Resilient Cognition – project update

Richard Keegan, Kristy Martin, Ben Rattray, Sarah Robinson, David Pyne, Andrew McKune, Julien Periard

UNIVERSITY OF CANBERRA

RESEARCH INSTITUTE FOR SPORT & EXERCISE

UNIVERSITY OF CANBERRA

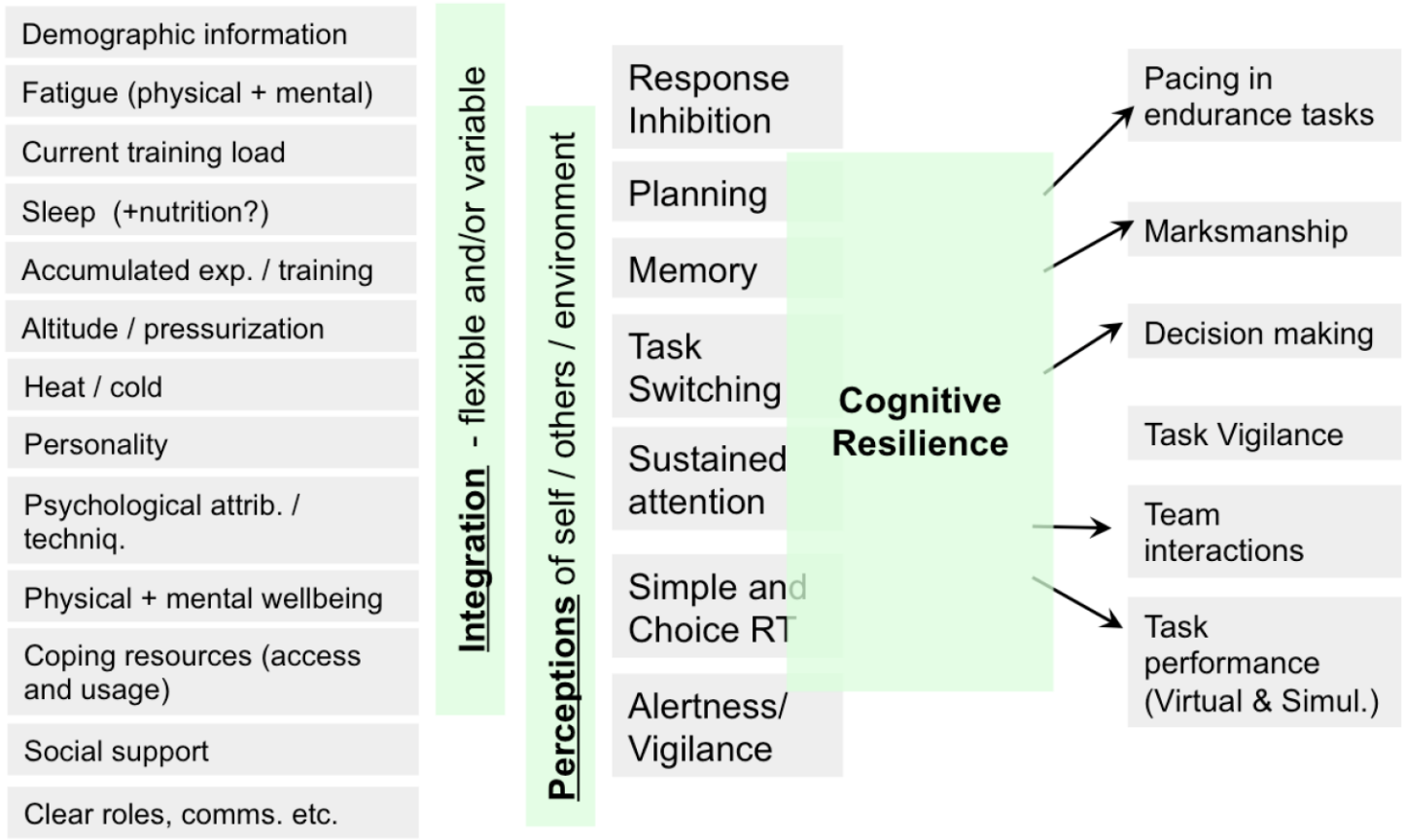
RESEARCH INSTITUTE FOR SPORT & EXERCISE

Aim

- Formulate a ***conceptual framework*** for studying ***cognitive resilience and military decision-making*** from an integrative perspective, spanning:
  - physiological,
  - psychological and
  - cognitive factors; and
  - how best to protect, develop and support these capabilities

Conceptual framework – Step 1

- Determine the physiological and psychological factors that contribute to resilient cognition



