

Computational Psychiatry Course Zurich 2021

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Psychosomatics

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Content of this lecture

Topics	Challenges for clinicians, patients & researchers
Definition of „Psychosomatics“	Misunderstandings and confusing terminology
What somatic / bodily symptoms are telling us	Insufficient recognition of suffering and high costs
Explanations for persistent somatic symptoms	Search for mechanisms beyond mind-body dualism
Developments of classification systems	Finding diagnostic names that are mechanism-driven and accepted by the medical field and patients
Treatments	Fatalism versus hope
Research agenda for the future	What remains to be done



The patient's perspective (chronic primary low back pain)

- I've been having **many years of pain**. I say to the emergency room doctors that **the reason for my pain are the discs in my back and they need to be fused**.
- I went 2–3 times to the *emergency room* last month. Maybe *50 times* over the past two years, mostly for this problem. **They say “go home, it's nothing, nothing we can do”**.
- They don't listen. I want them to take a myelogram. I want a consult with the orthopedic surgeon. **There is something that they are not seeing, but they could fix**.
- I feel so terrible **I want to commit suicide because I do not want to live on with this pain**.

All too often: Communication breakdown between „difficult patients“ and „hostile doctors“



It seems we have a definition of «Psychosomatics»...

If this patient with chronic pain is «psychosomatic», then **the matter «Psychosomatics» deals with is «the nothing»**, because he has «nothing» and «nothing» can be done...

GAME OVER WITH THIS «WHY BOTHER DEFINITION» OF PSYCHOSOMATICS?



Psychosomatic Medicine actually deals with patients who have “**something**” – they have **somatic symptoms** for which traditional medical concepts typically have “**nothing**” to offer in terms of:

- ***making a diagnosis*** based on positive criteria (instead: diagnoses by exclusion of organic causes)
- ***mechanistic explanations*** patients can understand and accept (instead: realm of lay psychology)
- ***effective therapies*** (instead: trial and error process; inadequate, harmful and expensive interventions)

Problem for Clinicians and patients alike: **Definitions for Psychosomatic Disorders are not uniform!**

- **Medically unexplained physical symptoms:** defined by «something» that is missing (i.e., a medical explanation)!
- **Somatoform symptoms (ICD-10):** as if they were of somatic origin, but they are not!
- **Functional somatic symptoms (Medical specialities):** disturbed functioning but no damage of an organ (system)
- **Somatic symptom disorder (DSM-5):** suffering from excessive psychological reactions to distressing somatic symptom(s)
- **Bodily distress syndrome (ICD-11):** suffering from many somatic symptoms alone justifies the diagnosis

Who's got somatic symptoms?

Eliassen et al, PLoS One 2016

Prevalence of bothering somatic / bodily symptoms in the last **14 days**
(Danish population)

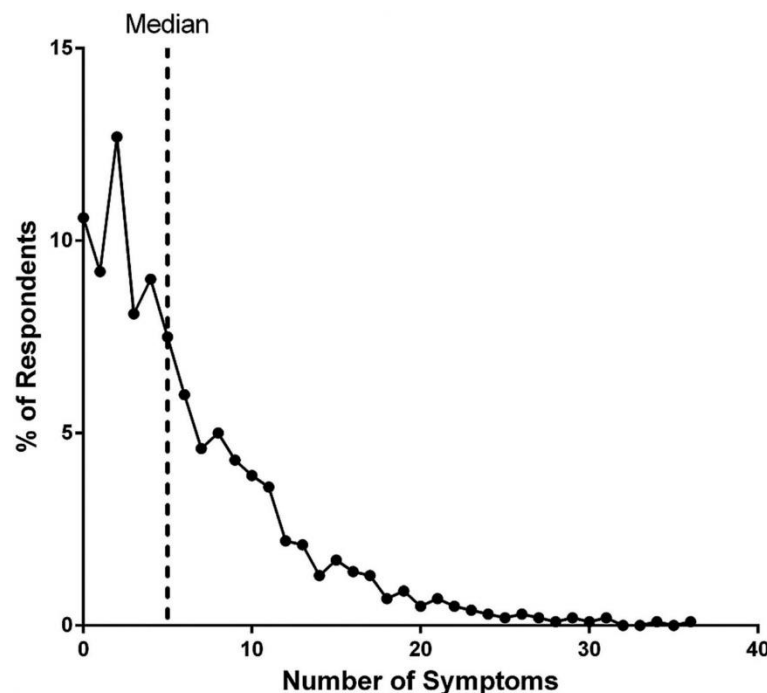
In total, **95%** (!) of ~36,000 respondents were bothered by at least one of totally 19 somatic symptoms.

Population from New Zealand (n=1,000)
List of 46 symptoms in the last **7 days**

89% reported at least one symptom,
median = 5 symptoms!

Most common symptoms were:
back pain (38%), fatigue (36%),
headache (35%), runny or stuffy
nose (34%), joint pain (34%).

Petrie et al, BMJ Open 2014



Symptom	Prevalence in total population (%)		
	Bothered in total	Somewhat bothered	Considerably bothered
Tiredness	60.7	48.8	11.9
Neck or shoulder pain	50.6	38.6	12.0
Back pain	49.7	37.5	12.2
Pain in leg/hip/knee	44.2	32.4	11.8
Headache	41.2	34.4	6.8
Cold, running nose, coughing	33.6	27.2	6.4
Sleeplessness	33.5	26.9	6.6
Stomach pain/abdominal distension	32.5	27.2	5.3
Indigestion, loose/hard stools	27.8	23.0	4.8
Skin rash, itching, eczema	21.3	17.6	3.7
Respiratory distress	20.6	17.1	3.5
Dizziness	17.9	15.4	2.5
Impaired hearing	17.7	14.8	2.9
Impaired vision	17.0	14.6	2.4
Rapid heart beat	14.6	13.0	1.6
Urinary incontinence	12.7	10.5	2.2
Nausea	11.8	10.2	1.6
Chest pain/discomfort	11.1	9.8	1.3
Urinary retention	4.1	3.4	0.7

