

Assessing the Relative Importance of Causal Factors

Abstract While contribution analysis provides a basis for making causal claims and understanding how and why change occurs, it does not on its own estimate the relative importance, much less the size, of the causal factors at work. In this CDI Practice Paper written by John Mayne, we discuss ways of assessing the relative importance of such causal factors, while arguing that there are likely no quantitative answers to the question. Rather, there is a need to carefully articulate the relative importance question, decide which causal factors one wants to compare, and to decide how one wants to interpret ‘importance’. A variety of perspectives are possible: perceived influence, the roles played by the factors, the funds expended, and the extent of the constraints to change. All are plausible ways of assessing the relative importance of causal factors.

Contribution analysis (Mayne 2011) is an approach for determining if an intervention contributed to bringing about an observed result and in what way, based on verifying reasonably robust theories of change (ToCs).¹ The contribution claims that are verified concern the causal links between the intervention and the observed results, and in complex settings, there can be quite a few causal factors at play. Moreover, the analysis of the intervention ToC leads to understanding on how and why the intervention has made a contribution. These are all valuable findings as part of an evaluation of the intervention. Other theory-based evaluation approaches, such as Realist Evaluation (Westhorp 2014), have similar aims.

Identifying and confirming the various causal factors at play is an important finding in understanding how change has been brought about. However, the questions often then asked are: what is the relative importance of these various causal factors? How important were the intervention’s efforts in bringing about change in comparison to other factors? The contribution analysis approach does not on its own get at these types of questions. Just as the previous CDI Practice Paper (Ton *et al.* 2019) discusses, this paper explores how we may interpret and approach the ‘how important’ question, particularly when experimental and quasi-experimental approaches are not possible.