Sub-types of resilience

Cognitive Resilience

Sub-type	Description	Key issues
Resistance	Cognitive performance not affected by stressors	Duration, regulation, management
Tolerance	Cognitive performance is affected but remains functional	Duration, regulation, management
Recovery	Cognitive performance was undermined but returns to previous	Acute vs. Chronic, Severity of impact
Positive Adaptation	Resources, processes or both increase to facilitate increased performance	Acute vs. Chronic, severity, management
Negative / (mal)adaption	Resource or processes are damaged/detrimented and do not return to previous levels	Acute vs. Chronic, severity, management

Types of Cognitive Performance

Task / context specific

Task performance (Virtual & Simul.)	Comms protocol + effectiveness	Exercises and simulations	Brightfox scenarios / M-A-P
Situational awareness	Marksman-ship	Tactical decision-making	Strategic decision-making
Psycho-motor vigilance	Meta-cognition	Self-regulation	Problem Solving
Pattern recognition	Task Inhibition	Working Memory	3-D rotation
Exec func. (‘bandwidth’)	‘Drive’	Arousal	Attention

Lab-based

Characterising responses over time

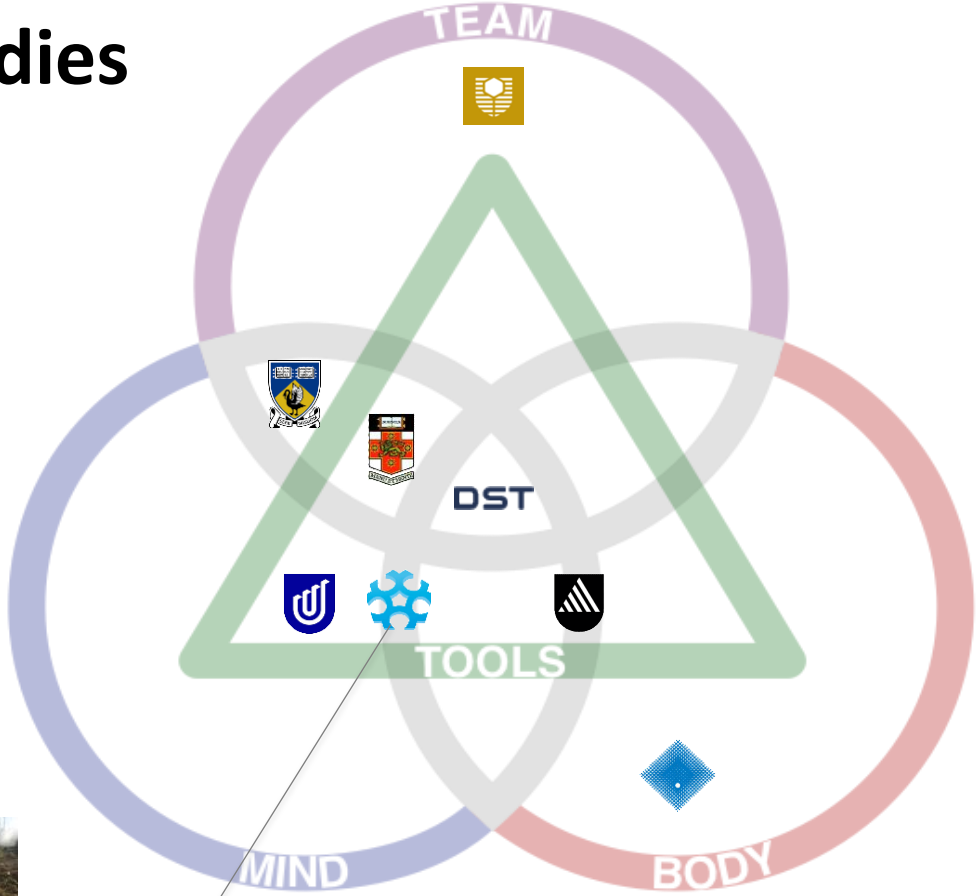
- Numerous challenges / pressures
- ‘Noisy’
- Proactive / live management
- What or who would be ideal?

- “Shoring up”
- Confidence / self-efficacy
- ‘Automaticity’ – right place right time
- Stress testing