How often is an organic cause of somatic symptoms? 3-year incidence of an emerging organic cause of the 10 most common somatic symptoms in out-patients of an internal medicine clinic

Although diagnostic testing was performed in more than two thirds of the patients, an **organic cause** for any symptom could be detected **in only 16%!**

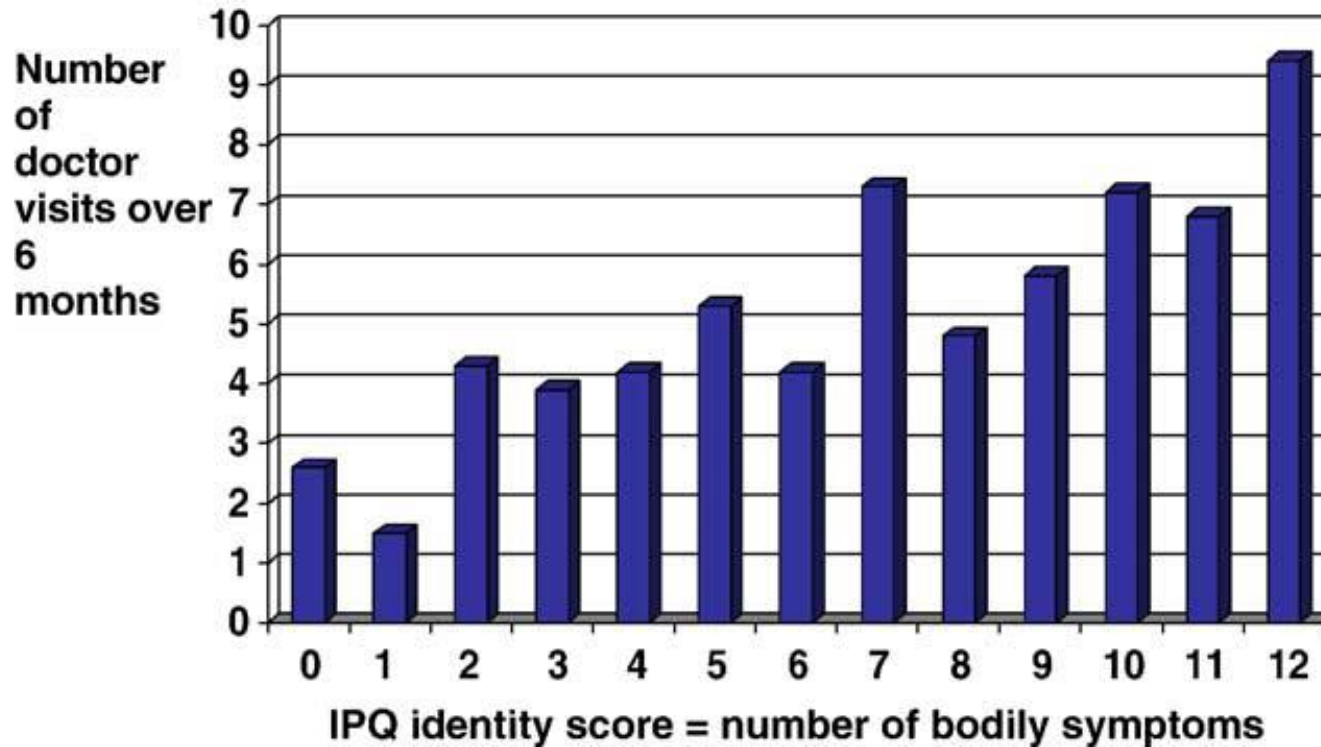
Somatic symptoms	Organic cause (%)
Chest pain	12
Fatigue	13
Dizziness	12
Headache	5
Edema	18
Back pain	3
Dyspnea	13
Insomnia	1
Abdominal pain	4
Numbness	5

Additional sobering findings:

- **Costs** of discovering an organic cause were high (particularly for headache and back pain)
- **Treatment** was often ineffective.
- **Improvement** in 50% of cases, although independent of treatment
- **Prognostic factors** for a favorable outcome:
 - organic cause of symptoms
 - symptom duration < 4 months
 - number of symptoms < 3

The number of medical consultations increases linearly with the number of somatic symptoms

This relationship is independent (!) of a) whether the symptoms can «medically» be explained or not and b) the presence of symptoms of depression and anxiety



295 patients with somatic symptoms from neurology, cardiology and gastroenterology outpatient departments.

Jackson et al, J Psychosom Res 2006

Interim conclusion - A high number of somatic symptoms is associated with:

- Poor health status
- Poor functional status
- Sick leave
- Increased health care use and costs
- These relationships are independent of the etiology of the symptoms!
- Still, the **focus** in health research has mostly been on „medically explained“ somatic symptoms or on only a few specific „medically unexplained“ somatic symptoms (e.g., fatigue, pain) **instead of** focusing on multiple somatic symptoms in general, which tend to occur together in the same person.
- Patients with multiple somatic symptoms tend to fall between chair and bench of medical specialties - **Psychosomatic Medicine is the medical specialty for these patients!**



Original Research Reports

“Psychosomatic”: A Systematic Review of Its Meaning in Newspaper Articles

- Systematic text word search and consensus rating of the meaning of the word “psychosomatic” in articles published in 14 U.S. and U.K. newspapers 1996-2002.
- “Psychosomatic” had a **pejorative meaning**, such as “imaginary” or “made up,” in 74 of 215 (34%) of the articles in which the meaning could be judged.
- Most commonly, “psychosomatic” was used **to describe a psychological problem or one in which the mind affects the body (56%)** rather than a reciprocal interaction (5%).
- More needs to be done to educate the media about its actual meaning to make it attractive to patients.



Oxford English Dictionary

Defines “psychosomatic” as **caused** or aggravated **by a mental factor** such as internal conflict or stress.

...and this meaning was (and still is) often *the one* attributed to the field by other doctors, trainees, and the lay public.

