HIP CUYAHOGA Health Improvement Partnership
SCHOOL OF MEDICINE CASE WESTERN RESERVE UNIVERSITY
CHI Center for Community Health Integration
Research & Development for Community Health & Integrated, Personalized Care
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Systems Thinking Toolkit

What is a Systems Thinking Toolkit?

This toolkit introduces systems thinking and tools for recognizing and seeing racism as a system. It provides definitions for key terms, tips for reading and interpreting diagrams of systems, examples of how system maps can be used, and a list of resources for more information and learning.

The toolkit is based on the work of the Cross-Sector Innovations Initiative (CSII) as part of Health Improvement Partnership-Cuyahoga (HIP-C) and ongoing work of the Cuyahoga County Citizens' Advisory Council for Equity (CACE).

In this toolkit, we seek to answer the following:

- What is a system?
- How is racism a system?
- How do I read a system map?
- What are the uses of system maps?
- How can I learn more about systems?

What is a system?

Systems thinking is a way of seeing and understanding systems. Systems are everywhere. The human body is a system. A phone is a system. The weather is a system. Communities and organizations are systems. Local government is a system. The Earth, our solar system, and galaxies are systems. What makes these systems is that they have *two or more people or elements that are interacting in some way with each other*.

> **Example**: If you increase physical activity (nervous system), the heart begins to pump more blood (cardiovascular system) to distribute oxygen from the lungs (respiratory system) to the muscles (muscular system), which burns calories (metabolic system) to create work and releases heat by sweating (integumentary system), and so on.

Different types of systems also interact with each other, giving rise to even more complex patterns of behavior.

> **Example**: Awarding a contract (procurement system) for construction to improve traffic

congestion (transportation system) leads to more stress (human systems) in people commuting to work (economic system) and school (education system) along with more carbon emissions impacting regional air quality (environmental system). These effects can in turn influence which transportation projects are supported and how they are funded (political system).

How is racism a system?

It's easy to see many aspects and effects of racism. From disparities in disease and health outcomes to discrimination and exclusion in education and work, the patterns of racism are not a mystery, even when they are hotly debated.

It's much harder – but crucially important – to look beneath the surface of racism. There, we see that:

- Different effects of racism are *related* to each other
- Activities that seem neutral or unrelated can create *patterns of racism*.

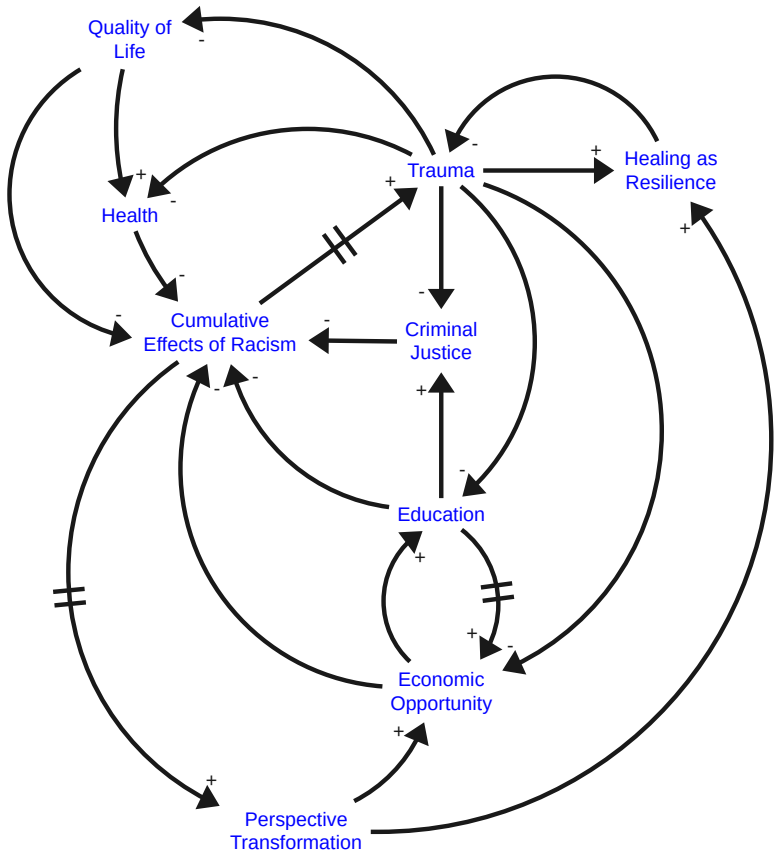
Although it is often easier to attribute the causes of racism to individuals or organizations, long-term change depends on our ability to recognize the *institutionalized patterns and systems* that underlie racism. Taking a systems approach provides a way to see, understand, and act more collectively and more effectively to advance racial equity.[1] It exposes the complexity of racism and its many connections. A systems approach also helps us see that changing one part of the complex system of racism will affect other parts, in positive or negative ways that we might not expect.

How do I read a system map?

A system map is a visual representation of a system. Figure 1 shows an example of a system map using a *causal loop diagram*. A causal loop diagram represents a system as a set of *causal connections* where one thing influences another. Each item in the diagram (such as Quality of Life) represents an element or variable that can increase or decrease. The single lines with arrowheads represent a causal connection from one variable to another. For example, the link between Quality of Life and Health represents a causal connection *from* Quality of life *to* Health.

