

Cerebrum – Virtual Cognitive Rehabilitation: a modern therapy tool focused on recovering from the disorders affecting the cognitive performance of deployed soldiers



Agenda

What is stress and how the organism responds

The effect of stress on the brain - Military

Stress management within the deployment cycle (pre-during-post)

Virtual reality and its strenghts

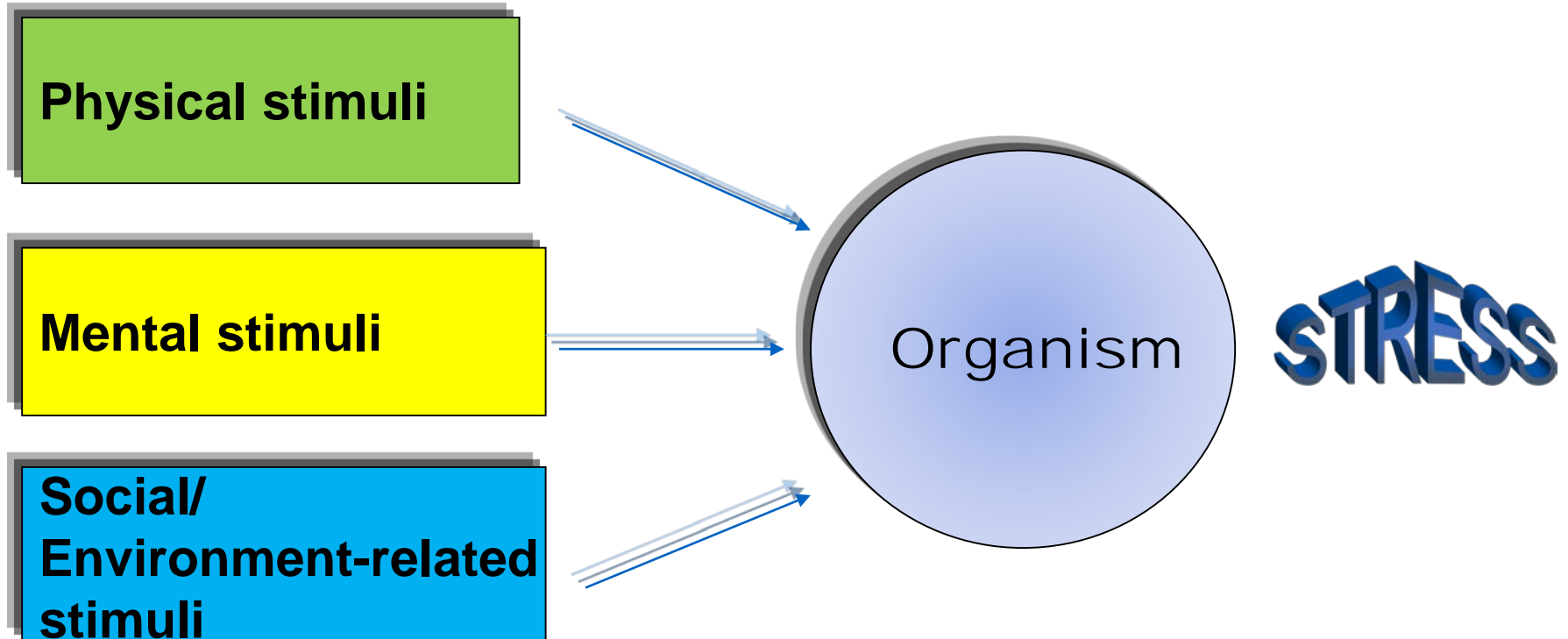
Virtual reality and the Military Environment

Virtual Reality and Rehabilitation 2.0

The Cerebrum Approach - How is it designed?