Boland et al, Psychosomatics 2018

Somatoform Disorders have been viewed as «classical psychosomatic disorders»

The ICD-10 defines *persistent somatoform pain disorder* as a “psychogenic” disorder: The predominant complaint is of persistent, severe, and distressing pain, which cannot be explained fully by a physiological process or a physical disorder, and *which occurs in association with emotional conflict or psychosocial problems that are sufficient to allow the conclusion that they are the main causative influences.*



12-month prevalence of somatoform disorders in Europe

Mental disorders in Europe in 2010

20'400'000 (5%) Europeans suffer from somatoform disorders!

(includes somatization disorder, undifferentiated somatoform disorder, pain disorder and hypochondriasis)

Only major depression (~30 mio), insomnia (~29 mio) and specific phobias (~23 mio) affect more Europeans than somatoform disorders.



Definition by the *American Psychosomatic Society (APS)* – founded in 1942

APS Mission 2020: «To advance the scientific understanding and ***multidisciplinary integration*** of **biological, psychological, behavioral** and **social factors** in human health and disease.»

- **Psychosomatic Medicine is not equivalent with what is understood by the term psychiatry.**

Psychiatry is concerned with the study and therapy of the *disturbances of the mind* whether these disturbances are the results of emotional experiences, or of anatomical changes (degenerative, inflammatory processes, or neoplasms) of the central nervous system.

Psychosomatic Medicine covers a different and broader field. Its object is *to study in their interrelation the psychological and physiological aspects of all normal and abnormal bodily functions* and thus to *integrate* somatic therapy and psychotherapy.

- **Psychosomatic Medicine is not restricted to any specific field of pathology.**

Medical specialties such as internal medicine, pediatrics, dermatology, etc., *may be so restricted*.

Psychosomatic Medicine, however, is not a medical specialty of this kind; it designates a *method of approach to the problems of etiology and therapy* rather than a delimitation of the area.



«Modern» Psychosomatic Medicine relies on the *Bio-Psycho-Social Model* of Health and Disease, both in clinical practice and research

Engel, Science 1977



- George L. Engel, MD
- University of Rochester Medical Center (NY)
- Department of Medicine & Department of Psychiatry
- Internist and Psychoanalyst
- President of the American Psychosomatic Society 1953

„The dominant model of disease today is *biomedical*, and it leaves no room within this framework for the *social*, *psychological*, and *behavioral* dimensions of illness.“

«The physician's basic professional knowledge and skills must span the social, psychological, and biological, for his decisions and actions on the patient's behalf involve all three.»

«Are the *fatigue and weakness* of the woman who recently lost her husband conversion symptoms, psychophysiological [stress] reactions, manifestations of a somatic disorder, or a combination of these?»

Bio-psycho-social history taking is needed to answer this problem, incl. a *landscape of somatic symptoms* (yields an accurate diagnosis in ~ 80%!)

Morgan & Engel. *The Clinical Approach to the Patient*. Saunders, 1969

DD Chronic Fatigue (>6 months): somatic, psychological, and behavioral causes

Infectious diseases

Hepatitis C, HIV, Lyme borreliosis, giardiasis, EBV, **Covid-19!!!**

Sleep disorders

OSAS, restless legs syndrome, narcolepsy

Endocrine and metabolic diseases

M. Addison, M. Cushing, poorly controlled diabetes, thyroid disorders, hypopituitarism

General medical disorders

Anemia, iron deficiency, chronic hepatic or renal disease, malnutrition, medication side effects, chronic pain disorders

Psychological causes

Depression, anxiety disorders, bipolar disorders, schizophrenia, PTSD, eating disorders, childhood trauma

Rheumatological diseases

Rheumatoid arthritis, systemic lupus erythematosus, Sjögren syndrome, vasculitis, sarcoidosis

Cardiopulmonary diseases

Chronic heart failure, idiopathic pulmonary hypertension, COPD, postural orthostatic tachycardia syndrome

Gastrointestinal diseases

Celiac disease, IBD, autoimmune hepatitis, liver cirrhoses

Malignancies

Lymphoma, occult tumors, cancer-related fatigue

Neurological diseases

Multiple sclerosis, myasthenia gravis, Parkinson's disease, muscle dystrophy, beginning dementia

Life-style-associated (behavior)

Overwork, chronic stress, morbid obesity, alcoholism / drugs, overtraining



Prevalence of chronic fatigue (> 6 months) without medical or psychiatric causes

- Population-based studies: 2%
- Primary care: 9%

Buchwald et al, Ann Intern Med 1995

Bates et al, Arch intern Med 1993

Prevalence of Chronic Fatigue Syndrome (CFS)

- Population-based studies (interview): 0.8% (95% CI: 0.2-1.3)
- Population-based studies (self-report): 3.5% (95% CI: 2.4-4.6)
- Primary care: 1.7% (95% CI: 0.4-1.4)

Johnston et al, Clin Epidemiol 2013



Proposed Diagnostic criteria for Chronic Fatigue Syndrome (Myalgic Encephalomyelitis)

Clinically evaluated, unexplained, persistent or relapsing chronic fatigue for ≥ 6 months, which is not the result of ongoing exertion, not substantially alleviated by rest, and results in substantial reduction in previous levels of occupational, educational, social, or personal activities.

