

# Contribution Analysis: Making Causal Claims in the Face of Complexity

The Evaluation Centre for Complex  
Health Interventions

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# The challenge

- Many interventions work in complex settings with many causal factors at work and many partners at play
- The need to understand and make credible claims about the contribution interventions (programs and projects) are making to expected outcomes and impacts
- Experimental designs for these interventions often not feasible or practical

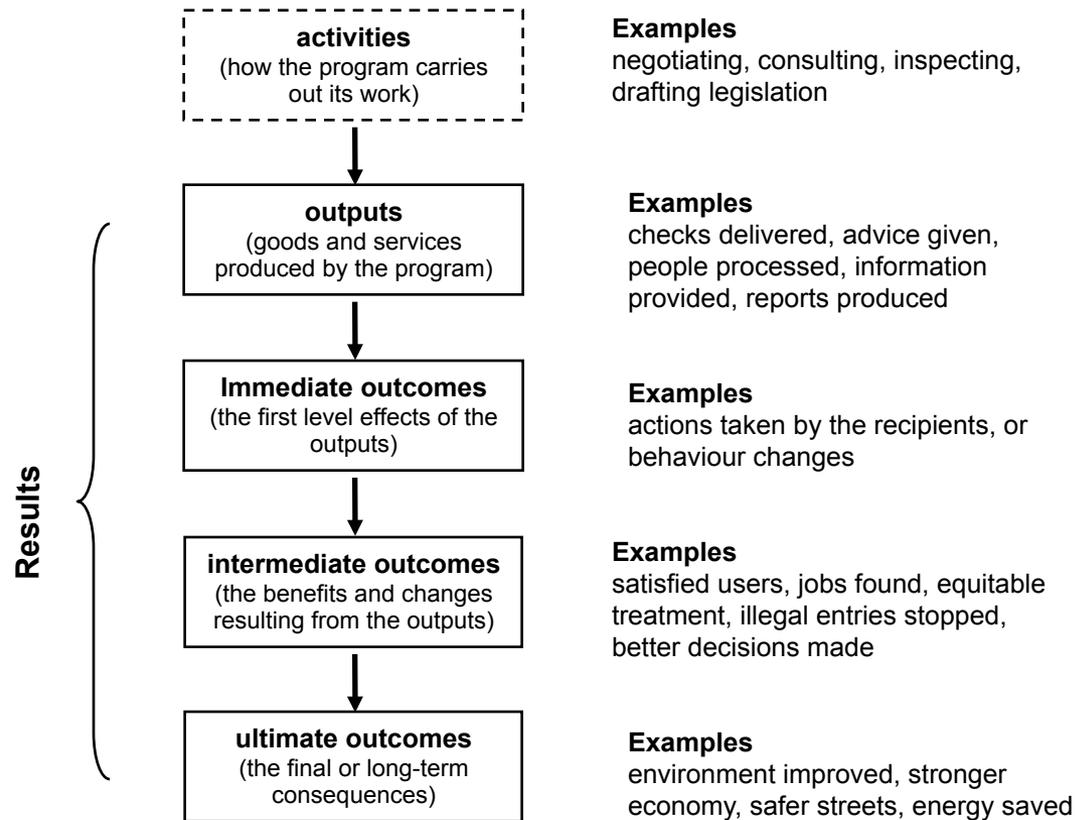
# Key tools and concepts

- Theories of change, impact pathways
- Nested ToC, Theories of reach
- Contributory causes
- Contribution analysis

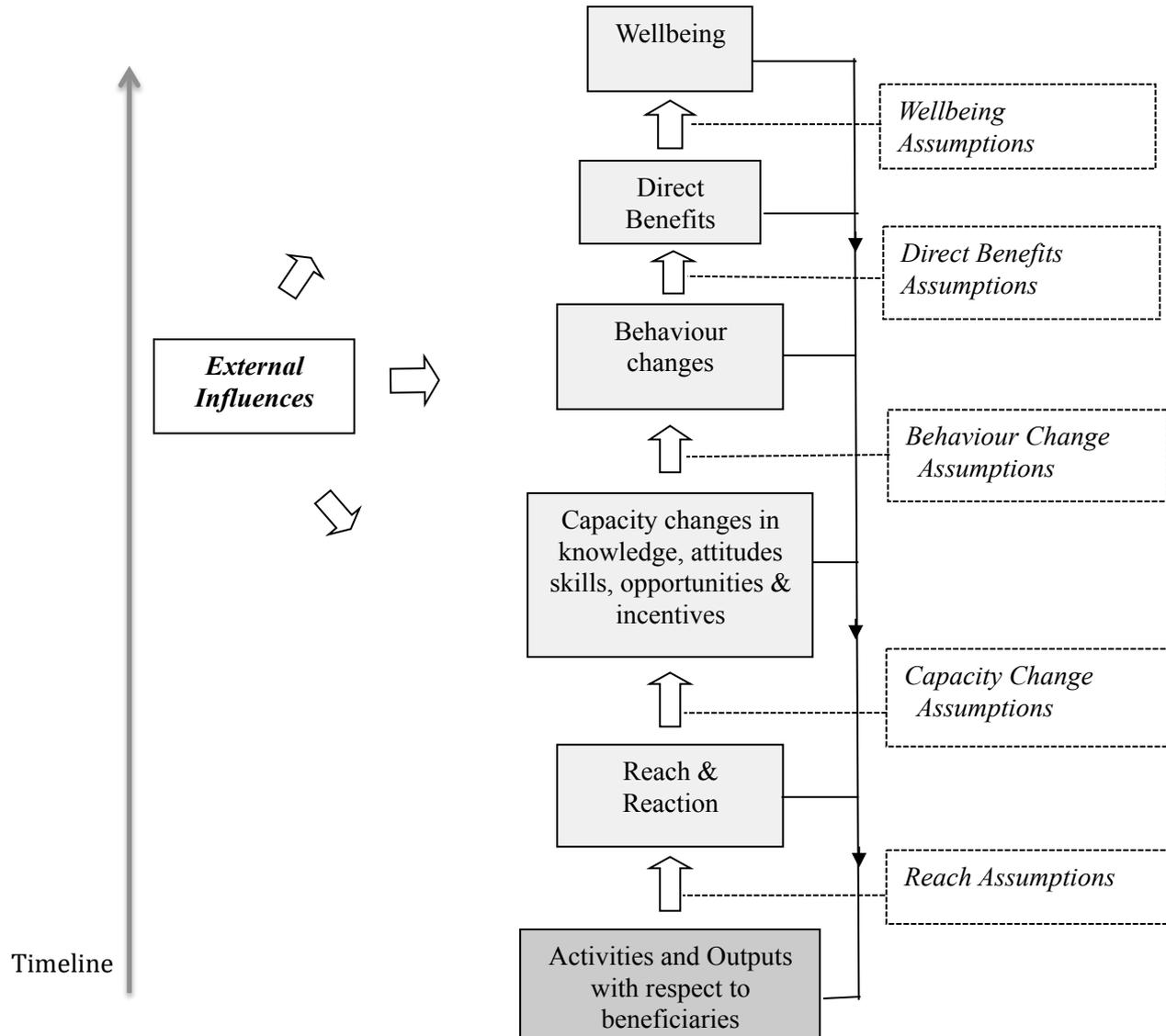
# Theories of change

- Terms not consistent
- Impact pathways/logic models/results chains show the logic of an intervention & key steps along the way
- ToCs add the assumptions behind the pathway
- ToCs are the basis for
  - understanding how and why interventions are working (or not)
  - for making contribution claims

# Traditional Generic Results Chain



# A More Useful Theory of Change



# Causal Link Assumptions

- Events and conditions that are (likely) necessary for the causal link to work
- They are NOT descriptions of the link
- The 'likely' allows for probabilistic interpretations: if the assumption doesn't occur, then the link is unlikely to be realized