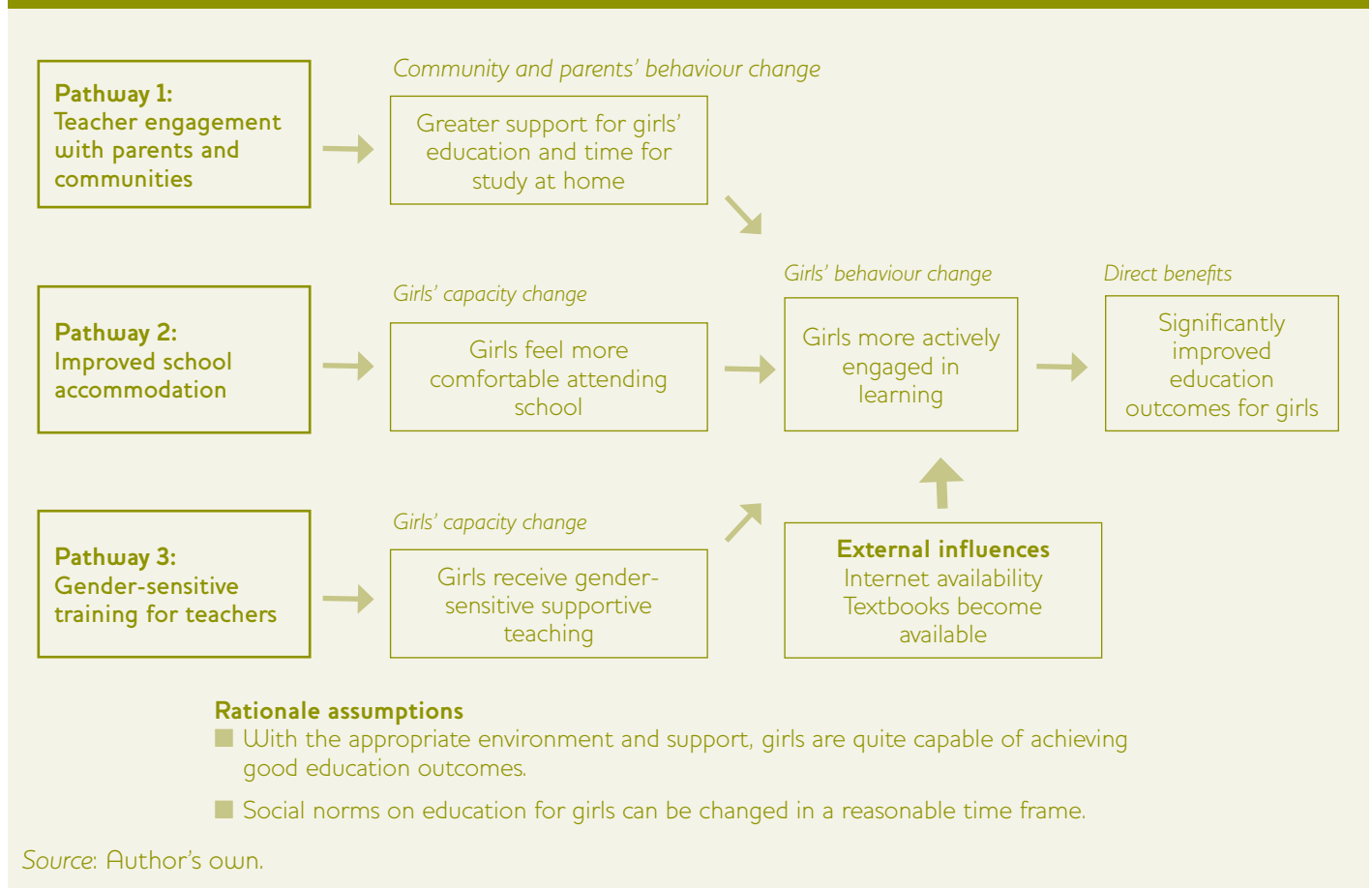
1 The setting

The focus here is on interventions that are somewhat complicated or complex. That is, interventions that may involve some or all of the following characteristics:

- Comprise a number of different intervention components or types of intervention activities and strategies;
- Involve a number of different actors, such as partners and intermediaries;
- Include a number of different pathways to impact;
- Are influenced by a number of external factors.

Complex multifaceted interventions are becoming more the norm than the exception, especially in development settings (Byrne 2013; Ramalingam 2013; Copestake 2014; Garcia and Zazueta 2015; Gerrits and Verweij 2015). In these settings, causality is not straightforward and there will be a number of different causal factors at work in bringing about the observed results. That is, change is brought about by a causal package of factors, none of which on their own is sufficient to bring about the expected change. Each such causal factor is an INUS condition, an Insufficient but Necessary part of a set of conditions that is, itself, Unnecessary, but Sufficient for the occurrence of the effect (Mackie 1974).

Figure 1 Overview Theory of Change for enhancing education outcomes for girls



A girls' education example

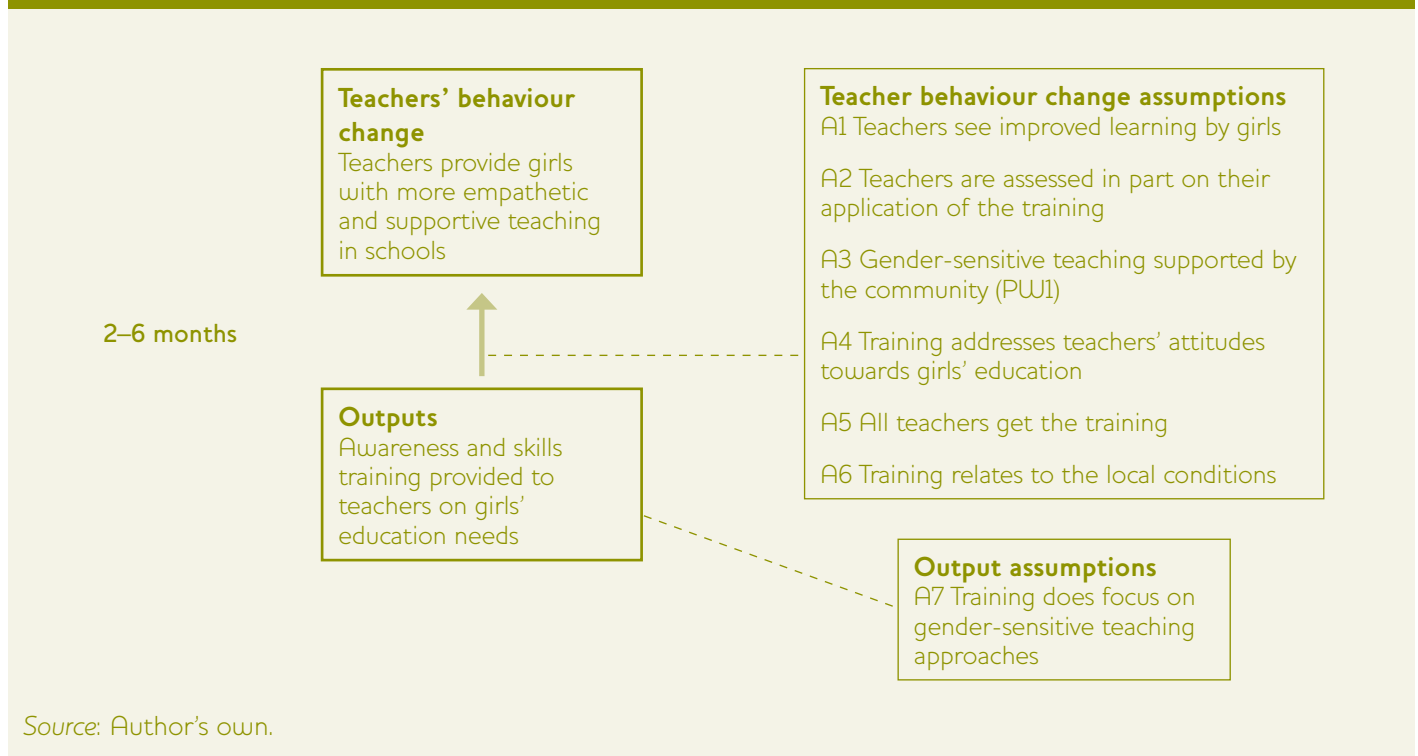
To explain many of the terms and concepts to be discussed, I will use an illustrative example of an intervention aimed at improving the education outcomes of girls. In a region, despite attending school, education outcomes for girls are low in absolute terms and in relation to boys. Girls' education is not seen as a priority and attendance is uneven. Based on interviews with students, households, teachers, and school authorities, several issues around the low education outcomes emerged:

- Many teachers themselves do not see girls' education as important and do not have the skills to provide a gender-sensitive approach to education.
- There is limited support and encouragement from parents and the communities for girls' education.
- There is an expectation that girls when at home are to help the older women with household chores, leaving little time available for study.
- There is some discomfort felt by girls with school accommodation, and some concern by parents of inappropriate mixing with boys.
- There is poor availability of textbooks.

A consortium of donors along with school authorities have agreed to address this problem, and in particular to:

- Provide special gender-sensitive training to teachers. The training aimed to raise teachers' awareness of the special needs and situation of girls in school, and address their attitudes towards education for girls. It also provides them with ways and means to adopt a more gender-sensitive approach in classrooms, by ensuring that girls are not discriminated in their opportunities to learn.
- Engage with parents and community leaders to stress the importance and the benefits of girls getting a good education. Meetings over a period of time were held both individually and in groups with parents and community leaders, discussing the importance and the benefits of girls getting a good education, and the support girls need at home and in the communities.
- Improve the accommodation for girls at schools. Some improvements were budgeted for in terms of bathroom facilities and areas where girls could meet. The lack of textbooks was a more general problem in the country that the consortium could not address.

Figure 2 Simplified Theory of Change for teacher engagement (PUJ3)



The expectation of the consortium intervention was that after two years there would be a significant improvement in education outcomes for girls, something like a 50 per cent improvement.

After two years, an evaluation found that, indeed, education outcomes for girls have significantly improved. Further, interviews with girls, households, and teachers identified other external events that occurred during the two years that could have influenced the education outcomes, namely:

- Due to a country-wide intervention by the World Bank, in the second year, textbooks have become generally available for students in schools.
- In significant parts of the region, internet access has become available.

Figure 1 shows the Overview Theory of Change (ToC) for the intervention, i.e. it shows at a high level, the main pathways to impact. Overview ToCs do not show the detailed causal links and their assumptions; rather, they just set out the causal pathways at work and the Rationale Assumptions underlying the intervention (Mayne 2015).

The underlying pathway models are based on the COM-B model (Michie, Van Stralen and West 2011) whereby behaviour change (B) is brought about by three necessary capacity elements: capabilities (C), opportunities (O), and motivation (M).²

Figure 2 is a simplified nested ToC for the teacher training component of the intervention (Pathway 2). It was developed from a more detailed nested ToC, based on the COM-B model of behaviour change (Mayne 2018).