Plus at least 4 of the following symptoms (≥ 6 months)

- Impaired memory or concentration
- Sore throat
- Tender cervical or axillary lymph nodes
- Muscle pain
- Multi-joint pain
- New headaches
- Unrefreshing sleep
- Post-exertion malaise

Centers for Disease Control and Prevention definition of CFS;
Fukuda et al, Ann Intern Med 1994

Diagnosis requires that the patient have the following three symptoms:

1. A substantial reduction or impairment in the ability to engage in pre-illness levels of occupational, educational, social, or personal activities that persists for more than 6 months and is accompanied by fatigue, which is often profound, is of new or definite onset (not lifelong), is not the result of ongoing excessive exertion, and is not substantially alleviated by rest,
2. Post-exertional malaise, * and
3. Unrefreshing sleep*

At least one of the two following manifestations is also required:

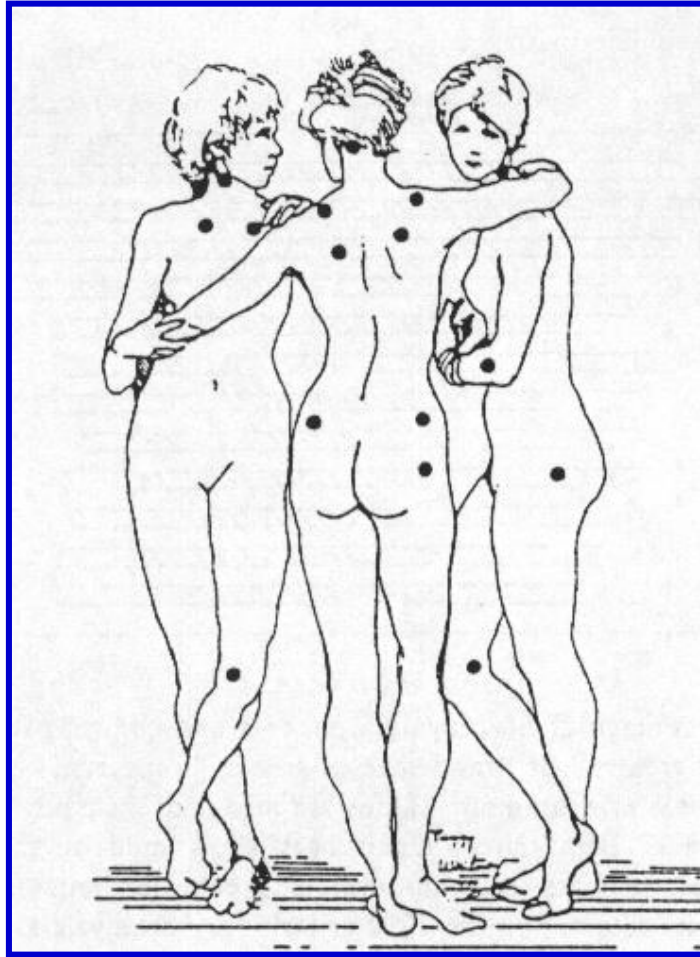
1. Cognitive impairment* or
2. Orthostatic intolerance

* Frequency and severity of symptoms should be assessed. The diagnosis of ME/CFS should be questioned if patients do not have these symptoms at least half of the time with moderate, substantial, or severe intensity.



Fibromyalgia Diagnostic Criteria (American College of Rheumatology 2016)

Tender points in 1990



Criteria

A patient satisfies modified 2016 fibromyalgia criteria if the following 3 conditions are met:

- (1) Widespread pain index (WPI) ≥ 7 and symptom severity scale (SSS) score ≥ 5 OR WPI of 4–6 and SSS score ≥ 9 .
- (2) Generalized pain, defined as pain in at least 4 of 5 regions, must be present. Jaw, chest, and abdominal pain are not included in generalized pain definition.
- (3) Symptoms have been generally present for at least 3 months.
- (4) A diagnosis of fibromyalgia is valid irrespective of other diagnoses. A diagnosis of fibromyalgia does not exclude the presence of other clinically important illnesses.

Ascertainment

(1) **WPI:** note the number of areas in which the patient has had pain over the last week. In how many areas has the patient had pain? Score will be between 0 and 19

Left upper region (Region 1)

Jaw, left^a
Shoulder girdle, left
Upper arm, left
Lower arm, left

Right upper region (Region 2)

Jaw, right^a
Shoulder girdle, right
Upper arm, right
Lower arm, right

Axial region (Region 5)

Neck
Upper back
Lower back
Chest^a
Abdomen^a

Left lower region (region 3)

Hip (buttock, trochanter), left
Upper leg, left
Lower leg, left

Right lower region (Region 4)

Hip (buttock, trochanter), right
Upper leg, right
Lower leg, right

(2) Symptom severity scale (SSS) score

Fatigue
Waking unrefreshed
Cognitive symptoms

For the each of the 3 symptoms above, indicate the level of severity over the past week using the following scale:

- 0 = No problem
- 1 = Slight or mild problems, generally mild or intermittent
- 2 = Moderate, considerable problems, often present and/or at a moderate level
- 3 = Severe: pervasive, continuous, life-disturbing problems

The symptom severity scale (SSS) score: is the sum of the severity scores of the 3 symptoms (fatigue, waking unrefreshed, and cognitive symptoms) (0–9) plus the sum (0–3) of the number of the following symptoms the patient has been bothered by that occurred during the previous 6 months:

- (1) Headaches (0–1)
- (2) Pain or cramps in lower abdomen (0–1)
- (3) And depression (0–1)