# Setting out Assumptions

- To set out an assumption for a sufficient intervention, you need robust arguments for:
  - **Necessity justification**—the argument why the assumption is needed
  - **Realization justification**—the argument why the assumption will likely be realized
- A robust argument is more than just a reason; it sets out premises and a conclusion with supporting evidence on why the assumption is necessary

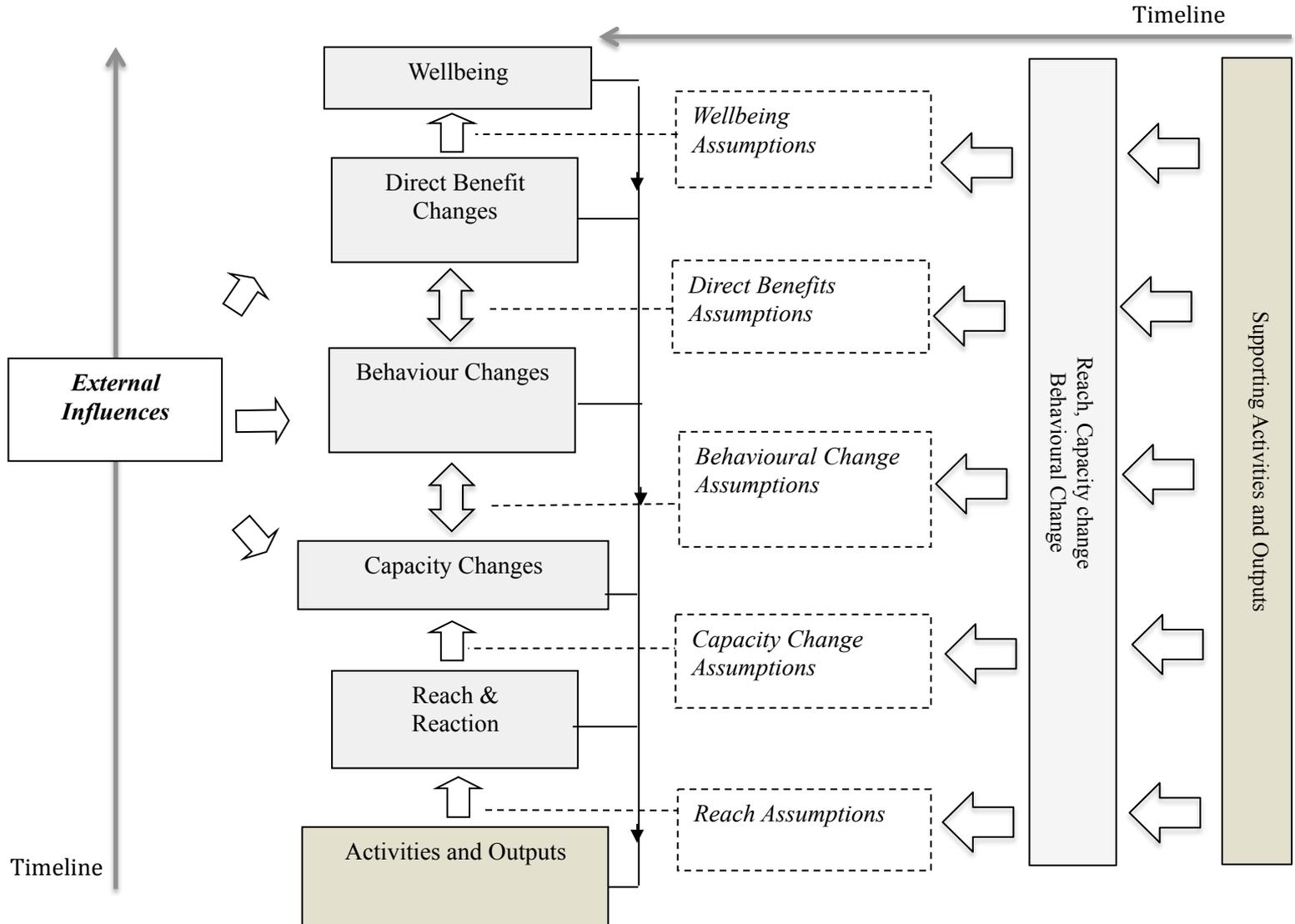
# Types of ToCs

- **Pre-existing**, based on prior research
- **Program**, based on program designers' values and beliefs
- **Grounded**, based on new empirical evidence

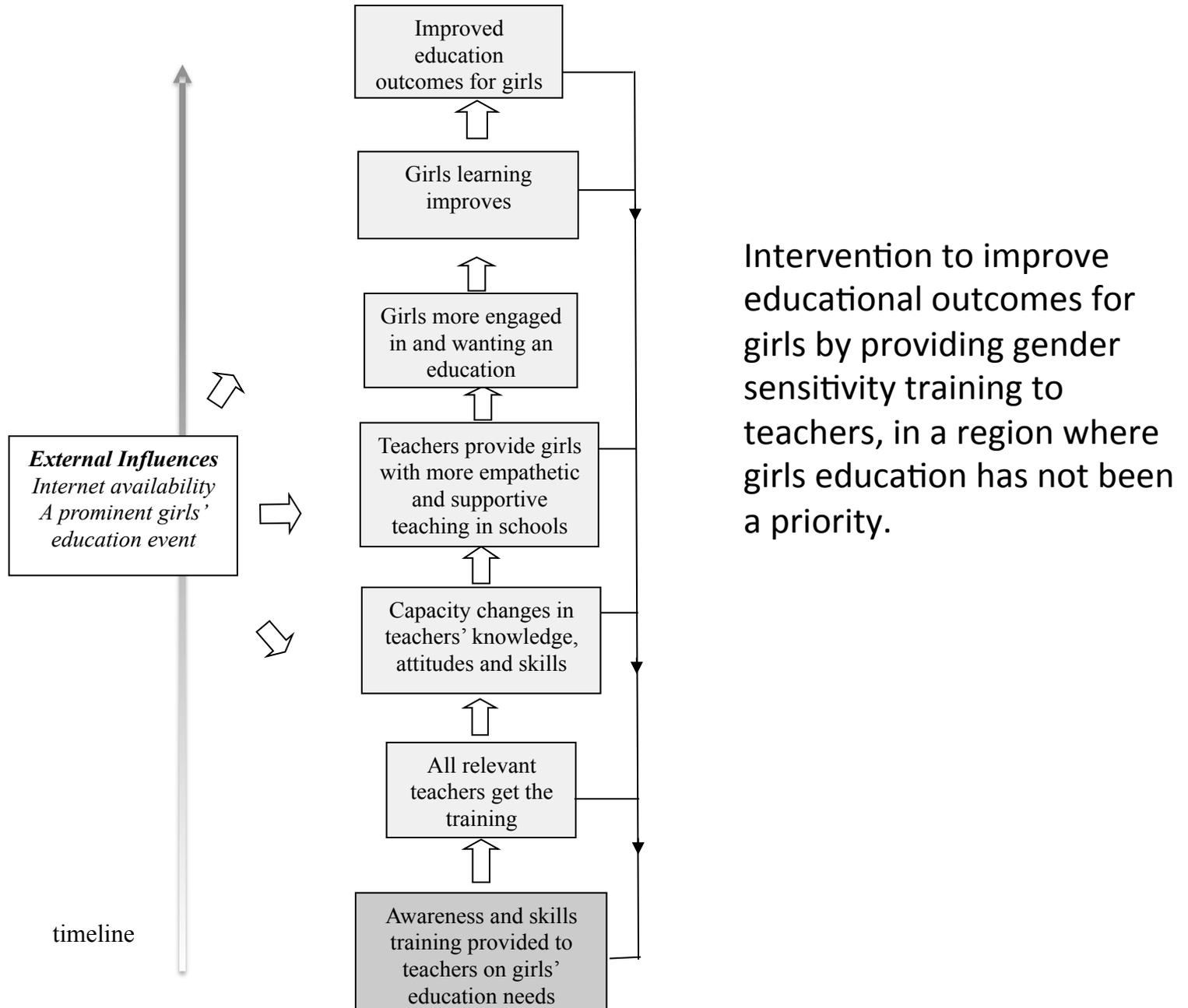
# Supporting Activities

- Actions taken to help ensure that causal link assumptions are realized
- Often means engaging with other partners
- Results in a more complicated but more likely successful intervention—a *comprehensive* intervention

