Introduction to Systems Thinking

Prof Ruth Hunter

Director, WHO Collaborating Centre for Complex Systems and Network Science for NCD Prevention and Control

Centre for Public Health, Queen's University Belfast

Session 1: Wednesday 24th January 2024

Aims:

- Introduce systems thinking concepts and methods to support capacity building

- Develop and enhance skills in applying systems approaches

Overview

- **Session 1:** Introduction to systems thinking and causal loop diagrams; Kumu tutorial

- **Session 2:** Definition of theme and reference mode; variable elicitation; structure elicitation; feedback loops identification

- Fri 26th Jan 2024
- Fri 2nd Feb 2024

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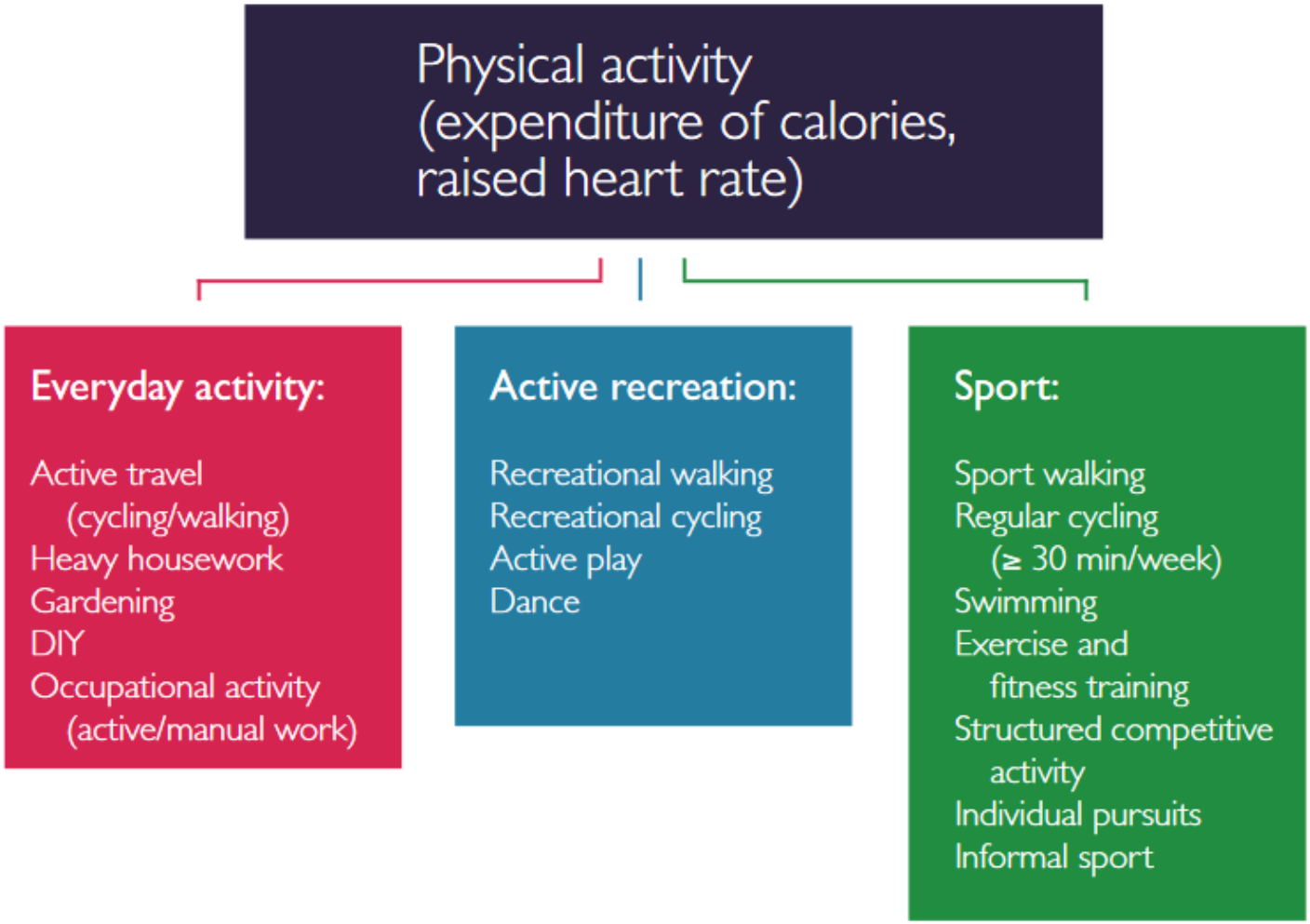
Physical activity: A systems perspective