The teachers' behaviour change is brought about through the interaction of several causal factors in a **causal package**, namely:

- 1 Relevant training provided to all teachers (A5), addressing gender issues, local conditions, and teachers' attitudes (A4, A6, A7);
- 2 Gender-sensitive teaching supported by community (A3);
- 3 Teachers' performance assessed on the new approaches (A2);
- 4 The improvement in girls' capacity and learning is evident (A1).

That is, all four of these causal factors are necessary (or likely necessary) in the causal package³ to bring about adequate gender-sensitive teaching; they are INUS conditions (Mackie 1974). The A1 element reflects the fact that behaviour change takes time and if teachers saw no improvement in girls' capacity and learning, the new teaching approaches would be unlikely to continue. Without A2, teachers would think that the school administration was not really serious about the new focus on girls. Teachers are part of the community and if the gender-sensitive training was seen

as against the local social norms, they would be unlikely to use the approaches (A3). The teacher training clearly has to address gender issues, reflect local conditions as much as possible, address the attitudes of the teachers towards girls' education (A4, A6 and A7), and be given to all teachers (A5).

2 Meaningful relative importance questions

In the example, having verified that each of the three pathways (improved teaching, improved accommodation, and enhanced community and parental support) indeed contributed to the improved education outcomes of girls, one might ask questions such as:

- Which pathway was more important?
- What was the relative importance of the four causal factors in the causal package that brought about improved gender-sensitive teaching?

These types of questions are often associated with the idea of determining how much of a result, in a quantitative sense, can be attributed to different causal factors, or to different actors involved in an intervention. How much of the intervention results can be 'claimed'?

As noted in the previous CDI Practice Paper (Ton *et al.* 2019), while the 'how much' evaluation question might sound sensible for accountability purposes, it may nevertheless be essentially unanswerable. In a complex setting where there are multiple and often interdependent causal factors at work in causal packages, determining net quantitative effects of the different causal factors becomes impossible. Therefore, instead of measuring the size of the importance quantitatively, we need to ask the question: what is the relative importance of a specific causal factor in this wider configuration of factors?

This brings us to the following two questions:

- What is being compared with what, and;
- What does 'importance' mean?

3 What to compare?

Let us look first at the 'what is being compared' question. This turns out to be a more complicated question than it appears, as there could be a variety of types of causal factors at play that determine the outcome of the programme:

External causal factors. These are perhaps the easiest to imagine: factors outside the intervention that could have played a role in bringing about the results and hence made a contribution. In the girls' education example, these are the availability of textbooks and the internet.

Components of the intervention. There may be several components of the intervention at work, each aimed at bringing about or supporting the bringing about of the expected results. Each of these components is likely to have its own pathway to results, setting out just how it is expected that the component activities undertaken will contribute to the observed results. Each component would be associated with one or more causal factors. The causal factors are typically the direct proximate results of the component activities. In the girls' education example, the intervention components are the improved teaching, the improved accommodation, and the enhanced parental and community support.

Causal factors along a pathway. The outputs of each component on their own are not likely to cause the results. Rather, the outputs of the component activity along with other supporting factors – the assumptions

Box 1 Different relative importance questions for the girls' education case

For the girls' education case, we identified four of these 'relative importance questions':

- G1 What is the relative importance of the various intervention components, namely, gender-sensitive teaching, improved school accommodation, and enhanced community and parental support in bringing about improved learning and education outcomes?
- G2 For the gender-sensitive teaching component, what is the relative importance of the causal factors at play, namely the teacher training, the support for gender-sensitive teaching by the community and parents, the assessment of teachers' performance by the school administration, and the evidence of improvement in the girls' learning? And remember that all these causal factors are logically of equal importance.
- G3 What is the relative importance of the various external factors at play, namely the availability of textbooks and the internet?
- G4 What is the relative importance of all the causal factors at play, such as the two external factors identified and the three intervention components?

along the component pathway ToC – together will make a contribution to an even more complex process of change that generates the results. That is, it is this wider *causal package* of factors that will bring about change, and all the factors in the causal package are necessary to bring it about, and hence in a logical sense, all are of equal importance. In the girls' education case, an example is the teacher training pathway shown in Figure 2.

These distinctions in type of factors suggest several more fine-grained evaluation questions to be considered in an evaluation:

- 1 What is the relative importance of the various intervention components in bringing about change?
- 2 For a specific intervention component, what is the relative importance of the different component causal factors at play?
- 3 What is the relative importance of the various external factors at play?
- 4 What is the relative importance of all the causal factors at play?