# A Basic Theory of Change for Comprehensive Interventions



# Results Chain for Enhancing Education Outcomes for Girls

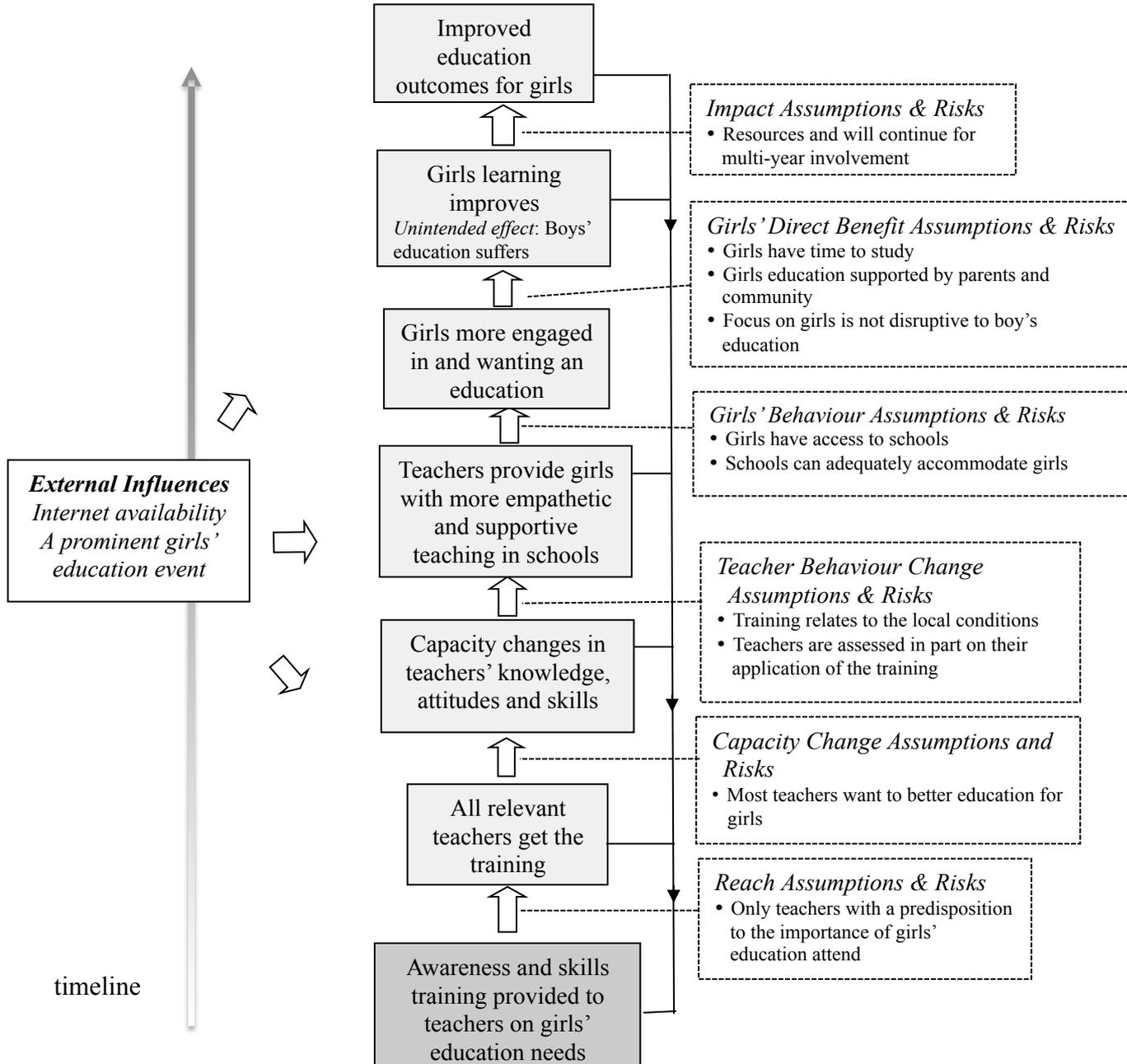


# Other support factors

Seems clear that more than training teachers may be required, such as:

- Getting girls to school
- Parental and community support
- Schools accommodate girls
- Teachers support girls education
- Empathetic teaching is rewarded
- Focus on and resources for girls' education are ongoing (outcomes take time)

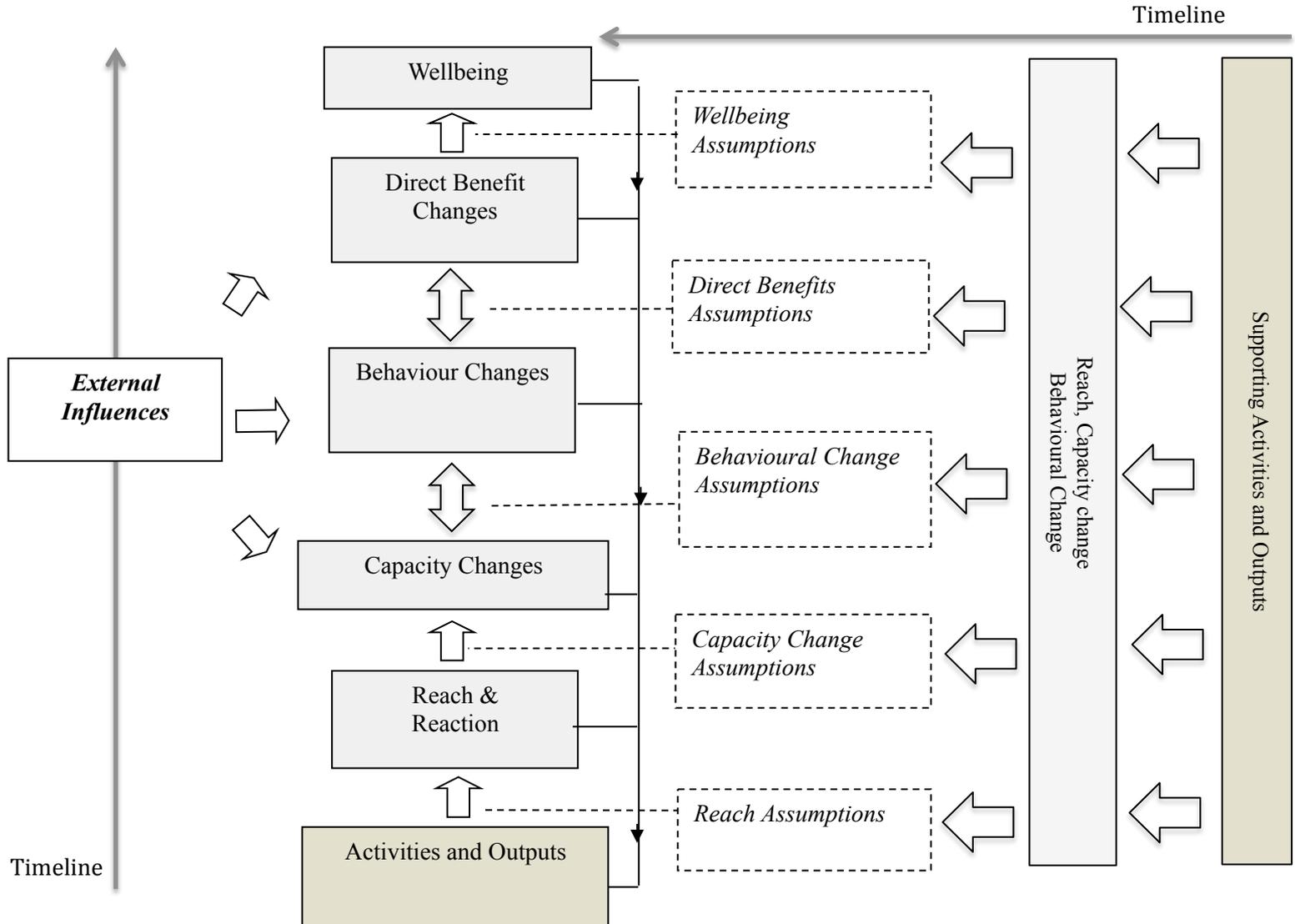
# Theory of Change for Enhancing Education Outcomes for Girls