The final symptom severity score is between 0 and 12

The fibromyalgia severity (FS) scale is the sum of the WPI and SSS

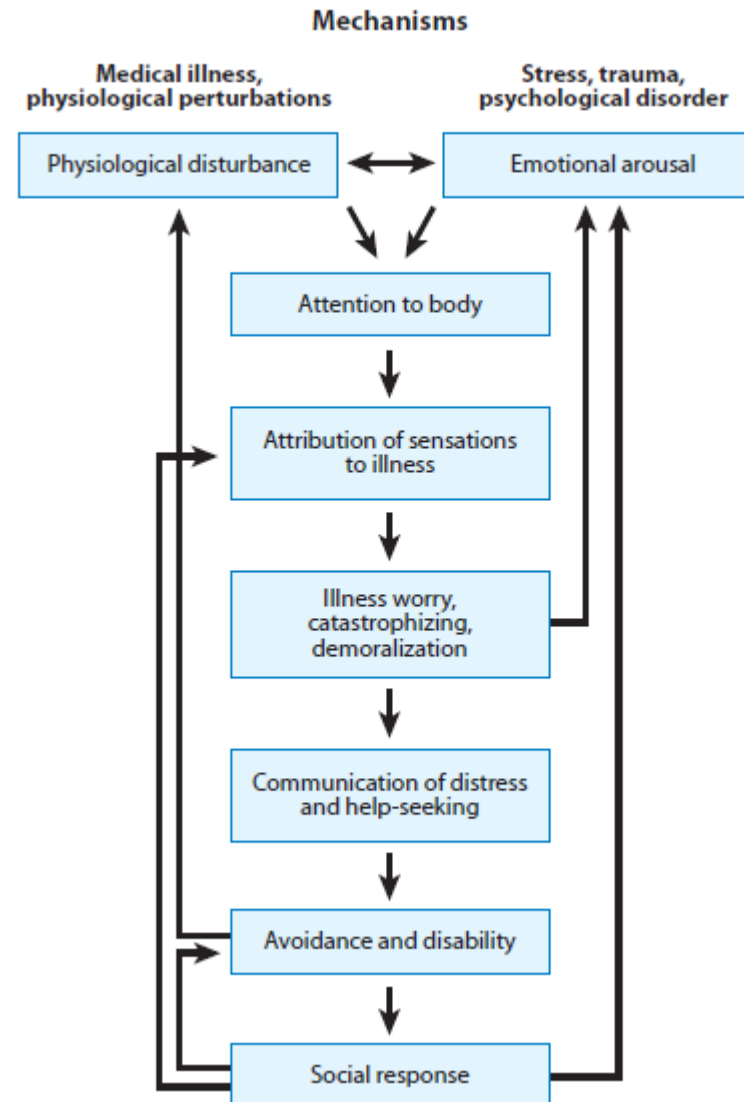
Mechanisms (I): Somatosensory amplification of perception in somatoform disorders

Neurocircuitry framework for somatosensory amplification

Identified brain regions:

- Anterior cingulate cortex
- Insula
- Amygdala
- Hippocampal formation
- Striatum

Perez et al, J Neuropsychiatry Clin Neurosci 2015



Somatosensory amplification:

Amplified perception of benign physiological sensations and their misattribution to serious diseases

Checking behavior:

Self-inspection of body functions for signs of disease

Rief & Martin, Annu Rev Clin Psychol 2014
Kirmayer & Taillefer, Wiley & Sons Inc. 1997
Barsky et al, Psychosom Med 1988

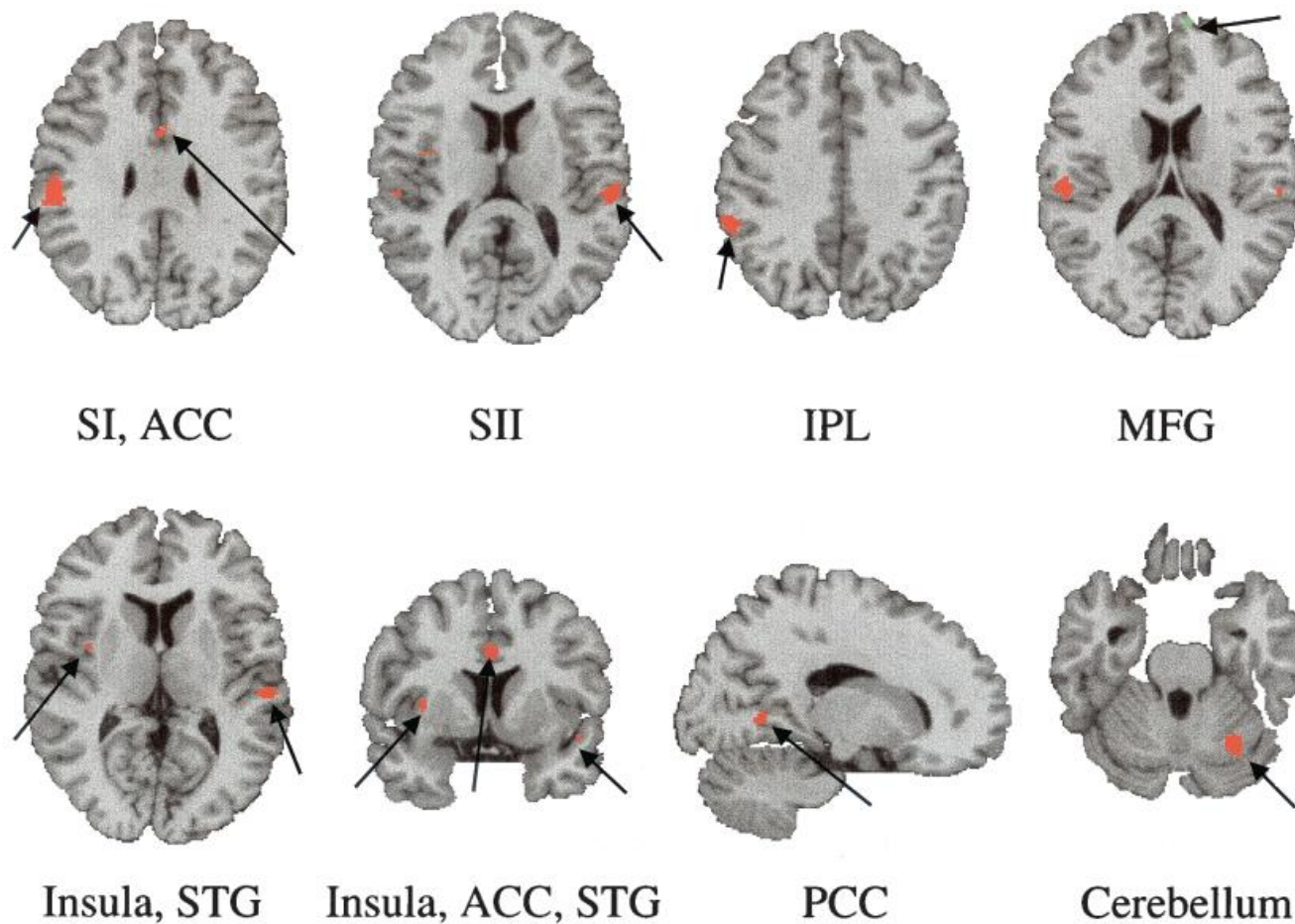
Mechanisms (II): **Central sensitization** (CS) as and underlying pathophysiology in functional somatic symptoms and syndromes (e.g. CFS, fibromyalgia)