These are four different types of questions, and answers to each of them would provide increased insight into how the intervention and its components played a role in the change taking place. In practice, one may not want to explore all possible relative importance questions, but focus on those of most interest. The important point we want to make here is that there could be many specific questions to make relevant comparisons, all related to the overall question of 'How important was the contribution of the project?'

4 How to interpret 'importance'?

In discussions, I have often seen 'the importance of a contribution' described as 'the strength of the contribution' or the 'significance of the contribution', but of course these terms do not really advance understanding. It seems to me that there are several interpretations of 'importance' that can be both operationalised⁴ and have intuitive meaning:

- the *perceived influence* of the causal factor in bringing about a change;
- the *role played* by the causal factor in bringing about a change;
- the *funds expended* by the causal factor;
- the *magnitude of the constraint to change* faced by the causal factor, including the time taken to bring about the change. That is, *the difficulty of bringing about a causal factor*.

Further, questions about 'importance' can be asked at different levels along a pathway to impact. For example, the importance of a causal factor can be in relation to the behaviour change realised as well as the resulting change in direct benefit or impact. The relative importance question to be addressed needs to be carefully defined.

Perceived influence

Here, importance is taken to mean how a target group perceives the influence of the causal factors. Typically, a target group has changed behaviour in some fashion, and the question then may be which causal factors were more or less influential in bringing about the change. And this perception question could apply to any of the four evaluation questions set out above. A verbal scale could be developed to rank the responses.

In the girls' education example, one could do such an exploration with the girls in school around the question of what it was that brought about their enhanced interest in learning and subsequent improved education outcomes. One could also explore with the teachers what factors were most influential in bringing about their adoption of gender-sensitive approaches to teaching.

In other cases, interest may be in the relative importance of the intervention compared to other external causal factors. Perceived importance can still be explored, but keep in mind that there may be different actor groups involved who may have different views on what was important, possibly complicating the comparison. One could look at the perceived importance for each actor group or for all actors. The different foci could be of considerable interest. In the example, one might want to know what factors the teachers perceived as most important in bringing about improved education outcomes for the girls.

The perceived influence perspective is often used by evaluators, and clearly it often makes sense to do so. This could be done with a survey or interviews with the relevant actors involved (such as the girls and/or the teachers) about the comparisons of interest. Obviously, care would be needed in how the data were collected so as not to bias the result. After asking whether certain predefined factors were influential, one could then ask about other factors not yet identified, and also explore the reasons behind their choices on importance. This would be especially important when, for example, the influence of interventions are compared with each other (Copestake 2014).

The role played

Another interpretation of importance could be the role played by the causal factor. A variety of roles is possible:

- As a **trigger** – the spark that starts the fire. One can explore the extent to which it was the causal factor (or intervention) that started the causal chain reaction that

led to impact. This might have happened through the provision of essential funds, by clearing a blockage in a process, or by providing the right motivation for others to get involved.

- As a **supporting role**. Providing, perhaps, essential skills and knowledge, reputation, or other forms of support to ensure overall success.
- As a **facilitator**, bringing key actors together to form the essential causal package of activities.
- As an **accelerator**, so that through its support, the time-line when the expected results are realised is shortened.

One or more of these roles might be associated with specific aspects and activities of the intervention. For example, if the intervention was expected to play a triggering role, but in fact an external causal factor played this role, i.e. got things going, while the intervention played a supporting role, then the importance of such an intervention is less and might even be questioned.

Assessing the role played involves building up convincing evidence (a compelling argument) that substantiates the role or roles played by the causal factors. A comparison of the expected role of the causal factors of interest beforehand with their actual role in what actually happened is often useful. It is likely that the intervention aimed to play a specific role: was this role usurped by other causal factors, suggesting that other factors were relatively more important in bringing about change?

The funds expended

This is an oft-used rubric to assign level of importance: what was spent to deliver a causal factor or group of factors? Though it seems quite straightforward to apply, it may not necessarily reflect the degree in importance. One needs to be aware that there could be many reasons for the level of funds expended, unrelated to the importance in the change process.

In the girls' education example, one could compare the costs of the teacher training, the costs of the schools' accommodation improvements, and the costs of the engagement efforts with the community and parents.

In assessing costs, data should be available from administration records. If the comparison is to be with external factors, getting relevant funding information for those factors may not be possible. And estimating funding would only make sense for action-type causal factors, not for causal factors that were conditions for bringing change about.