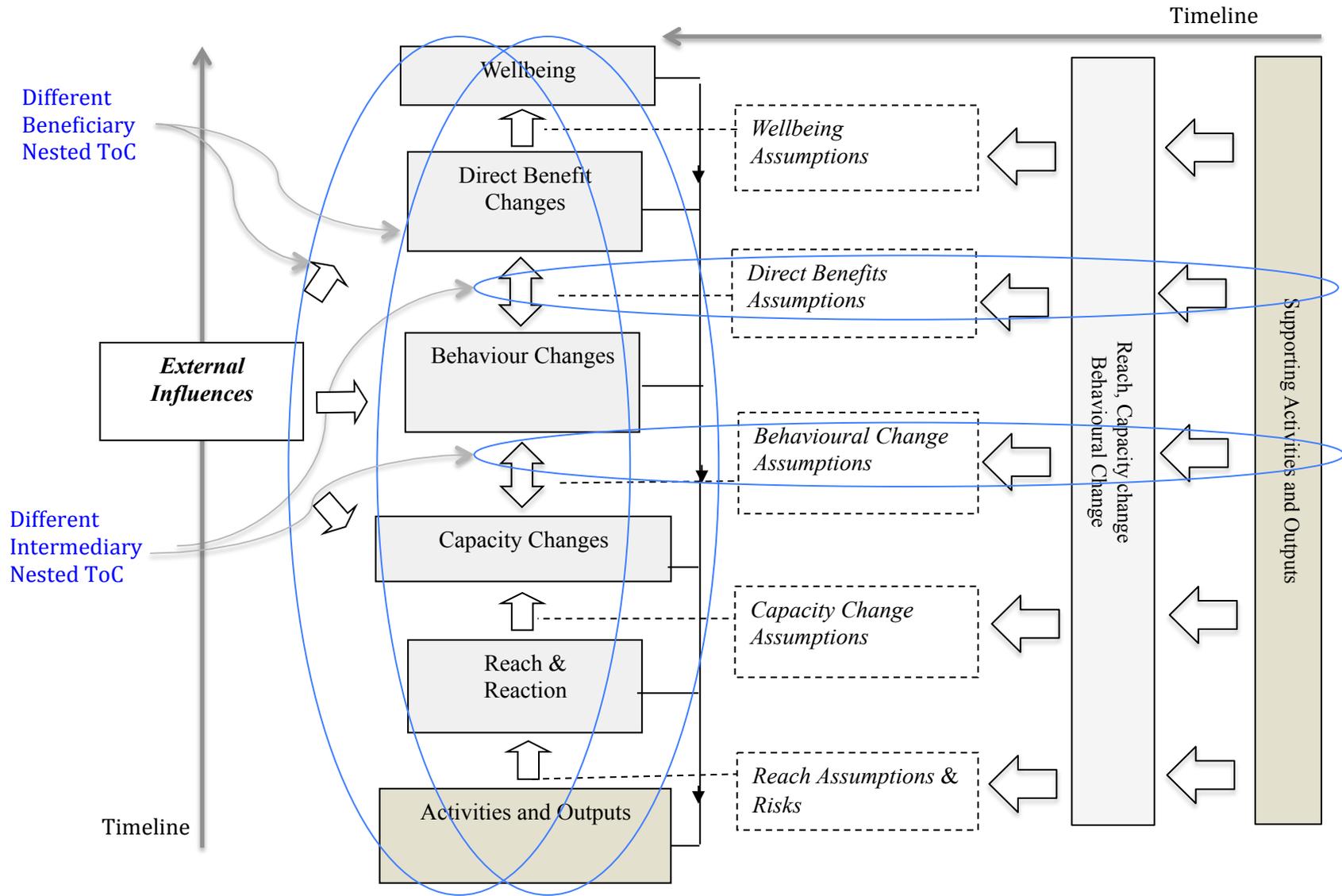
# Nested ToC

- Sub-ToCs within an overall ToC
- Frequently focus on one specific target group of beneficiaries or intermediaries (*a theory of reach*)
- Very useful in decomposing a more complex setting

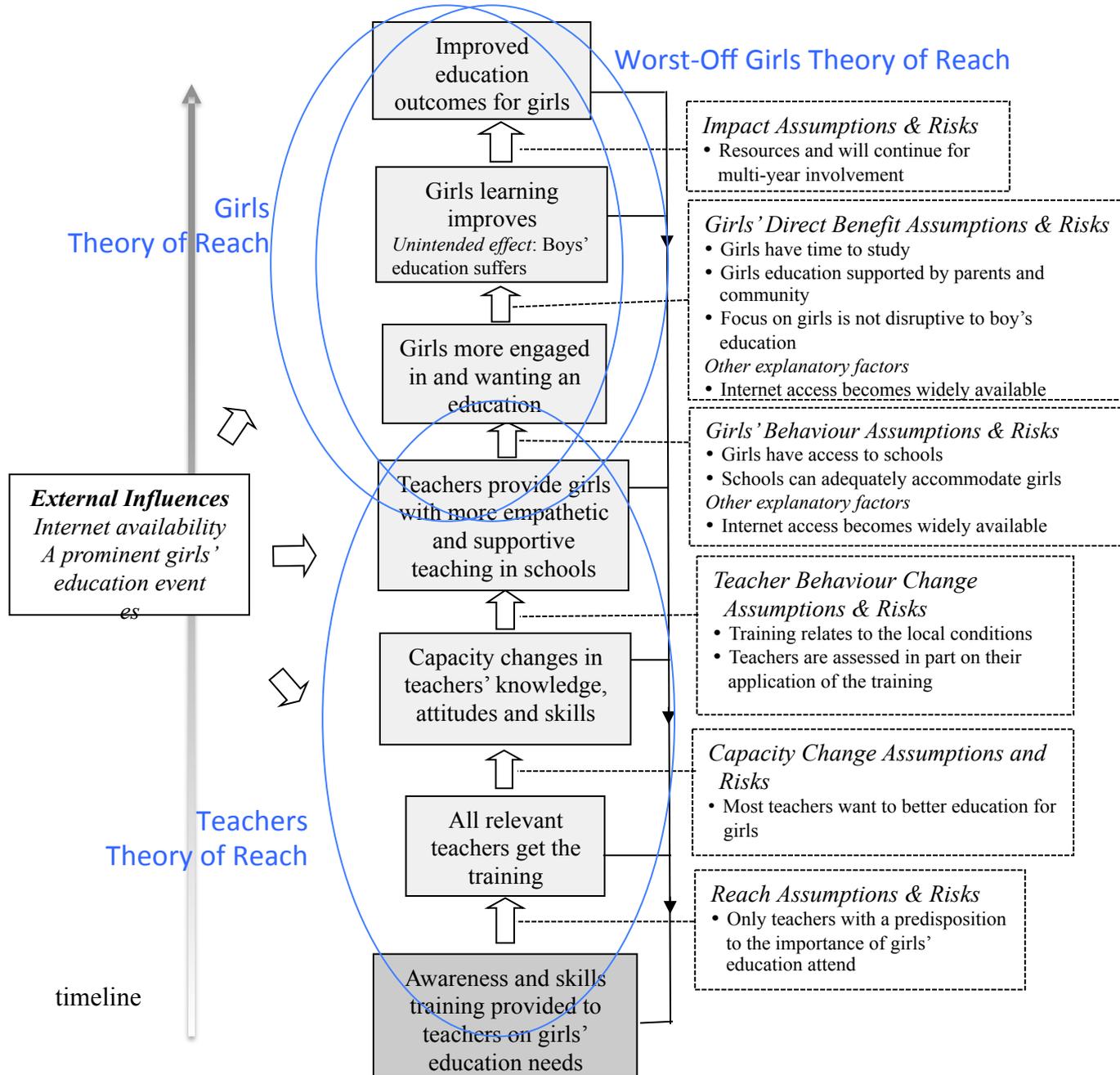
# A Basic Theory of Change for Comprehensive Interventions



