The dynamical network approach of chronic stress.

Published: 19-04-2018
Last updated: 13-04-2024

The primary research aim is to identify the adaptation system as a dynamical network or complex adaptive system in which the constituent parts interact and are showing critical phases via critical phase transitions from a disease phase with serious...

Ethical review	Approved WMO
Status	Will not start
Health condition type	Other condition
Study type	Observational invasive

Summary

ID

NL-OMON48573

Source
ToetsingOnline

Brief title
The dynamical network approach of chronic stress.

Condition

- Other condition

Synonym
overstrain, tension

Health condition

chronische stress

Research involving
Human

Sponsors and support

Primary sponsor: Academisch Medisch Centrum
Source(s) of monetary or material Support: Stichting Arbo Unie

Intervention

Keyword: chronic stress, complexity science, dynamical network, early signs

Outcome measures

Primary outcome

Clinical Allostatic Load Index, a measure for chronic stress. Is chronic stress measurable in blood values?

Blood pressure, measure of stress: is hypertenion measurable?

Hair cortisol, a measure for the quantity of cortisol in the 5 months before the moment of sampling: was chronic stress measurable in terms of hair cortisol in the 5 months previous to the end of the study?

Heart Rate en Heart Rate Variability, a measure for stress and rest (sympathetic en parasympathetic activity): Do these measures show any sign of chronic stress?

Questionnaires to measure chronic stress.

Questionnaires to measure chronic stress related disorders.

Questionnaires work en private situation, to map the stress factors present in the work- en private situation.

Secondary outcome

Not applicable.

Study description

Background summary

Traditional approaches in research in the field of stress and stress related disorders have led to fragmented knowledge (9, 10).
Therefore we adopt a scientifically fundamentally different research approach in this field: the dynamic network approach. This dynamical network approach is originating in the complexity approach of science. In complexity science the behaviour of a system or model (complex systems) is studied. In a complex system, or complex adaptive system, the constituent parts interact in mutually various ways and these interactions obey local rules. There exists no centrally applied rules to steer these interactions. The total of local interactions determine the behaviour of the whole system. This phenomenon is called emergence (15, 16, 17, 18, 19, 20).
In this study we approach the stress system (alert system) as a complex adaptive system, in which the constituent parts influence each other and interact in various and multiple ways and are continuously prone to change in time (dynamic). We consider the stress system in terms of a network in which the parts are continuously in interaction and change in time, depending on what happens in the environment of the complex adaptive system.
Complex adaptive systems experience change under the stimuli coming from its environment, but have a certain resilience to change (21, 22, 23, 24, 25). However, when the stimuli from the environment become larger and stronger and more frequent, there will be a point at which the complex adaptive system will show a radical change. This radical change is called a critical phase transition, in which the system flips over towards another state or phase, which takes place at a so called tipping point (bifurcation point) (21, 22, 23, 24, 25).
This critical phase transition is exactly what we think happens in chronic stress: the stress stimuli in the environment become so strong an frequent, that the system approaches the tipping point and undergoes a critical phase transition towards another phase (chronic stress phase) and finally towards disease.
The constituent parts of a complex adaptive system show early warning signals when approaching the tipping point (27, 28, 29). These early warning signs can be measured. In this study we want to detect and measure these early warning signs. To be able to make chronic stress and its early warning signs visible and more tangible by looking at these phenomena as a dynamic network is important, because sofar traditional approaches failed to picture a clear map towards progress, which is really needed, since overstrain, burn out and other stress-related disorders have a high prevalence and come with high costs, not only in the Netherlands, but also internationally (1, 2, 3, 4).

The cause is the continuous wear and tear of daily life and continuing stimuli and strain, which has become normal in our busy times (5).

Repeated and long-lasting exposure to stressors, resulting in semi-continuous activation of our stress system in some periods during life aren*t only a likely cause of overstrain and burn out, but play also a role in developing musculoskeletal disorders and cardiovascular disease.

Chronic stress doesn*t only effect health directly, but also indirectly by predisposing individuals to unhealthy life styles (5, 7).
Stressors and activation of the stress system effect health, work and functioning (5, 6, 7). In the Netherlands it is estimated that at least one third of work absenteïsm is associated with psychological complaints because of stress related factors (8).