- CS denotes **hyperexcitement of central neurons** through an **amplification of neural signaling** involving various synaptic and neurotransmitter activities.
- CS manifests clinically as **hypersensitivity** (e.g. hyperalgesia) **to** various **noxious** (eg, pressure and heat), as well as **non-noxious** (eg, touch) **stimuli**.
- Whether CS is absolutely requiring an afferent **input** or can be completely **autonomous** is debated (e.g., if pain memory can “produce” pain without any sensory input).

Woolf et al, J Physiol 1988; Yunus, Semin Arthritis Rheum 2007; Woolf, Pain 2011; Yunus, Curr Rheumatol Rev 2015



Hyperalgesia in fibromyalgia: Augmented pain processing in fibromyalgia as an evident sign for central hypersensitivity.



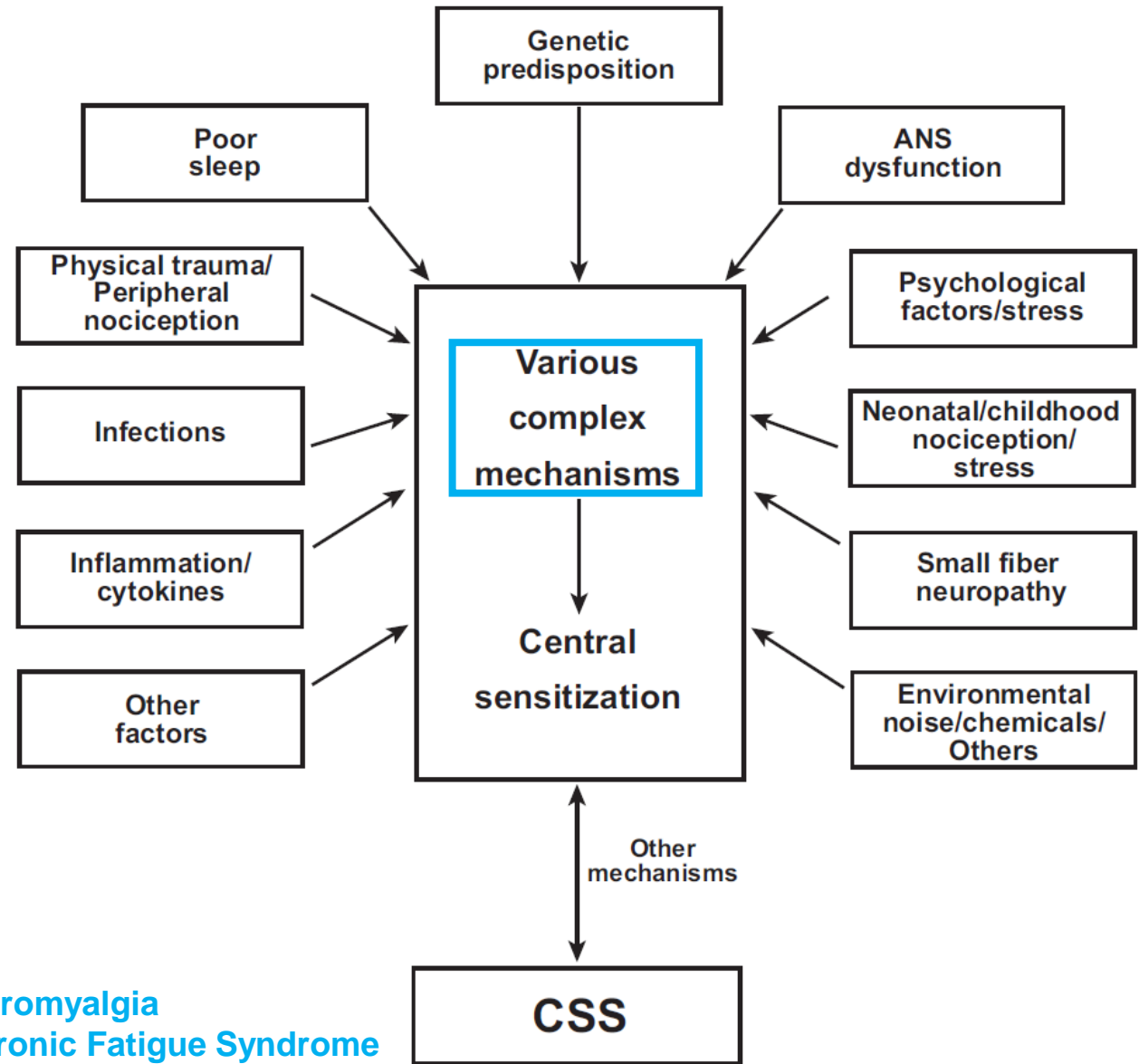
- A similar *subjective* pain condition resulted in similar activation patterns in the neural pain matrix of fibromyalgia patients and controls (applied thumbnail pressure: 2.4 vs. 4.2 kg/cm²).
- A similar *objective* pain pressure resulted in greater effects in patients vs. controls (applied thumbnail pressure: 2.4 kg/cm²).
- Regions with significantly greater fMRI responses to pain pressure in patients vs. controls (regional cerebral blood flow).
- This different brain activation pattern suggests sub/cortical augmentation of pain processing in fibromyalgia.