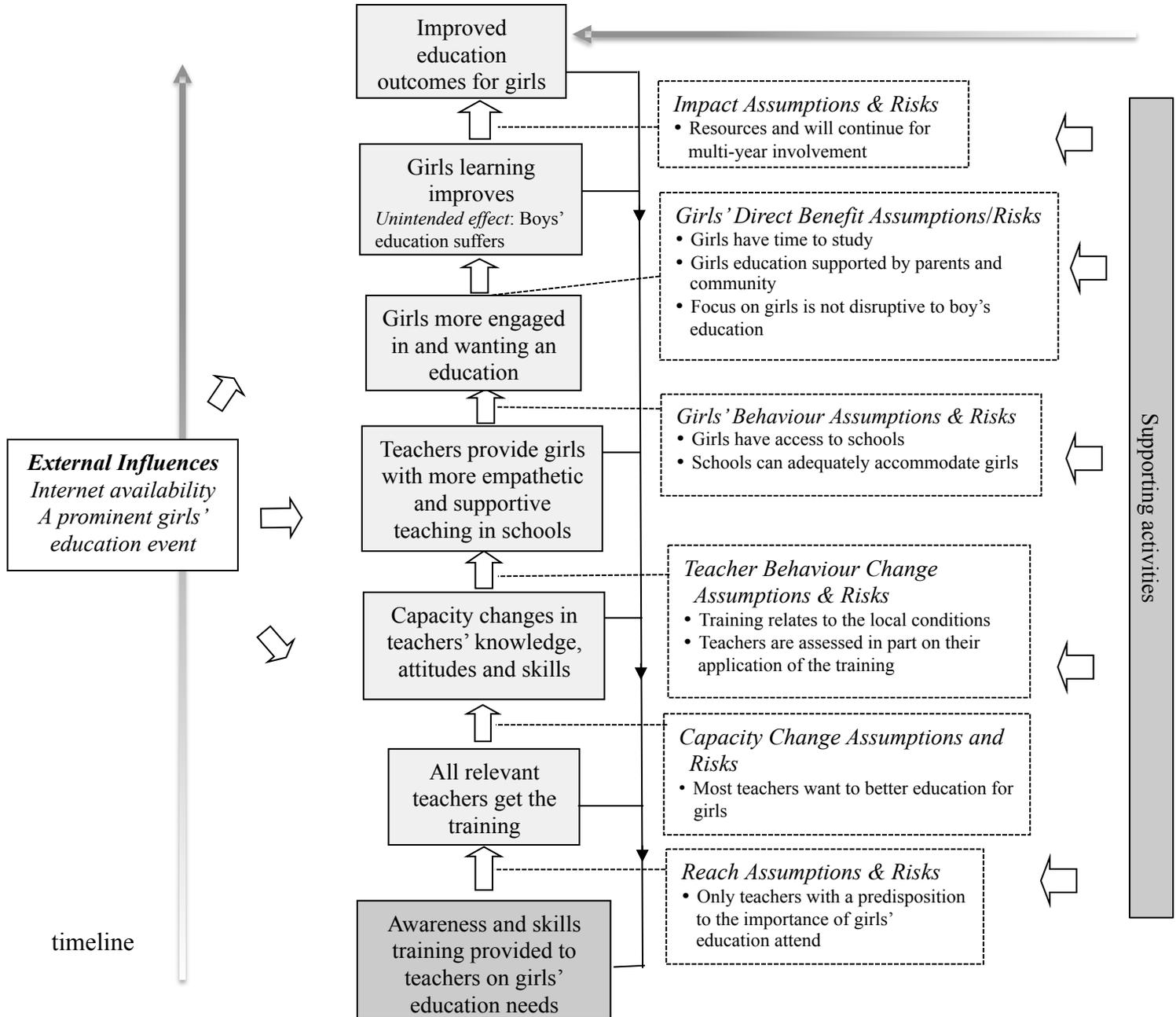
# A Basic Theory of Change for Comprehensive Interventions



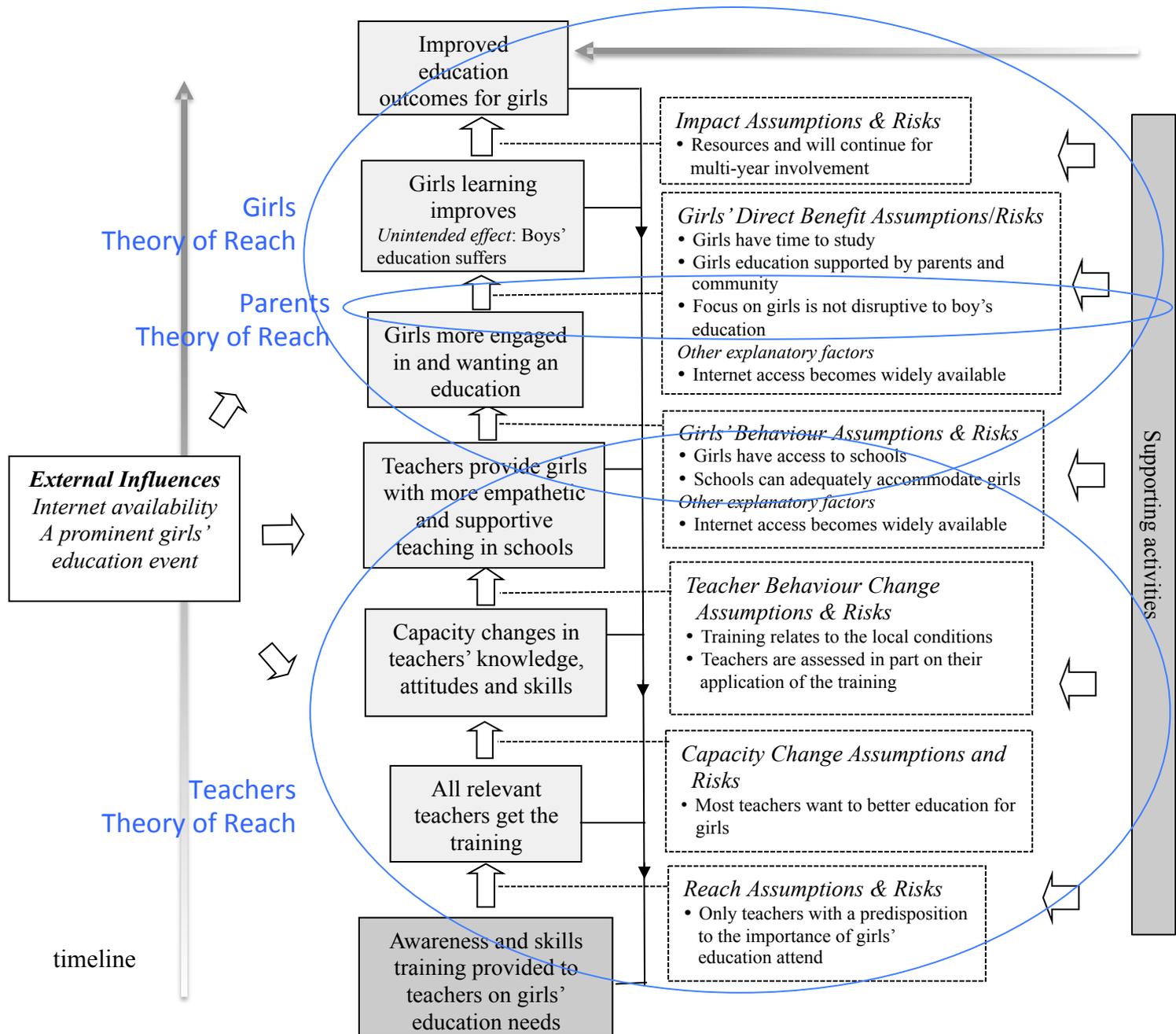
# Theory of Change for Enhancing Education Outcomes for Girls