Cerebrum: application of Virtual reality to mental health of soldiers

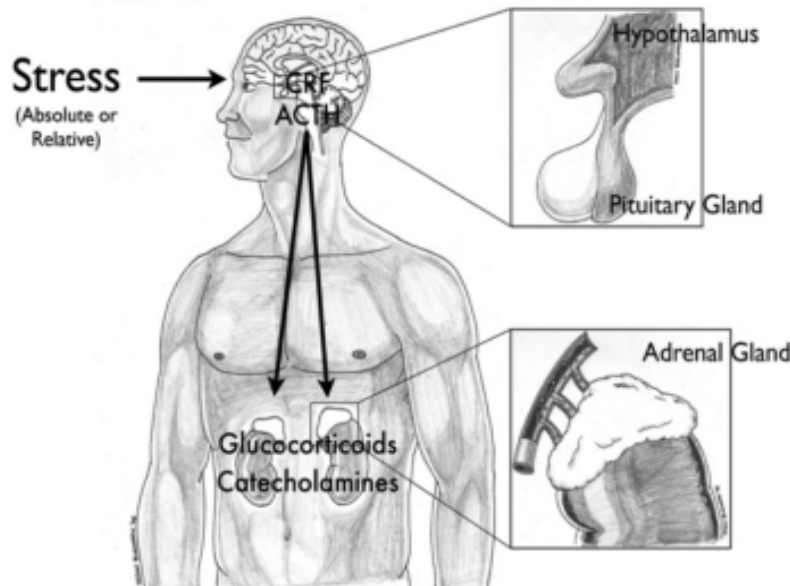
What is stress and how the organism responds



GENERAL ADAPTATION SYNDROME

Imbalance between environmental stress and the capacity to cope with it: **non-adaptive responses**

The effect of stress on the brain



Stressful situation



Activation of the HPA axis



Production of CRH and ACTH



Secretion of cortisol and catecholamines (adrenaline and noradrenaline)

Physiological concentration of cortisol: increased arousal and energy

Excessive production of cortisol: decreased brain plasticity, negative effects on neurogenesis, decreased cognitive abilities

The effect of stress on the brain- Military

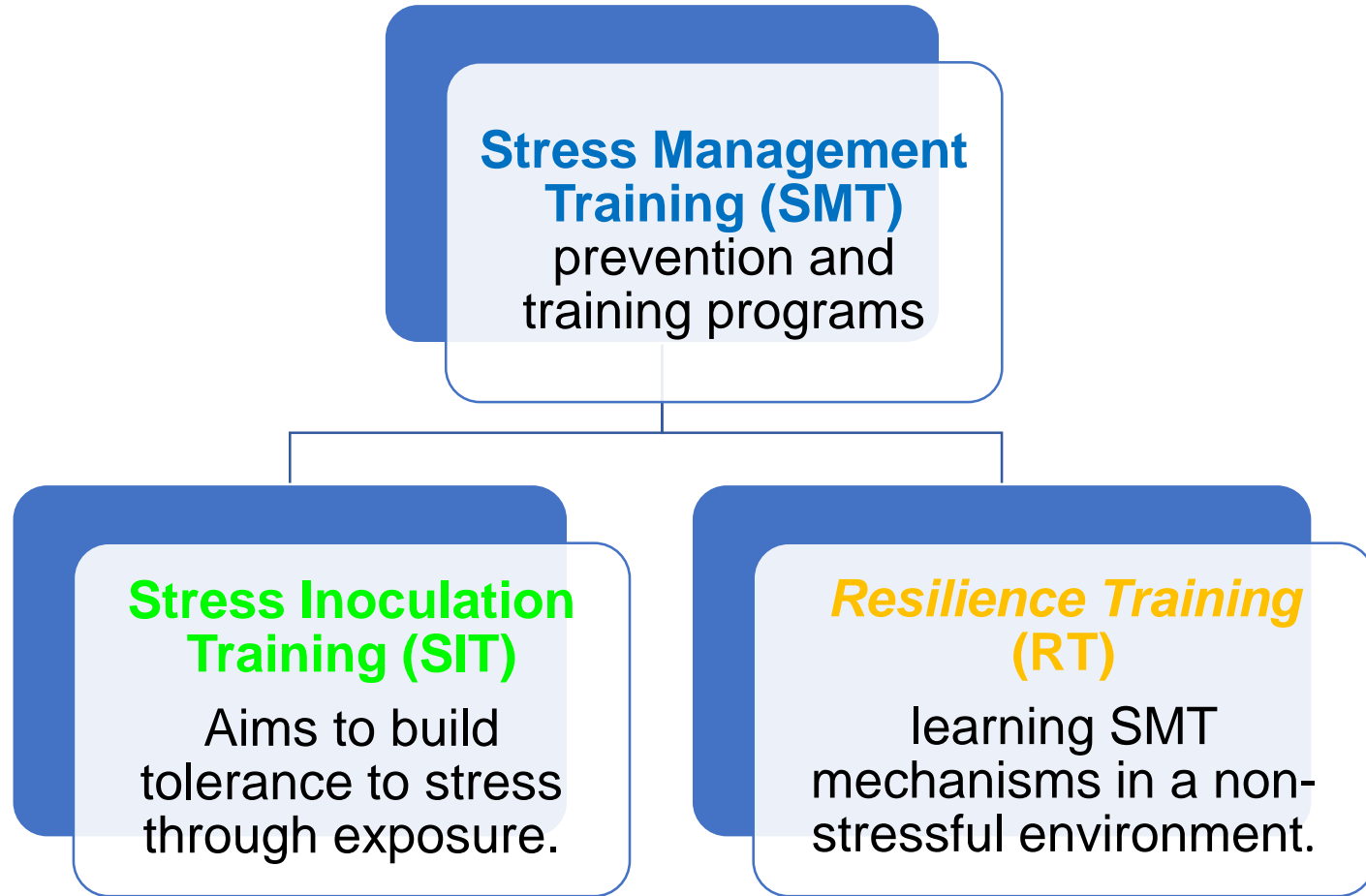
Wingen et al. (2012)

