Using systems archetypes in public health: A review connecting system dynamics literature and public health applications

Loes Crielaard[*1], Luc Hagenaars[1], Jillian O'Mara[1], Mary Nicolaou[1], Wilma Waterlander[1], Karien Stronks[1]

[*] Correspondence:
Loes Crielaard
l.crielaard@amsterdamumc.nl

[1] Amsterdam UMC, Department Public and Occupational Health, University of Amsterdam, Amsterdam Public Health Research Institute, Van der Boechorststraat 7, Amsterdam 1081 BT, The Netherlands

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Abstract

Systems archetypes represent typical system structure-behaviour combinations that can be 'diagnosed' across different systems to identify potential leverage points. This review examined their history and value based on foundational system dynamics literature, to reflect on public health applications. We found that archetypes help generate hypotheses about leverage points and unintended consequences of interventions, but two methodological considerations emerged. First, archetypes help systematise the formulation of defensible hypotheses, prompting systematic examination of storyline, system behaviour over time and system structure. However, these hypotheses still require testing. All 29 public health studies acknowledged this hypothesis-generating function and suggested testing through quantitative system dynamics modelling or real-world experiments. Second, archetypes support cross-checking hypotheses about system behaviour against (qualitative or quantitative) empirical data over time. However, omitting this cross-checking risks jumping to conclusions. While nearly all 29 public health studies engaged with storyline and system structure to identify an archetype, only nine addressed system behaviour over time, of which only four cross-checked against empirical data. Archetypes thus have the potential to facilitate evidence-based hypotheses about system behaviour, leverage points and unintended consequences, but public health could benefit from a more disciplined application in line with system dynamics theory.