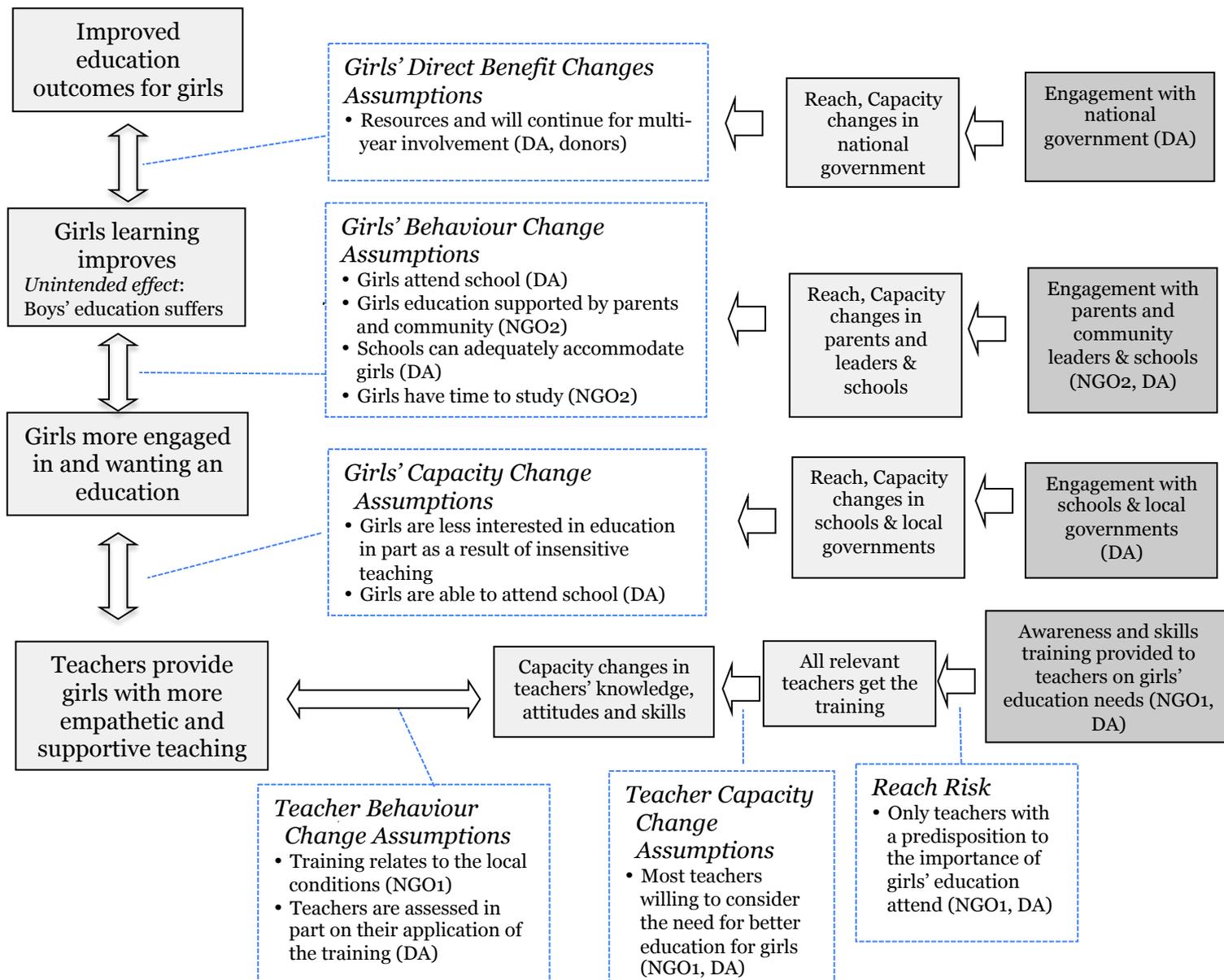
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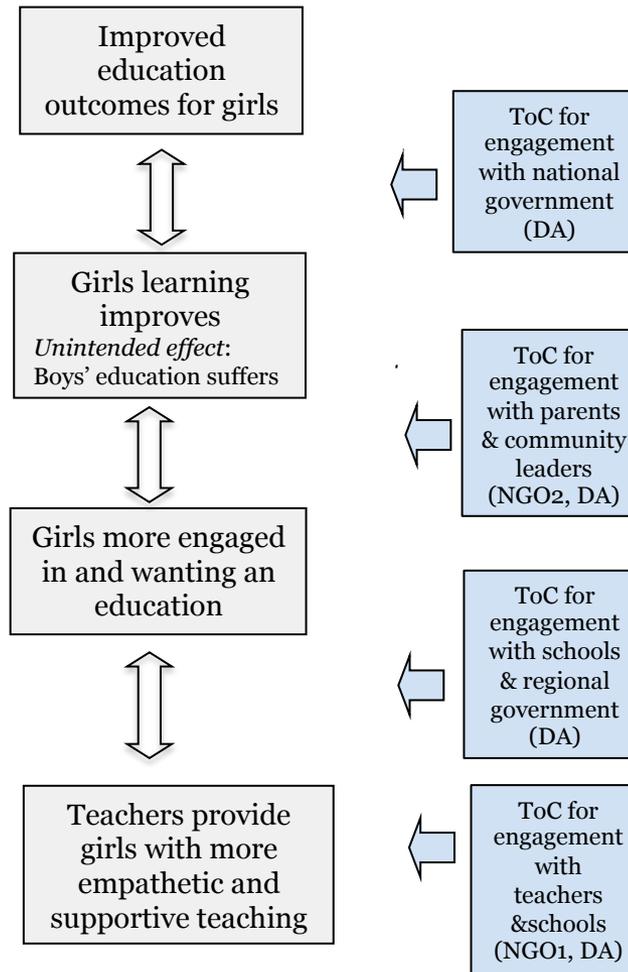
# Theory of Change for Enhancing Education Outcomes for Girls



# Theory of Change for Enhancing Education Outcomes for Girls: A Comprehensive Intervention Perspective



## Simplified Overview Theory of Change for Enhancing Education Outcomes for Girls



# The causality context

- Many causal factors at work:
  - Intervention activities and engagement efforts
  - Partner efforts
  - Other related interventions
  - Social and economic trends
  - ???
- We want to know what the intervention efforts accomplished? Did it make a difference?