The complex pathophysiology of central sensitization (CS) and central sensitivity syndromes (CSS)

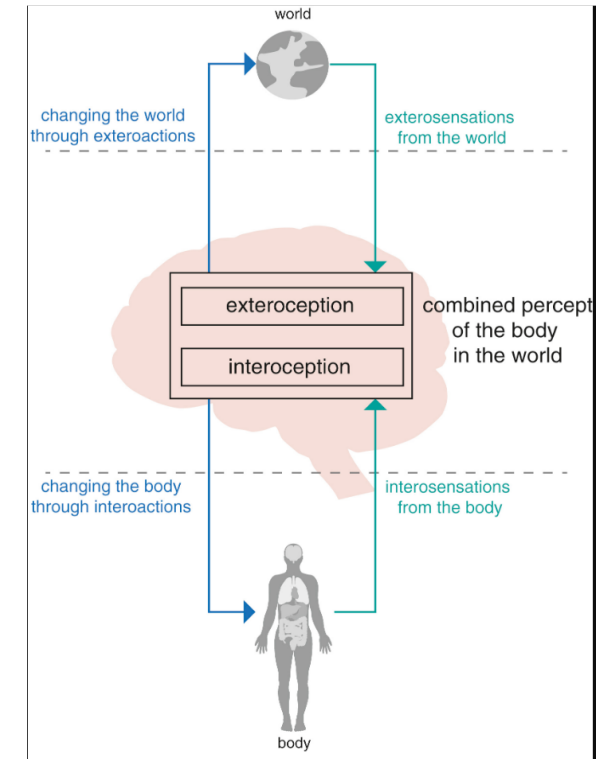
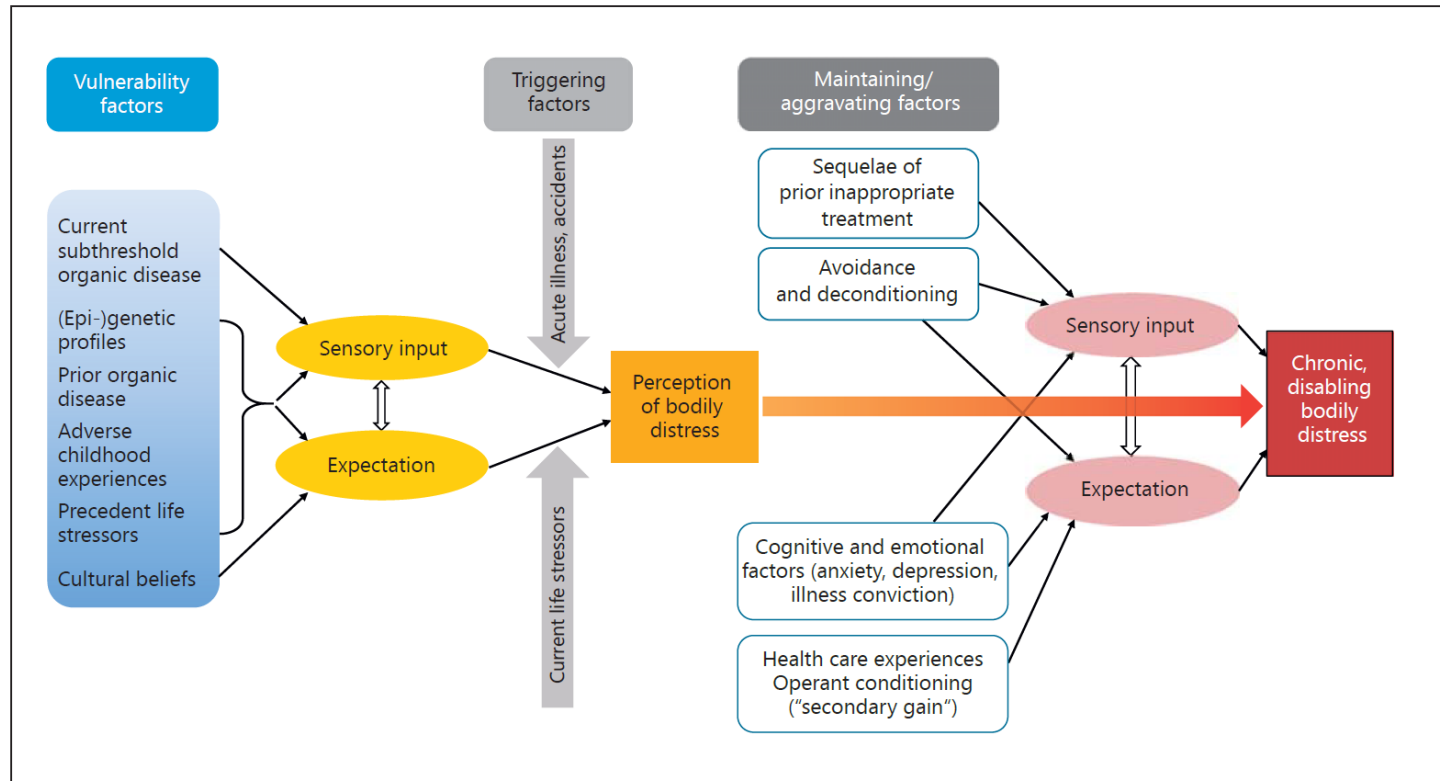
- Different peripheral and central factors contribute to CS and CSS through different and complex mechanisms.
- The relation between CSS and CS is likely to be bidirectional.
- **Chronicity** in e.g. chronic pain or chronic fatigue **may enhance CS** (“pain memory”, “fatigue memory”).

Yunus, Curr Rheumatol Rev 2015

Fibromyalgia
Chronic Fatigue Syndrome



Mechanisms (III): Disorder of perception of bodily distress



- Computational model of somatic symptoms: **The CNS is constantly constructing its environment, including bodily states.**
- Signals from bodily sensors are only processed bottom up **if they don't match** the top-down predictions which are determined by expectations.
- When overly precise top-down predictions meet with low precision bottom-up input, **disorders of perception can arise as failure of inference.**
- In this computational scenario, **the immediate perception of bodily distress could be mistaken as a symptom of an organic illness.**

Developments in the classification of persistent somatic symptoms

Confusion in terminology is only partly resolved

- Functional somatic symptoms and syndromes
- ~~Somatoform disorders~~
- ~~Medically unexplained physical symptoms~~
- Somatic symptom disorders
- Bodily distress syndrome



“The existence of specific functional somatic syndromes is largely an ***artefact of medical specialization*** rather than reflecting any real differences between patients and physiological mechanisms.”