The difficulty of bringing about a causal factor

The idea here is that many causal factors are brought about by the actions of the intervention, and bringing about one specific causal factor in this causal package could be more

or less a challenge. The more difficult it is to generate the causal factor, the more important in terms of focus, energy, and effort it would be.

One can talk about the critical *constraints to change* in an intervention setting. The challenge could imply the costs involved, the time involved, or just the difficulty of bringing about the desired change, such as changing social norms. Information on the relative difficulty of bringing about the causal factors would be quite useful for adapting the implementation of the intervention and for trying it elsewhere. If the problem the intervention is addressing has been well set out, it would likely give us some idea about the difficulty of bringing about the various factors for changes needed. There is an assumption here, of course, that the intended change was actually brought about by the causal factor.

But this 'difficulty' perspective might not always be relevant. For example, if it were found that a key causal factor for change was an ongoing social trend, its difficulty ranking would be very low, not reflecting its importance at all.

In the girls' education example, intervention causal factors of interest are the improved teaching, the improved accommodation, and the enhanced support by parents and communities. Where the social norms are a real constraint to change, the improved community and parental support may be the most difficult factor to bring about, requiring ongoing dialogue and adequate time for norms to slowly change, perhaps followed by the improved teaching and then the improved accommodation. Such an assessment would be a reasonable interpretation of the relative importance of each of the intervention components.

Assessing 'difficulty' could involve a combination of interviews with those bringing about the changes, prior experience bringing about such changes, and subjective views on the challenges faced. For example, in surveys or interviews, a scale could be used to describe a range of degrees of difficulty.

5 Discussion

A first step in assessing the importance of a causal factor is, of course, to confirm (or not) that these are indeed contributory causes. This would be done using a theory-based approach, such as contribution analysis (Mayne 2011), or applying process tracing (Befani and Mayne 2014; Punton and Welle 2015). If it turned out that a particular causal factor was not a contributory cause, then of course its relative importance is clear, namely none.

In terms of the relative importance question posed earlier, each of the possible interpretations of 'importance' could be quite reasonable and appropriate in a particular case, as could be the specific comparison questions. As a result, there

are a large number of possible ways of operationalising the relative importance question. Key is clearly to define well which of the relative importance questions are of highest interest. In the girls' education case, for example, we might want to explore the relative importance of:

- The three components of the intervention: gender-sensitive teaching, improved school accommodation, and enhanced community and parental support;
- The external influences in comparison to the intervention's contributions;
- The causal factors associated with the pathway to (1) improved teaching, and (2) enhanced community and parental support.

In terms of the different interpretations of 'importance', it may sometimes be the case that several of the perspectives could give similar rankings. This would strengthen the findings. For example, the difficulty in generating the change approach may correlate quite well with the funding perspective.

A good strategy to address the relative importance question may be to use several or all of the possible

interpretations of 'importance' and then draw overall conclusions on relative importance. It might be found, for example, that the most influential factors were not those with large financial costs, or those which were associated with relatively easy-to-change causal factors. All this would be useful information for improving the implementation of the intervention or for implementing it elsewhere.

We argue that for the most part, getting quantitative answers to the relative importance question is not feasible or practical. Rather, there is no one best way to answer the question and one needs to look at more qualitative approaches. The suggestion here is to go beyond using expert judgement to assess relative importance and to carefully consider and define the relative importance question one wants to address. This is not a straightforward task. We saw that in complex settings there can be quite a few causal factors at play, only some of which are likely to be of interest, and further, that there can be several possible ways of interpreting importance. Thus, there may be several different types of comparisons one wants (or needs) to make. Exploring the relative importance this way is quite likely to lead to very useful findings about the causal factors making a contribution to an observed change.

Endnotes

- 1 Weak ToCs can only lead to weak contribution claims. Mayne (2017) discusses criteria for robust ToCs.
- 2 Further discussion on this girls' education example and the various nested ToCs used for each of the three pathways can be found at: www.researchgate.net/publication/330158251_May2018_Revised_Girls'_Education_Example_TOCA_CA_and_PTclean.

- 3 For a discussion on 'likely necessary' assumptions, see Mayne (2015) and Mahoney (2008).
- 4 A separate issue is the strength of evidence behind any contribution claim, which is unrelated to the relative importance of the claim.

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This CDI Practice Paper was written by **John Mayne**.

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