# Conceptualizing Causality

What kind of causal relation exists then between a complex intervention ( $X$ ) and an impact ( $Y$ )?

- Can we say  $X$  causes  $Y$ ? No
- Is  $X$  necessary for  $Y$ ? No
- Is  $X$  sufficient for  $Y$ ? No

But we clearly want to make some causal link between the intervention and the impact

# Conceptualizing Causality

- An intervention works as part of a broader **causal package** comprising the intervention outputs + a set of support favors (assumptions). And if it works, then this causal package is indeed sufficient to bring about the impact.
  - IE, the expectation is that the intervention efforts plus the coordinated activities of partners are sufficient to bring about the desired changes
- Further, if the intervention is 'working', then it is an essential part of this causal package; as such **it made a difference**
- An INUS cause

# Intervention Causality

- The intervention in this case is a *contributory cause*. *On its own it is neither necessary nor sufficient.*  
(smoking and lung cancer)
- A very useful concept when working with messy interventions

# The Intervention as Trigger

Intervention is one among several 'causal factors'. But is that all? We probably expect more, that the intervention:

- acts as a trigger to start the causal chain (the spark that lights the fire)
- and may act as sustaining support for change along the way (gasoline to keep the fire going)

*A principal contributory cause*

# Demonstrating Contributory Cause

How then to show that the intervention made a difference?

1. Sufficiency through generative (process) causality theory-based approaches, such as contribution analysis
2. Connecting to theory-based approaches

# Four approaches to causal attribution

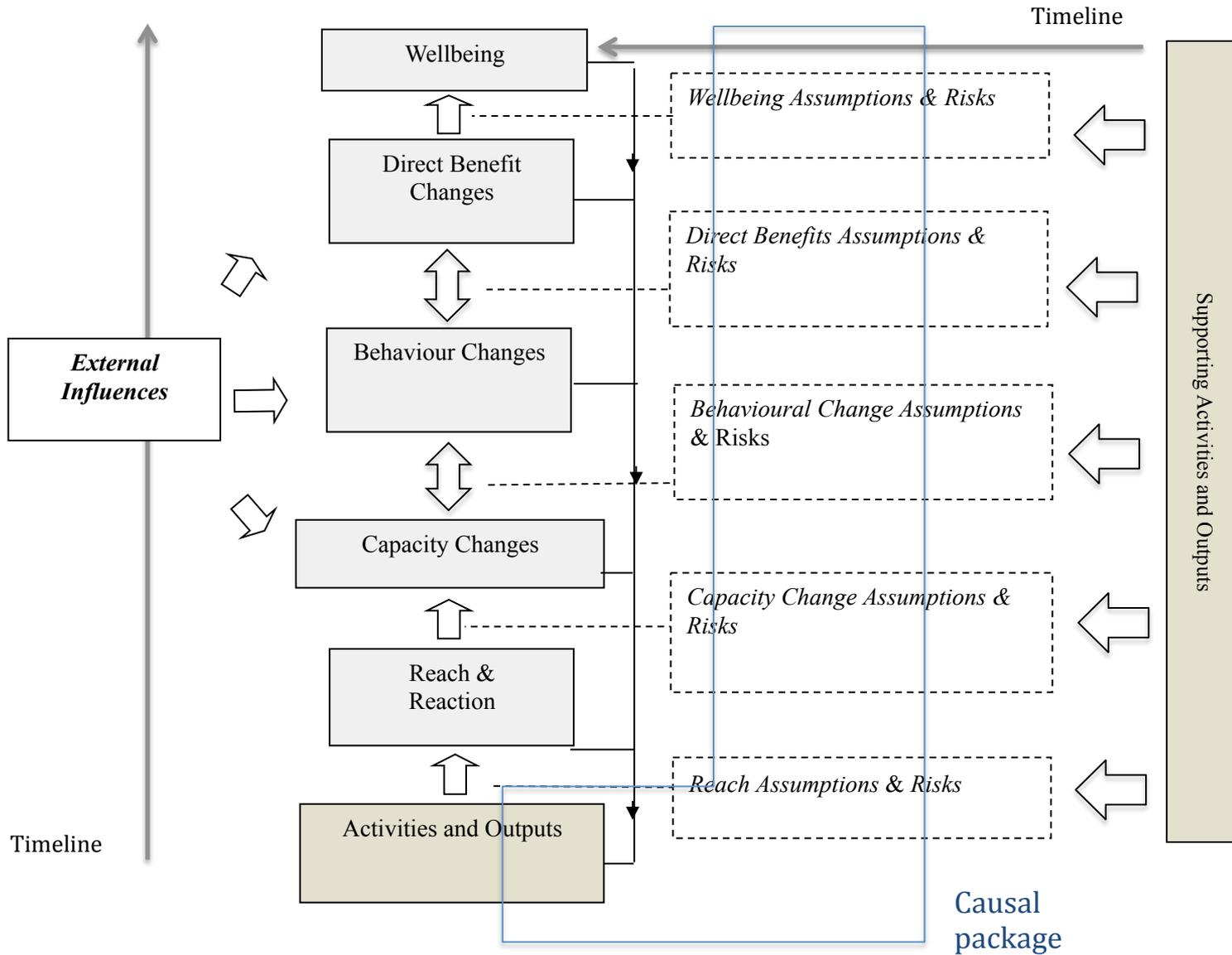
- *Regularity frameworks* that depend on the frequency of association between cause and effect - basis for statistical approaches
- *Counterfactual frameworks* that depend on the difference between two otherwise identical cases - basis for experimental and quasi experimental approaches
- *Comparative frameworks* that depend on combinations of causes that lead to an effect - basis for 'configurational' approaches, such as QCA
- *Generative frameworks* that depend on identifying the causal links and 'mechanisms' that explain effects - basis for 'theory based' and 'realist' approaches.

# Theories of Change as a Model of Contributory Causes

*ToC is a model of the intervention as a contributing cause (an INUS Cause)*

- ToC identifies support factors (assumptions) and confounding factors (risks)
- Intervention outputs plus the assumptions (the **Causal Package**) are sufficient to bring about the intended impacts
- Explains how and why intended impacts are expected to occur

# A Basic Theory of Change



# Contribution Analysis

*Using a generative perspective on causality, CA shows that an intervention is a contributory cause:*

- The expected result occurred
- The ToC (causal package) is sufficient
  - support factors (assumptions) occurred and any other support factors have been included in the ToC
- The intervention is necessary for the ToC to be sufficient
- Can explore the role the intervention played, such as a trigger
- And can explore the contribution played by other influencing factors

# Contribution Analysis

- Simply put, CA makes claims about 'causality'—actually contribution—based on verifying a ToC
- The more robust and detailed the ToC, the more credible the claim
- But the more robust and detailed the ToC, the more data and analysis required

# Dealing with Complexity

- Using nested ToC to decoupled a complex intervention—theories of reach
- Developing impact stories with contribution claims for each (key) nested ToC
- Using the impact stories as the basis for overall contribution claims

# Steps in Contribution Analysis

1. Set out the attribution problem to be addressed
2. Develop the postulated theory of change
3. Gather the existing evidence on the ToC
4. Assemble & assess the contribution story
5. Seek out additional evidence
6. Revise & strengthen the contribution story

# 1. Set out the attribution problem

- Acknowledge the need to address attribution/contribution
- Scope the causality problem
  - What is really being asked
  - What level of confidence is needed?
- Articulate the cause-effect question
- Explore the contribution expected
- What are the other influencing factors?
- How plausible is a contribution?