Functional somatic syndromes by speciality

Gastroenterology	Irritable bowel syndrome, non-ulcer dyspepsia
Gynaecology	Premenstrual syndrome, chronic pelvic pain
Rheumatology	Fibromyalgia
Cardiology	Atypical or non-cardiac chest pain
Respiratory medicine	Hyperventilation syndrome
Infectious diseases	Chronic (postviral) fatigue syndrome
Neurology	Tension headache
Dentistry	Temporomandibular joint dysfunction, atypical facial pain
Ear, nose, and throat	Globus syndrome
Allergy	Multiple chemical sensitivity

Somatic Symptom Disorder (SSD): A «revolutionary» approach for DSM-5

Replaced: Somatoform disorders, somatization disorder, pain disorders, hypochondriasis

- A. One or more somatic symptom(s) that are distressing or result in significant disruption of daily life
- B. Excessive thoughts, feelings and behaviors related to these symptoms or associated health concerns. At least one of the following must be present (positive criteria):
 - 1) *Disproportionate and persistent thoughts about the seriousness of one's symptoms.*
 - 2) *persistently high level of anxiety about health or symptoms.*
 - 3) *excessive time and energy devoted to these symptoms or health concerns.*
- C. Chronicity: Although any one somatic symptom may not be continuously present, the state of being symptomatic is persistent – more than 6 months

The diagnosis includes conditions with no medical explanation and conditions where there is some underlying pathology but an exaggerated response! *“Forget about medically unexplained symptoms (Francis Creed)”*



Bodily Distress Syndrome (BDS): Diagnostic criteria for ICD-11 (effective in 2022?)

1. The patient is **moderately to severely impaired by the stated number of symptoms** from at least one of the following symptom groups:

≥3 Cardiopulmonary symptoms

Palpitations/heart pounding, precordial discomfort, breathlessness without exertion, hyperventilation, hot or cold sweats, dry mouth, trembling or shaking, churning in stomach/"butterflies," flushing or blushing

≥3 Gastrointestinal symptoms

Abdominal pains, frequent loose bowel movements, feeling bloated/full of gas/distended, regurgitations, diarrhea, nausea, burning sensation in chest or epigastrium, constipation, vomiting (other than during pregnancy)

≥3 Musculoskeletal symptoms

Pains in arms or legs, muscular aches or pains, pains in the joints, feelings of paresis or localized weakness, backache, pain moving from one place to another, unpleasant numbness or tingling sensations

≥3 General symptoms

Concentration difficulties, impairment of memory, excessive fatigue, headache, dizziness

≥4 Symptoms from any of the above symptom groups

2. Illness duration ≥ 6 months

3. Relevant differential diagnoses have been ruled out

Bodily Distress Syndrome (BDS)

Single-organ type

Fulfilling criteria for 1-3 symptom groups

Multi-organ type

Fulfilling criteria for at least 4 symptom groups

Patients with BDS vs. reference group (verified medical condition):

- Poorer **self-rated health**
- Higher **illness worries** at index consultation and throughout follow-up (2-10 yrs)
- Higher annual **health care costs** (4,066 USD vs 2,270 USD)
- 3-fold higher risk of **sick leave** during the first 2 yrs of follow-up
- Increased risk of newly awarded **disability pension** (5-fold: single-organ type, 9-fold: multi-organ type)

Rask et al, Psychosom Med 2017



Empirically tested treatments for persistent somatic symptoms

Treatment goals: Diminishing physical symptoms, health-related anxiety, preoccupation and rumination about symptoms and health concerns

- Cognitive Behavioral Therapy (CBT)
- Treatment of comorbid anxiety and depression.
- Coping with the symptoms and improving daily activities and quality of life
- Psychotropic drugs (e.g. imipramine)
- Relaxation training and mindfulness
- Problem-solving approach
- Psychodynamic psychotherapy
- Psychoeducation
- Physical activity
- Case management and collaborative care

Dimsdale et al, J Psychosom Res 2013;
Sharma & Manjula, Int Rev Psychiatry 2013;
van der Feltz-Cornelis et al, Front Psychiatry 2018



Psychological interventions for persistent somatic symptoms in adults – *they work!*

Clinically relevant small-to-medium effects can be achieved

For all studies (n=10, n= 1081 participants) comparing some form of psychological therapy with usual care or a waiting list, the psychological therapy resulted in

less severe symptoms at the end of treatment (SMD -0.34; 95% CI -0.53 to -0.16)

van Dessel et al, Cochrane Database Syst Rev 2014

Although much remains to be done, fatalism regarding treatment outcome of distressing somatic symptoms is inappropriate: instead of «nothing» can be done, «something» can actually be done!



What needs to be done! – Research agenda for Somatic Symptom Disorders, Bodily Distress Disorders and Functional Somatic Disorders

EURONET-SOMA: European initiative to improve research, treatment, communication and collaboration on persistent somatic symptoms across the age span <https://www.euronet-soma.eu/>

- (1) Development of **questionnaires** and **semi-structured interviews** to assess these conditions.
- (2) Identification of **diagnostic profiles relevant to course and treatment outcome**; incl. biomarkers (e.g., inflammation, neuroimmunology), psychological, behavioral and social factors.
- (3) Identification of **mediators and moderators** of clinical course and treatment outcomes.
- (4) Development of **effective interventions in different health care settings** - focus on diminishing symptoms, personalized treatment and **patient preferences**.
- (5) **Translational research** exploring how psychological and somatic symptoms develop from somatic conditions and biological and behavioral pathogenic factors.