral therapy
- Acceptance and commitment therapy
- *Mindfulness (present-moment awareness, and non-judgmental)*
- Biofeedback



Lifestyle interventions can further strengthen resilience and support coping with **pain** and **stress**.⁴

Learn other strategies to break the **pain-stress. Click to learn more..**

References:

1. Lunde CE, Sieberg CB. Walking the tightrope: a proposed model of chronic pain and stress. *Front Neurosci.* 2020 Mar 26;14:270.
2. Knezevic E, Nenic K, Milanovic V, Knezevic NN. The role of cortisol in chronic stress, neurodegenerative diseases, and psychological disorders. *Cells.* 2023 Nov 29;12(23):2726.
3. Petrini L, Arendt-Nielsen L. Understanding pain catastrophizing: putting pieces together. *Front Psychol.* 2020 Dec 16;11:603420.
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Coping with the pain-stress cycle in Latin America culture

In many hispanic communities, acknowledging pain and using painkillers are often perceived as signs of weakness.¹

Remaining stoic and avoiding medications may help preserve social standing within the community.¹

To achieve optimal clinical outcomes, culturally competent health services should consider the patient's cultural background, beliefs, and values related to health and illness.²

References:

1. Meints SM, Cortes A, Morais CA, Edwards RR. Racial and ethnic differences in the experience and treatment of noncancer pain. *PainManag*. 2019 May;9(3):317-334.
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