# Meaningful Causal Questions

1. Has the intervention *made a difference*?
  - Is the intervention a contributory cause?
2. Why has the impact occurred?
  - How did the causal factors bring about the result?
  - What was the context and the mechanisms?
  - What role did the intervention play?

## 2. Develop the ToC and Risks to It

Build the postulated impact pathway and ToC:

- Decide who to involve?
- Identify the assumptions (and risks)
- Identify roles played by other influencing factors (support factors and outside factors)
- Determine how contested the ToC is

# 3. Gather existing evidence

- Assess the logical robustness of the ToC
  - Are there logical leaps of faith?
  - Does it make sense? Is it reasonable?
- Gather available evidence on
  - Results
  - Assumptions (necessary events & conditions)
  - Other influencing factors

## 4. Assemble and assess the contribution story

- Set out the contribution story
- Assess its strengths and weaknesses
- Refine the ToC

# Theory of change analysis

- Which results and assumptions occurred?
- Need to identify which of the links in the results chain have the weakest evidence
- Some may be supported by prior research
- Some links may be well accepted
- But some may be a large leap of faith, or the subject of debate
- With limited resources, these **contested links** are where effort should be focused

# 5. Seek out additional evidence

- Determine what evidence is needed
- Gather new evidence on results and assumptions
  - further measurements
  - Additional data sets, such as from comparison groups

# Strengthening Techniques

- Refine the results chain and/or gather additional results & assumptions data
- Survey knowledgeable others involved
- Identify relevant research or evaluation (Campbell & Cochrane Collaborations)
- Use multiple lines of evidence
  - Track intervention variations and their impacts (time, location, strength)
  - Undertake case studies
  - Examine comparison groups
- Do a focused mini-evaluation

# Strengthening the ToC

- *Key informant interviews*: don't just ask if things worked?
  - Ask about aspects of the (implicit) ToC
  - Ask why they think things worked or not, why was there a contribution made—what's the evidence?
  - Ask about external factors at play
- *Focus groups and workshops* are great occasions for this type of discussion
- *Case studies* can be used in the same way: to explore the implicit ToC stakeholders are using to think about the intervention

# Other influencing factors

- Literature and knowledgeable others can identify the possible other factors
- Reflecting on the theory of change may provide some insight on their plausibility
- Prior evaluation/research may provide insight
- Stakeholders will have views
- Relative size compared to the program intervention can be examined
- Knowledgeable others will have views on the relative importance of other factors

# 6. Further revise and strengthen the contribution story

- Revise the ToC
- Build the more credible contribution story
- Reassess its strengths and weaknesses
- Assess the role played by the intervention
- Revisit step 5

# Contribution Analysis confirms

- the expected results occurred
- the causal package is sufficient
  - the supporting causal factors—the assumptions for each link in the ToC—have occurred and together provide a reasonable explanation for the occurrence of the results
  - any other identified supporting factor that occurred has been included in the causal package, revising the ToC as needed
- the intervention is a necessary part of the causal package
  - without the activities and outputs of the intervention, the supporting factors alone are not sufficient to bring about the results.

## 7. Develop the complex contribution story

- Develop the impact story for each key nested ToC
- Develop the contribution story for the overall theory of change

# Contribution Analysis

- A way to explore cause and effect using generative causation concepts
- Systematically
  - verifies the theory of change of an intervention
  - assesses other factors
- Delivers credible contribution claims
- Is practical but requires effort

# Contribution Analysis

- Not a quick and dirty method
- Time consuming and needs data
- Contribution claims will not be definitive

# Possible Light CA

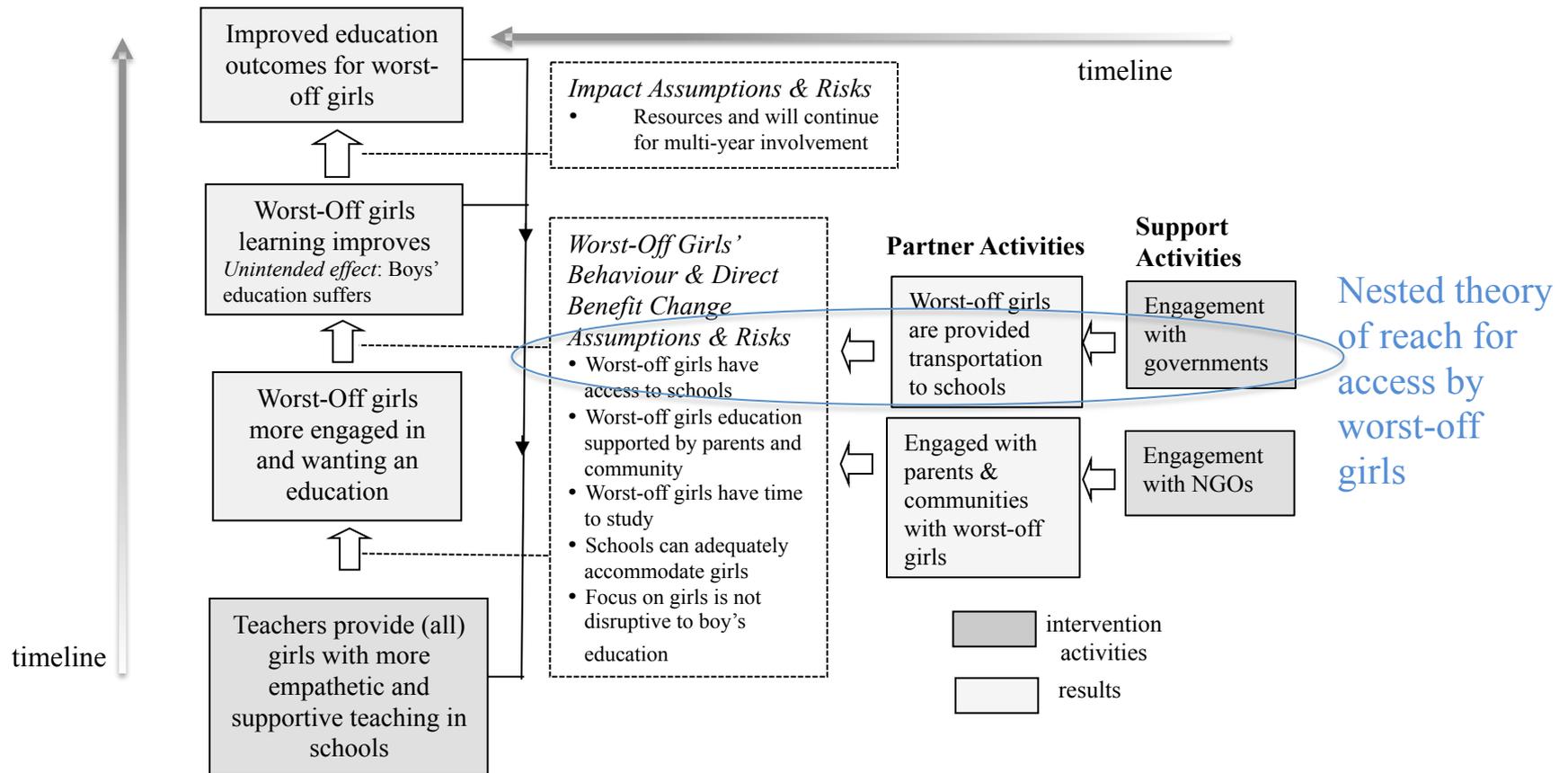
- Develop the theory of change
- Confirm that the expected research outputs were delivered
- Check early outcomes occurred
- Based on the strength of the rest of the theory of change, conclude the intervention made a contribution

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**Extras**

# Theory of Reach for Enhancing Education Outcomes for Worst-Off Girls



# Theory of Change for Enhancing Education Outcomes for Girls