What is physical activity



Source: (2011)Start active, Stay Active : A report on physical activity for health from the four home countries' Chief Medical Officers

Known benefits

23% inactive globally

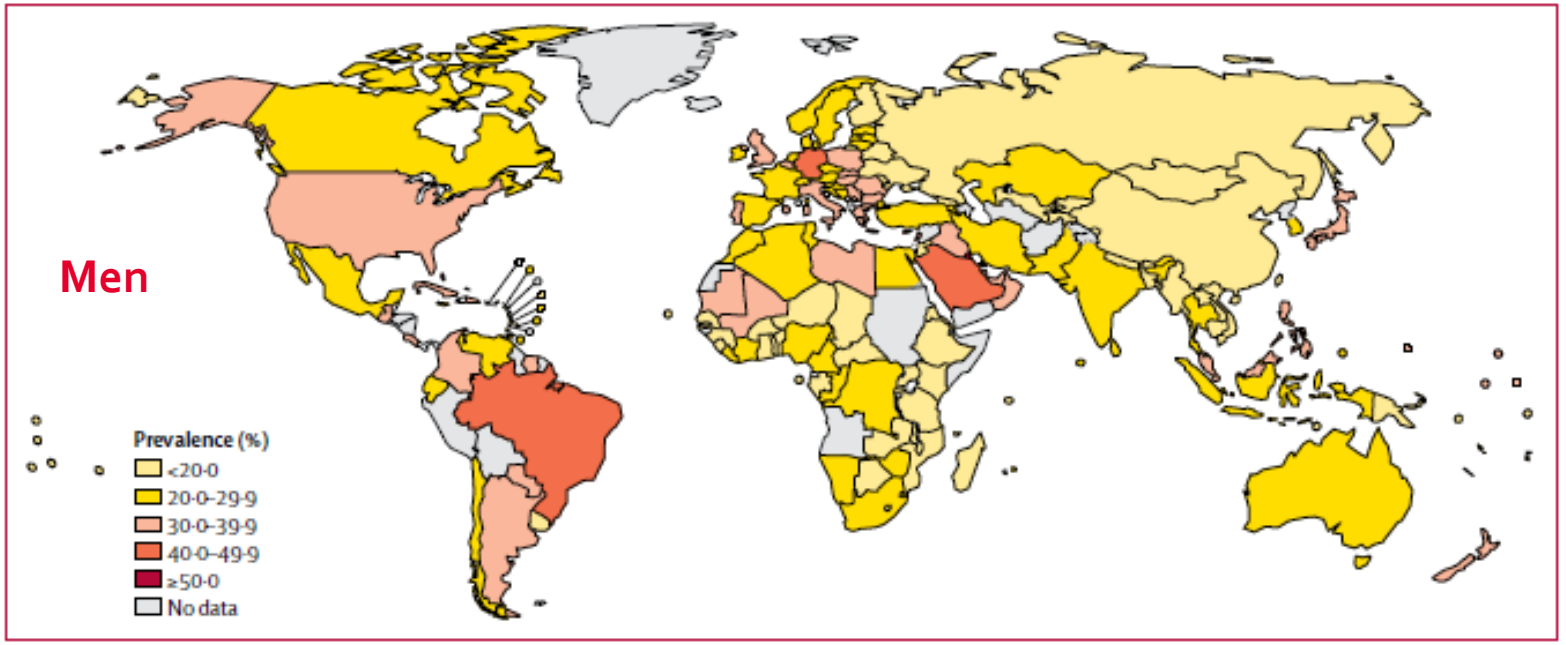


Figure 4: Country prevalence of insufficient physical activity in men in 2016

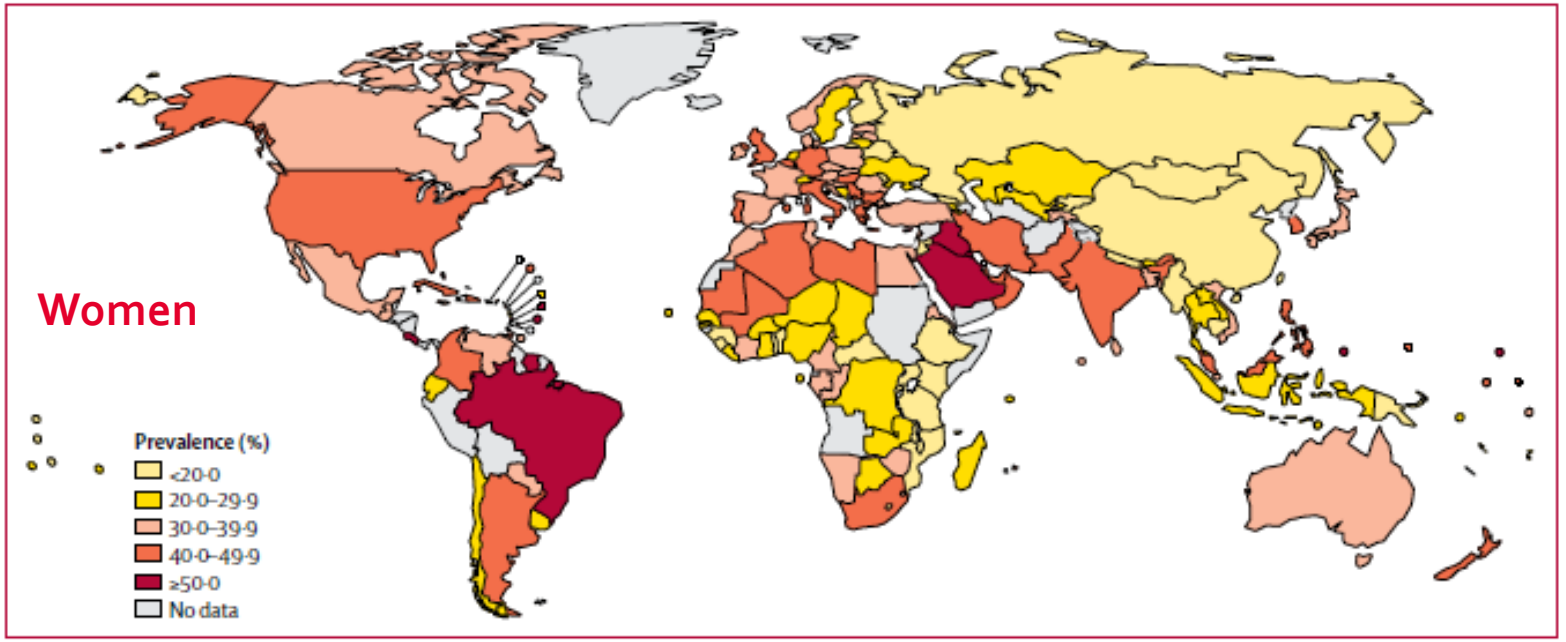


Figure 5: Country prevalence of insufficient physical activity in women in 2016

Lancet Glob Health 2018; 6: e1077–86

WHO Global Action Plan for Physical Activity (GAPPA)

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REPORTS, CASE STUDIES & ASSESSMENTS

Global action plan on physical activity 2018–2030: more active people for a healthier world