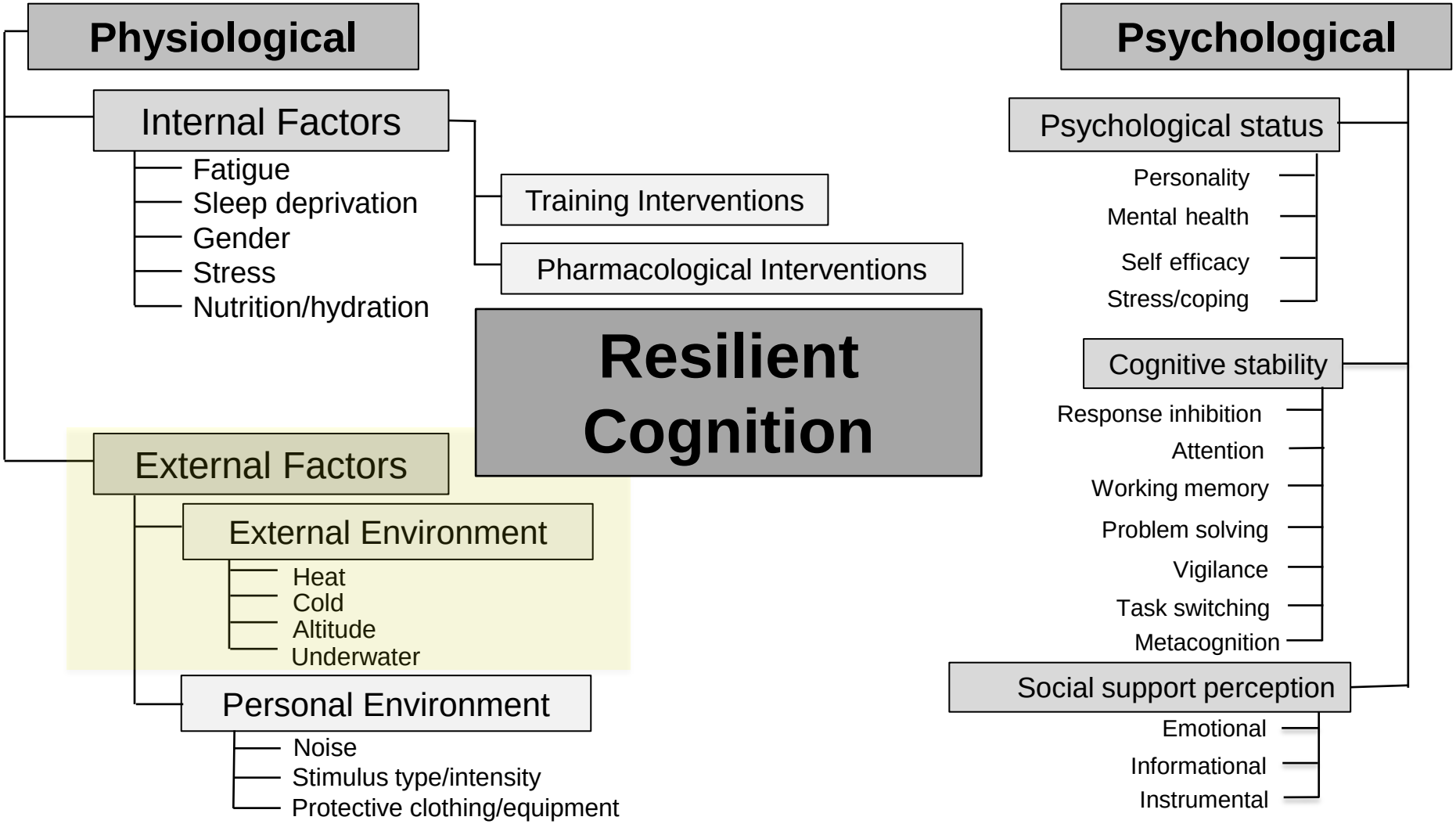
- Readiness/resources to adapt
- “Bounce-back-ability”
- Characterizing the stimuli
- Fails lots, fail cheaply, ***learn***