A research by the University of Amsterdam on 33 NATO soldiers deployed for 4 months to Afghanistan (ISAF)



- Reduction in **midbrain integrity** and activity and in its functional connection with the **prefrontal cortex**
- Negative effects on the brain network regulating **attention, short term memory** and **executive functions** (planning and decision making procedures)

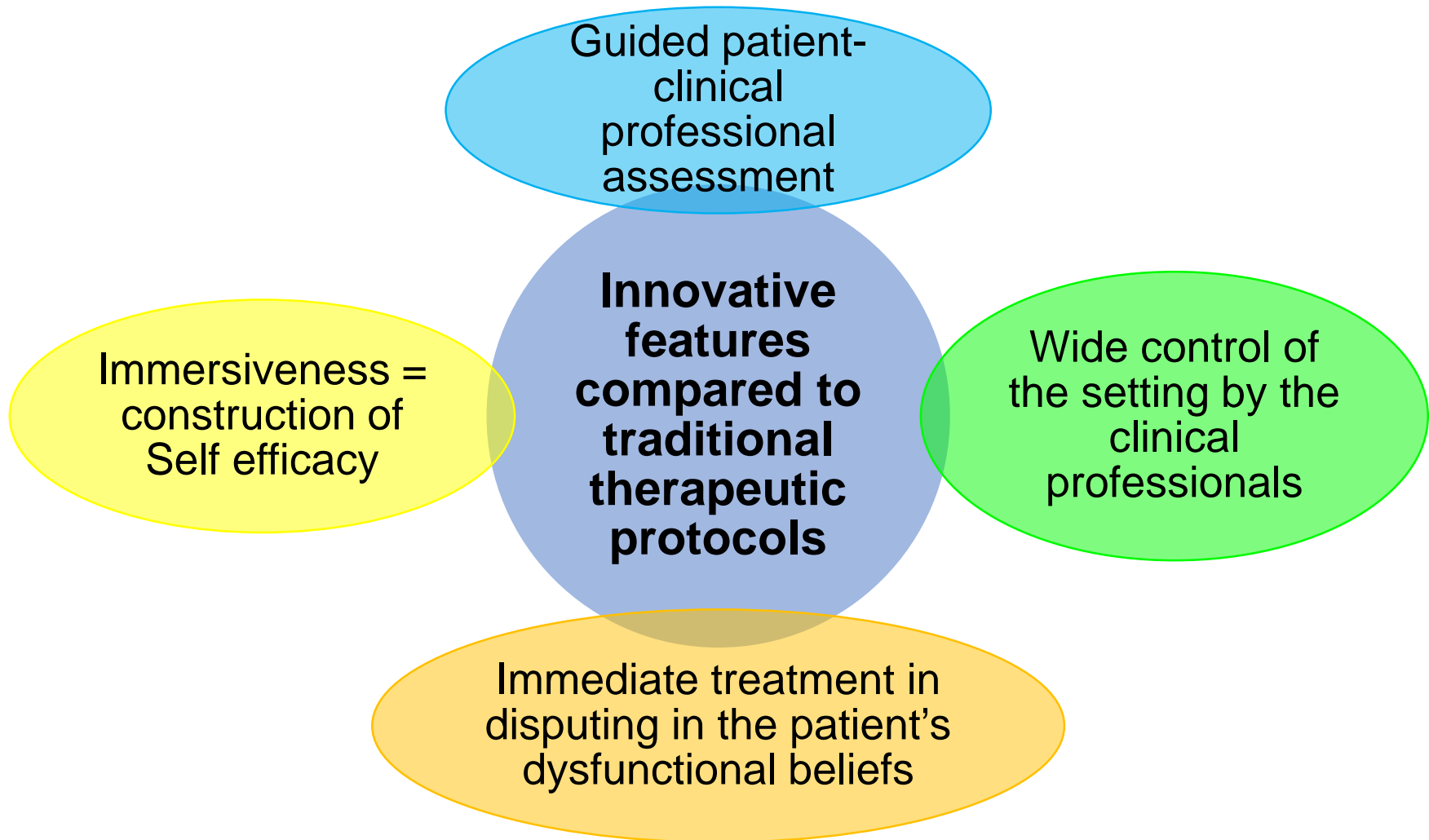
Stress management within of the deployment cycle (pre-during-post)



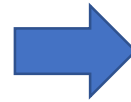
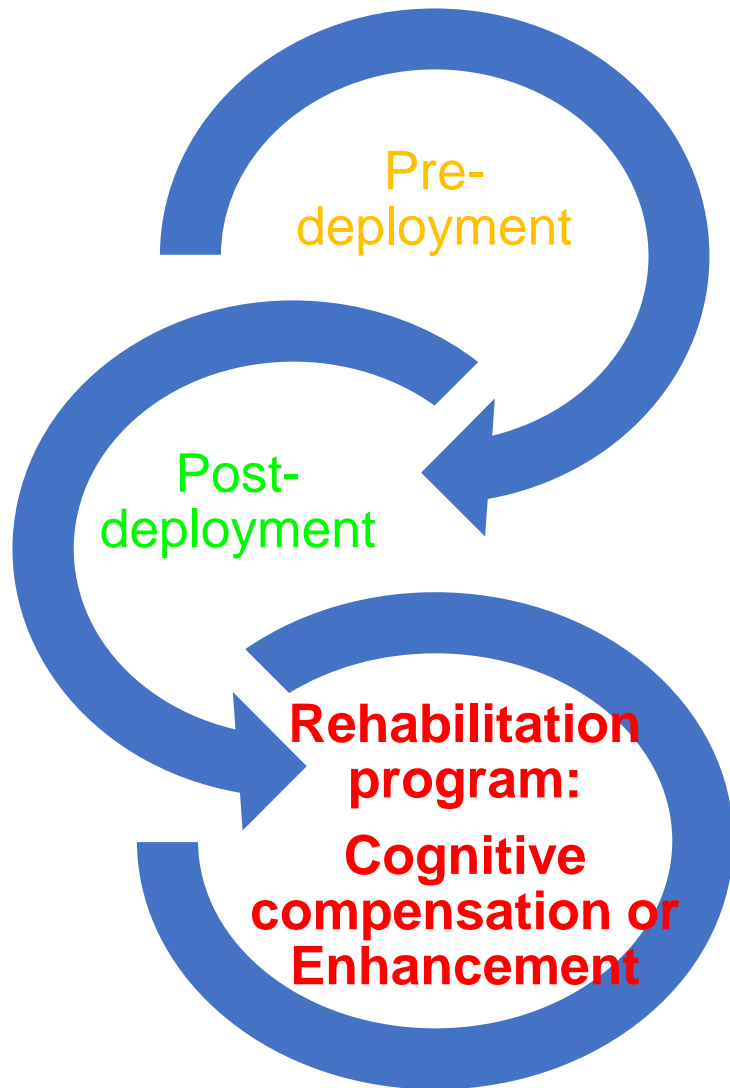
Combined Training