A) Link Polarity. Each link has a plus (+) or minus (-) sign, which indicates whether the effect of one variable on another is in the *same or opposite direction*. A plus (+) sign indicates that the effect is in the same direction of change while a minus (-) sign indicates the effect is in the opposite direction.

Figure 1. Example of a causal loop diagram of structural racism



Example: *Increasing* Quality of Life leads to an *increase* in Health, so the effect of change is in the same direction, and the link has a plus (+) sign. *Decreasing* Quality of Life leads to a *decrease* in Health, so the effect of change is again in the same direction. In contrast, *increasing* Trauma *decreases* Health, so the effect of change is in the opposite direction and the link has a minus (–) sign.

B) Delays. Some links have double lines crossing them. These represent *delays between causes and effects*. For example, there is a delay between Cumulative Effects of Racism and Trauma. This means, that the effects of changes in the Cumulative Effects of Racism on Trauma take time to appear. Another way of thinking about this is that if one had a "magic wand" and could immediately change one element or variable, would the effects of that change appear immediately or only after some time? A delay mark indicates that it will take some amount of time.

Delays are important to consider because changing the delays can often be a way to bring about change.[2]

Example: In Figure 1, there is a delay between Education and Economic Opportunity. This means that it will take time before an improvement in education translates into better economic opportunities. While this will be an improvement in the long run, finding ways to change the length of the delay might be an even more powerful intervention, especially if it is combined with efforts to improve education.

C) Causal Pathways. In a system map, there can be one or more steps, called *causal pathways,* between two variables.

Examples: In Figure 1, there is a causal path from Economic Opportunity to Criminal Justice that goes from Economic Opportunity to Education to Criminal Justice. This is often written using the shorthand of Economic Opportunity → Education → Criminal Justice. But this isn't the only causal pathway from Economic Opportunity to Criminal Justice. There are also causal pathways from:

- Economic Opportunity → Cumulative Effects of Racism → Trauma → Criminal Justice
- Economic Opportunity → Education → Cumulative Effects of Racism → Trauma → Criminal Justice.

The overall effect of one variable on another is a combination of *direct and indirect effects*. For example, in Figure 1, Economic Opportunity has a *direct effect* on the Cumulative Effects of Racism and an *indirect effect* on the Cumulative Effects of Racism through Education.

D) Feedback Loops. When causal pathways circle back to where they began, they form *feedback loops*.

Example: Some of the feedback loops in Figure 1 are between:

- Economic Opportunity and Education (Economic Opportunity → Education → Economic Opportunity)
- Trauma and Healing as Resilience (Trauma → Healing as Resilience → Trauma)
- Trauma, Health, and Cumulative Effects of Racism (Trauma → Health → Cumulative Effects of Racism → Trauma)

Feedback loops tend to either *reinforce* or *balance* a change in a system. In a *reinforcing feedback loop*, a change in one element through the causal pathway *reinforces the initial direction of change*. This is true regardless of whether the initial change is an increase or decrease.

> **Examples**: In Figure 1, an *initial increase* in Economic Opportunity will increase Education (because the + sign indicates the effect is in the same direction), which will then feedback and *increase* Economic Opportunity. Since the effect reinforced the initial change, it is a *reinforcing* feedback loop.
>
> If we have an *initial decrease* in Economic Opportunity, there will be a decrease in Education (because the + sign indicates the effect is in the same direction), and a decrease in Education will lead to a decrease in Economic Opportunity (again, the + sign indicates the effect is in the same direction). Since the effect of the initial decrease in Economic Opportunity was a further decrease in Economic Opportunity, this is also a *reinforcing* feedback loop.

In a *balancing loop*, the effects of a change *are in the opposite direction of the initial change*.

> **Example**: In Figure 1, an *increase* in Trauma leads to more Healing as Resilience (a way of responding to trauma), which then leads to a *decrease* in Trauma. Since the initial increase is balanced by a decrease, this is a *balancing loop*.

What are the uses of system maps?

There are several ways system maps can be useful.

- First and foremost, they can help us bring to light our *assumptions* about how systems might help maintain the status quo.
- In sharing system maps, we can begin to see and appreciate *different perspectives* and see underlying systems more holistically.
- We can use system maps to think about *how changes in one part of the system might affect other parts of the system*. This can help us consider a wider range of scenarios and identify questions we may want to consider as we plan a new program or a policy change.
- We can use system maps to explicitly consider ways to *change the underlying system*, not just by intervening in one part of a system, but by drawing our attention to solutions with greater impact.

  > **Example**: In Figure 1, high impact solutions might include, 1) shortening the delay between Education and Economic Opportunity or 2) altering the structure of the system by removing a causal link, such as weakening/removing the link between Trauma and Criminal Justice so that trauma is no longer a determinant of criminal justice involvement and outcomes.

How can I learn more about systems?

There are helpful readings listed below. A good place to start is with #2, "Leverage points: places to intervene in a system."

You can use our free online computer simulation to explore the diagram in Figure 1 and gain deeper insight into the possible interactions of interventions in a feedback system. Click here.

Readings

1. powell ja. Structural racism: building upon the insights of John Calmore. *North Carolina Law Review*. 2008;66(3):791-816.
2. Meadows D. *Leverage points: places to intervene in a system.* Hartland, VT: The Sustainability Institute;1999.

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