Scientific research in this field has been difficult and fragmented (9, 10), since our stress system is such a complicated system, especially in relation to our (private and working) environment. Not surprisingly, since the human stress system has so many different aspects, which have been developed by the forces of evolution (13) and which are intertwined in a very complex way.
The last years at least two theoretical notions of chronic stress have been developed: the allostatic load theory and the cognitive activation theory of stress (7, 10, 11, 12). A third important theory in stress research is the *stress adaptation model* theory (26), stating that different clinical entities like burn out, overstrain, fibromyalgia, chronic musculoskeletal complaints and chronic fatigue syndrome might have at their origins the same mechanisms of pathophysiology.

More light should be shed on the phenomenon of chronic stress as a costly factor in our modern society, with its overload of external stimuli of especially psychological character as well as of internal mental origin. The classical research has been successful, but could not elicit the reasons why one individual develops chronic stress, where another individual does not and could so far not explain those aspects of chronic stress, we need to understand to be able to really prevent and treat chronic stress. The stress system has extensively been investigated, but until now with classical scientific research methods, leading to research where isolated variables of stress are investigated, where all of the aspects and variables which influence the stress phenomenon are very densely interrelated (14). This makes it difficult to unravel the human stress system and the development of chronic stress, so that new ways of research are needed and must be explored. One of the new and promising approaches in research is the complexity approach or dynamical network approach, using the views and combined forces of various fields in science as is usual in what is called the science of complexity, a field of science that by its mere nature requires interdisciplinary collaboration. The idea of complexity is associated with a large number of phenomena we can observe in nature, in society, in laboratory and in computer models (15, 16, 17, 18, 19, 20).

Study objective

The primary research aim is to identify the adaptation system as a dynamical network or complex adaptive system in which the constituent parts interact and are showing critical phases via critical phase transitions from a disease phase with serious health complaints to a post disease phase with chronic stress less complaints and from there back to a healthy state during adequate treatment.

Study design

This study concerns an observational, nonrandomized investigation between a group of patients who suffer from chronic stress and / or disease and receiving care as usual and a group of healthy volunteers to the question whether chronic stress can be considered as a process in which the adaptation system shows critical
phase transitions from a disease phase via one or more critical phases towards a healthy, normal phase.

Study burden and risks

Bruises after venipuncture and vasovagal reflex.

Contacts

Public
Academisch Medisch Centrum

Meibergdreef 9
Amsterdam 1105 AZ
NL
Scientific
Academisch Medisch Centrum

Meibergdreef 9
Amsterdam 1105 AZ
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

For patients
1. Between 21 and 65 years of age.
2. Having an indication for rehabilitation at BeLife, center for multidisciplinary rehabilitation and starting the treatment.
3. Referred by an occupational health physician or general practitioner with symptoms of chronic stress (positive score for chronic stress) and associated health complaints to a multidisciplinary rehabilitation program. These associated health complaints include disorders which are stress related (burn out, overstrain, anxiety disorder, depression, post-traumatic stress disorder (PTSD, chronic as well as acute), chronic complaints of the musculoskeletal system, metabolic syndrome, cardiovascular disease, serious hypertension, chronic fatigue syndrome (CFS), fibromyalgia, medically unexplained physical symptoms (MUPS))
4. A positive score for chronic stress
5. Being at work
6. Being able to write and read.
7. Written informed consent., For healthy volunteers.
1. Between 21 and 65 years of age
2. A negative score for chronic stress.
3. Being able to write and read
4. Written informed consent

Exclusion criteria

No exclusion criteria

Study design

Design

Study type:	Observational invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)
Control:	Active
Primary purpose:	Basic science

Recruitment

NL

Recruitment status:	Will not start
Enrollment:	40
Type:	Anticipated

Ethics review

Approved WMO Date:	19-04-2018
Application type:	First submission
Review commission:	METC Amsterdam UMC
Approved WMO Date:	16-07-2019
Application type:	Amendment
Review commission:	METC Amsterdam UMC

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL62117.018.17