PUBLISHED : 2018

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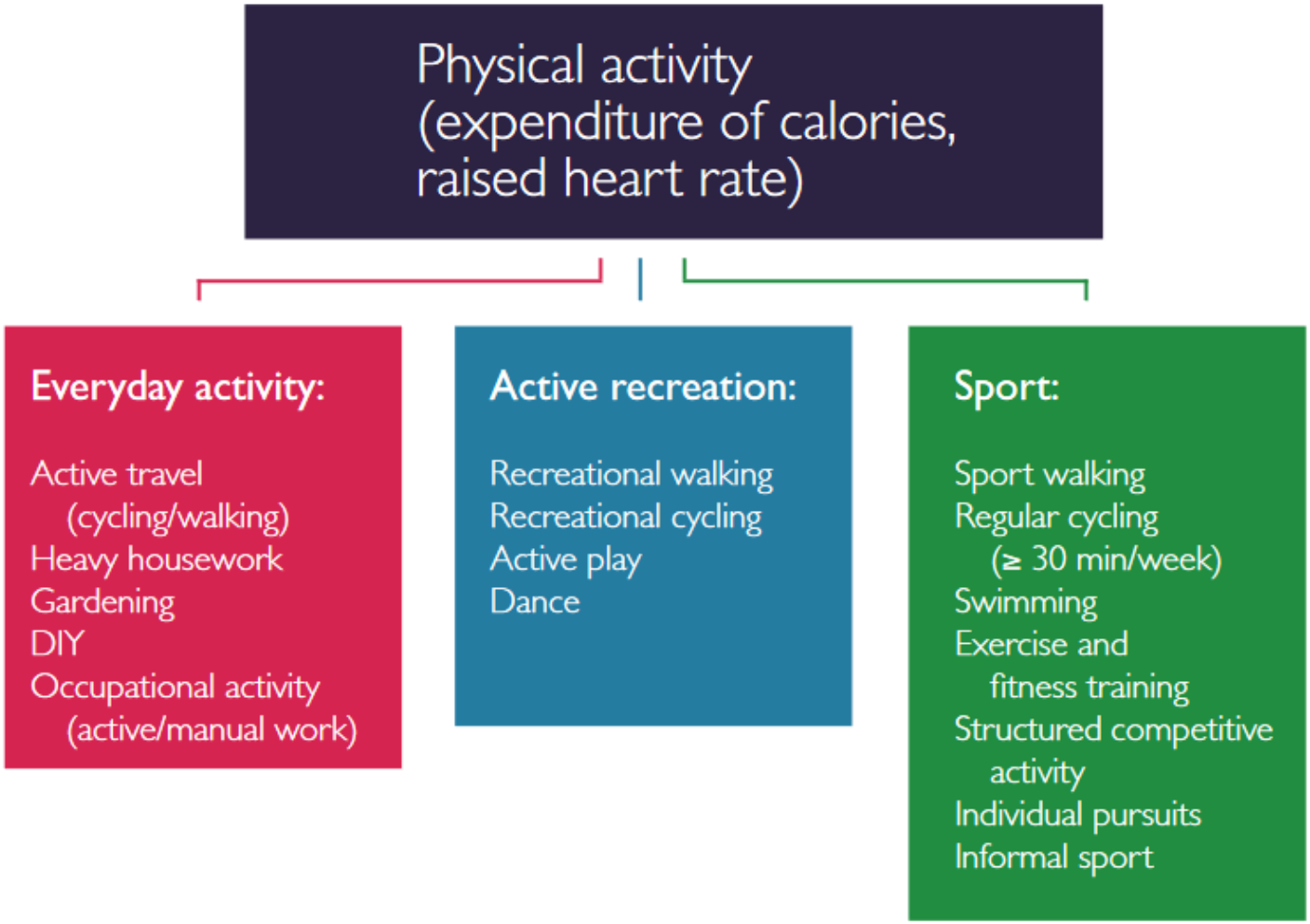
GAPPA sets out an ambitious target of achieving "a 15% relative reduction in the global prevalence of physical inactivity in adults and in adolescents by 2030.

WHO Global Action Plan for Physical Activity - GAPPA

What is physical activity



Source: (2011)Start active, Stay Active : A report on physical activity for health from the four home countries' Chief Medical Officers