improving performance and building up adaptation capacity for soldiers

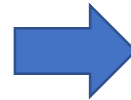
Virtual reality and strenghts



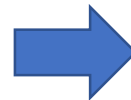
Virtual reality and Military Environment



Pre-emptive learning of the processes needed to master reality (**as the Self**)



VR + CBT = treatment of anxiety disorders and post-traumatic stress disorder



Preliminary research study we proposed, whose validation is underway

Virtual Reality and Rehabilitation 2.0



The CEREBRUM Approach



Therapeutic Add-on



Bio-Psycho-Socio-Cultural Approach



**Clinical, Social, Subjective and
Functional aspects**



**Cognitive Remediation: metacognition,
performance, self-efficacy**



Psychoeducation: giving knowledge

CEREBRUM: How is it designed?



EBM → EBP →
Exercises

Protocol

Psychoeducation,
informing, motivation and
contextualisation - VR
immersion – Feedback –
Discussion and
confrontation

CEREBRUM: How is it designed?

20 levels –

Attention and Working Memory

22 levels –

Memory and Learning

10 levels –

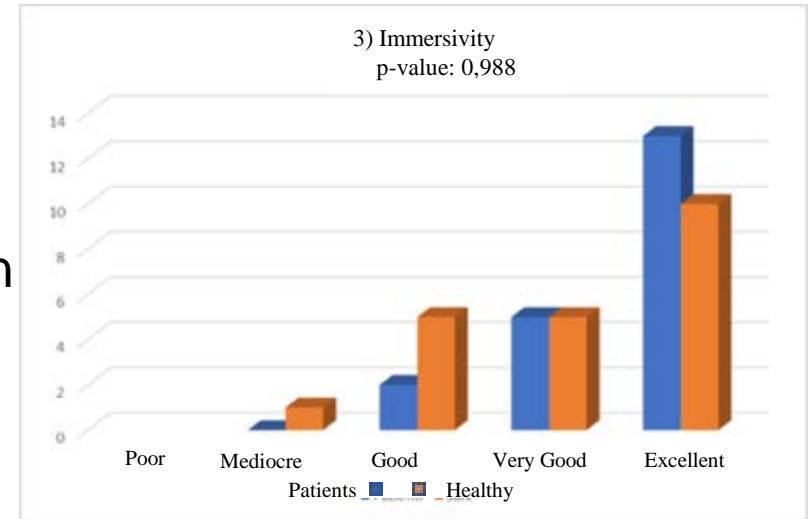
Cognitive Estimation



Cerebrum: application of VR to mental health of soldier

Results:

- ❖ UX – VR version
- ❖ Comments Ho.Care – Desktop version
- ❖ Validation comments – VR version



Hypothesis:

Specific sub-group of military personnel

→ **Rehabilitate** neuropsychological deficits

→ **Improve** the effective performance moderators

→ **Compliance**

*Thank you for
your **attention!***



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