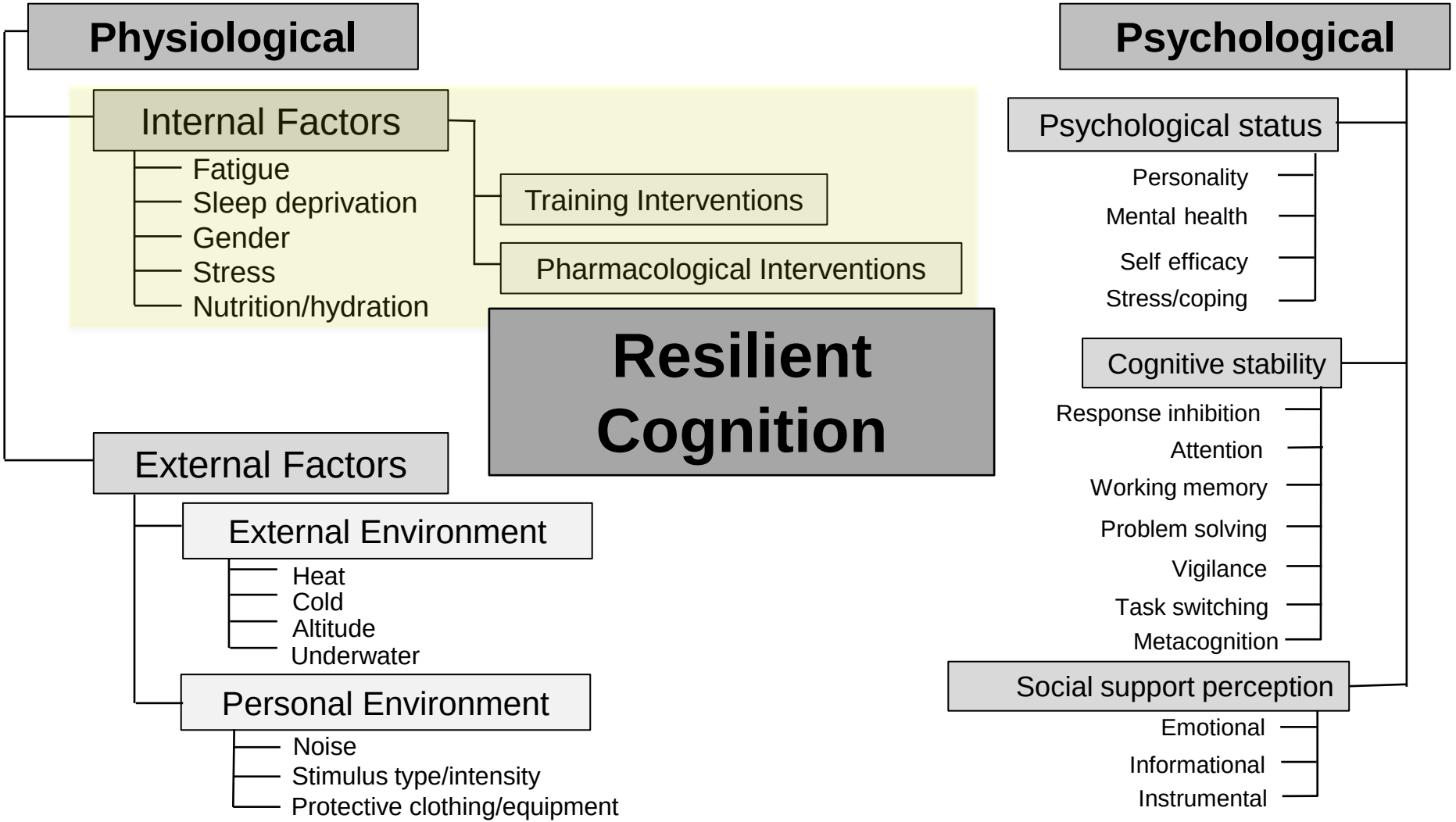
HPR*net* Studies

Human Performance Research *network*



An integrated approach to enhancing cognition and decision-making under stress
University of Canberra [Prof Kevin Thompson]


Physiological
Internal Factors
Fatigue
Sleep deprivation
Gender
Stress
Nutrition/hydration
Training Interventions
Pharmacological Interventions
Resilient Cognition
External Factors
External Environment
Heat
Cold
Altitude
Underwater
Personal Environment
Noise
Stimulus type/intensity
Protective clothing/equipment
Psychological
Psychological status
Personality
Mental health
Self efficacy
Stress/coping
Cognitive stability
Response inhibition
Attention
Working memory
Problem solving
Vigilance
Task switching
Metacognition
Social support perception
Emotional
Informational
Instrumental


Physiological
Psychological
Internal Factors
Fatigue
Sleep deprivation
Gender
Stress
Nutrition/hydration
Training Interventions
Pharmacological Interventions
Resilient Cognition
Psychological status
Personality
Mental health
Self efficacy
Stress/coping
Cognitive stability
Response inhibition
Attention
Working memory
Problem solving
Vigilance
Task switching
Metacognition
External Factors
External Environment
Heat
Cold
Altitude
Underwater
Personal Environment
Noise
Stimulus type/intensity
Protective clothing/equipment
Social support perception
Emotional
Informational
Instrumental

Conceptual framework – Step 2

- Supplement, expand, refine and clarify conceptual framework by gathering ***relevant experiences*** from ***key gatekeepers and stakeholders***

- Longitudinal, wide sweep association study – ***matching cognitive and performance data*** to ***subjective physiology, training load, sleep, genetic data*** (links to other HPRnet partners)

Step 3 - Testing

- Select and agree levels of ‘task specificity’
- Develop suitable ‘stressors’ and ‘challenges’
- Develop a practical approach to monitoring Cognitive Resilience in the field
- Test our associations / predictions
- Interventions

Conclusion

- We have developed a (draft) model for understanding this complex space
  - It's big / cumbersome (but so is real life)
  - It alludes to complexity and dynamic systems (like real life)
  - Clarifies 'the art of the possible'

- We are in a position to collaborate…!
  - We know what we are doing, what we bring to the party, what is within reach

- Ideas changing rapidly – adaptable…. resilient!