A broader definition of physical activity

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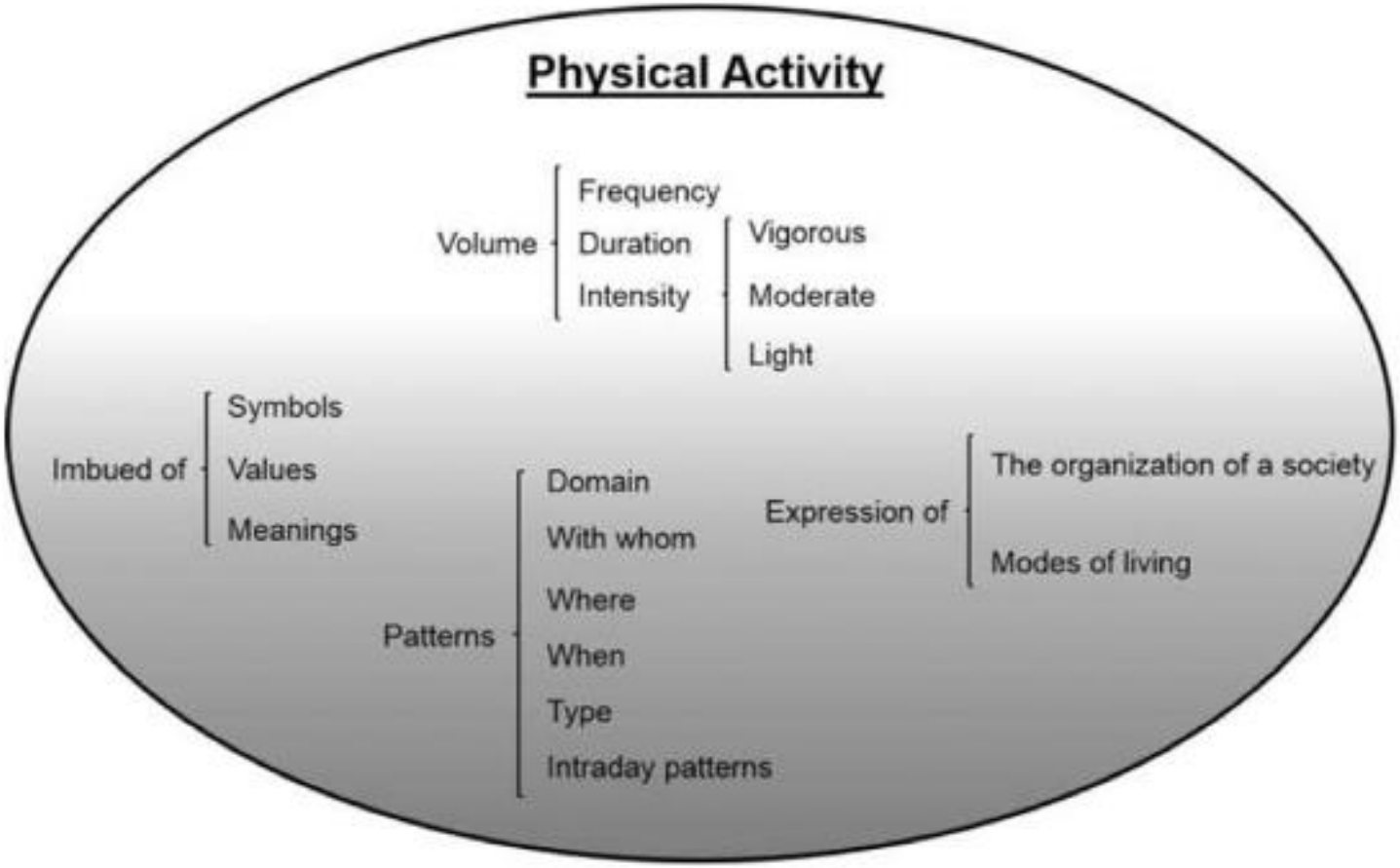
Caspersen et al. (1985)	Piggin (2019)
Bodily movement	People moving Acting Performing
Skeletal muscles	Culturally specific Spaces Contexts
Results in energy expenditure (kilojoules)	Influenced by Interests Emotions Ideas Instructions Relationships

Piggin J, 2020: https://www.frontiersin.org/articles/10.3389/fspor.2020.00072/full

Moving beyond quantitative recommendations



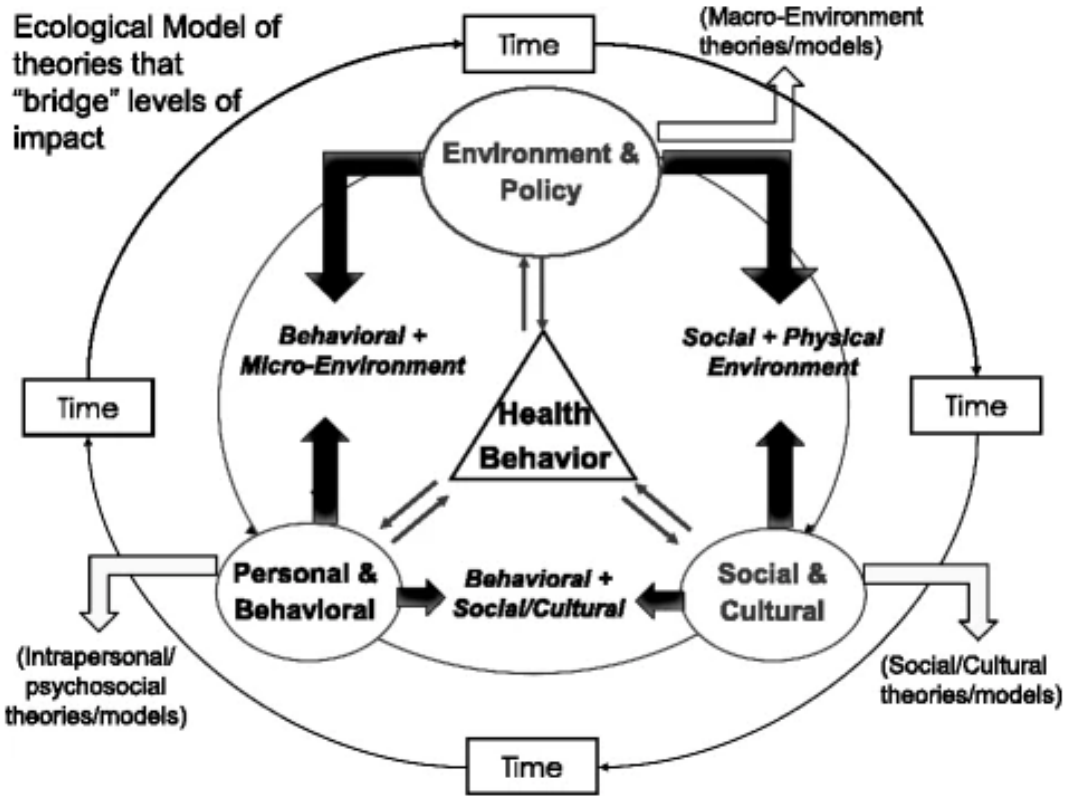
Preventive Medicine 2017; 96: 160-162

A complex behaviour

Heterogeneous

Non-linear

Unpredictable



Dynamic

Interdependent

Feedback loops

Ecological model of theories that "bridge" levels of impact

King, A.C. Theory's role in shaping behavioral health research for population health. *Int J Behav Nutr Phys Act* **12,** 146 (2015). https://doi.org/10.1186/s12966-015-0307-0

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Introduction to Complex Systems

What is a system?

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- Integrated whole conceived or perceived by an observer

- Composed by multiple interdependent entities that define, and are defined, by the whole

- And that interact with its external context/environment

What is a system?

Systems can be…

Simple

Complicated

Complex

Simple systems

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- Usually few components that interact in very specific and predictable forms
- Structure and behaviour are easy to understand
- Easy to predict results/outputs
- Easy to master/control

Complicated systems

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- Usually many components that need coordination, but that interact in specific and predictable (albeit non-trivial) forms

- Understanding of its structure and behaviour requires specialized expertise

- Results/outputs are predictable

- Hard to master/control

Complex systems

Conditions:

Numerosity and diversity

Feedbacks and interdependencies

No or little central control

Non-equilibrium

Ladyman & Wiesner. What is a complex system?

Complex systems

Conditions:

Numerosity and diversity

Feedbacks and interdependencies

No or little central control

Non-equilibrium

Properties:

Self-organisation

Non-linearity

Robustness

History and memory

Emergence

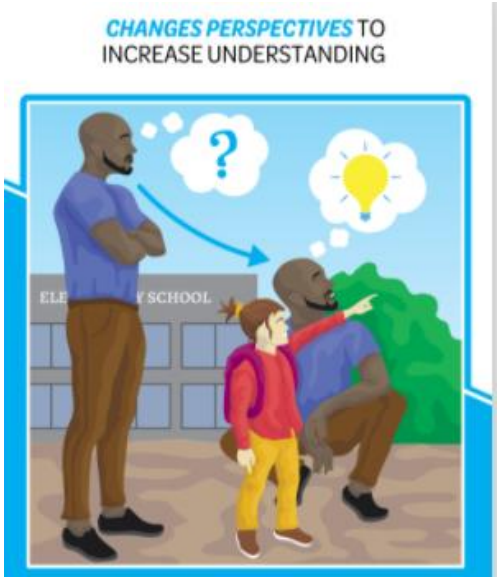
Adaptive behaviour

Ladyman & Wiesner. What is a complex system?

How the conditions and properties of complex systems apply to physical activity behaviour and promotion?

Systems thinking

- Way of thinking based on core systems concepts
- Habits of a systems thinker: https://thinkingtoolsstudio.waterscenterst.org/cards



https://www.who.int/europe/publications/i/item/WHO-EURO-2022-4195-43954-61946

Systems-oriented methods

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- Systems mapping
- Systems dynamics
- Network analysis
- Agent-based modelling
- Soft systems methodology
- Adaptive policy
- Adaptive management
- Critical systems heuristics
- System control theory
- Viable systems model

Thanks for listening

Prof Ruth Hunter

Director, WHO Collaborating Centre for Complex Systems and Network Science for NCD Prevention and Control

Centre for Public Health
Queen's University Belfast

Email: ruth.hunter@qub.ac.uk

Twitter: @Ruth_HunterQUB