Rapid Cycle Evaluation at a Glance

Evaluation Brief
Design Options for Home Visiting Evaluation
November 2020

Rapid cycle evaluation (RCE) approaches are attracting growing attention as a way to efficiently assess the implementation of interventions and to inform program improvement. RCE is an umbrella term that is used and defined broadly. This brief defines RCE as an approach that relies on formative methods.

RCE may help Maternal, Infant, and Early Childhood Home Visiting (MIECHV) awardees test program changes quickly and rigorously. The purpose of this brief is to introduce MIECHV awardees to RCE and its potential use in their programs.

This brief—

- Defines RCE
- Compares RCE with traditional research designs
- Describes methods that can be used in RCE
- Provides an example of how RCE can address a research question
- Outlines steps to prepare for RCE
- Lists potential benefits of RCE
- Provides additional resources

MIECHV funds the development and implementation of evaluations by awardees. MIECHV is administered by the Health Resources and Services Administration in collaboration with the Administration for Children and Families.

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What is RCE?

RCE is an approach to evaluation that relies on innovative designs and methods to quickly test program components and provide actionable results to integrate improvements into further testing. RCE can use a

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variety of designs and methods. The literature is still developing, but common hallmarks of RCE approaches include rapid cycle analysis and formative process improvement.

Rapid cycle analysis quickly assesses the effectiveness of program components by testing different treatment conditions. It also facilitates ongoing feedback to staff to support program improvement.

Formative process improvement allows for a careful review of interim data and modifications to the study and/or intervention design for optimal implementation to achieve desired outcomes. Modifications to the study design are planned and may be based on existing research, prior information, or observation. For example, changes may include modifying dosage, reassigning participants to more effective treatment groups, or removing ineffective treatment groups. RCE can quickly determine the likely effectiveness of a program component based on interim data and allow for design modifications to achieve desired outcomes.[1]

RCE approaches use rapid cycle analysis as part of a feedback loop to generate new knowledge and optimize interventions. These approaches enable the engagement of stakeholders—the people and agencies invested in the program and interested in the evaluation results—in reviewing program components, analyzing and interpreting results, and adapting practice and measurement collaboratively. Stakeholders have key insights into the program, which provides the information required to quickly tailor design components to the local context.

How does RCE compare with traditional research approaches?

RCE approaches differ in important ways from traditional research approaches. RCE is characterized by rapid testing and analysis, flexibility in design and implementation, a focus on short-term outcomes, and testing specific program/service elements within a program. By contrast, traditional approaches are characterized by longer timelines and more rigid definitions of the intervention and what is being evaluated. The focus is typically on long-term outcomes, and there is usually an assessment of the whole program or service model. However, both approaches can use randomization and experimental or quasi-experimental designs.

RCE approaches are flexible. They incorporate review of interim data throughout the study, which may result in changes to the design, sample, or randomization. While traditional designs would be compromised by such changes, RCE uses methods that ensure the designs remain unbiased and robust despite these changes. Evaluators and program staff can jointly review and interpret interim findings and make modifications to practice and measurement simultaneously. For example, during an interim review of findings, a program discovers that a subgroup is not experiencing positive outcomes through a new service strategy. The program could narrow the target population to a specific subgroup experiencing positive outcomes or increase the number of participants randomized into more effective treatment groups (see example on next page). Traditional research methods are more rigid. Decisions regarding the sample, randomization, and dosage are made at the start of the study and cannot be changed.

Some RCE approaches provide a way to gather precise information on program effectiveness with smaller sample sizes than those required when using traditional methods. They achieve this by using research designs (e.g., time series analysis) and statistical methods (e.g., hierarchical linear modeling) optimized for drawing inferences from small samples. Time series analysis measures outcomes for the same participants under different conditions over time, which helps examine the relationship between the intervention and changes in outcomes. This method helps identify trends and precise effects on outcomes.

RCE is not the right approach for every question. While both traditional and RCE methods can produce reliable and unbiased results, RCE adds complexity and flexibility that may not always be necessary. Traditional methods may be more appropriate for answering straightforward questions about the effectiveness of an intervention or for examining the impact of an established intervention on long-term outcomes.

RCE Example

The following example is based on a real study in home visiting, but it has been modified to clearly illustrate an RCE approach.

A home visiting program aimed to increase the rate of appropriate referrals to mental health services for mothers who screened positive for depression. The program implemented an intervention to enhance home visitors' self-efficacy in decision making after scoring the depression screener. The intervention provided home visitors with trainings, written guidance, and access to mental health consultants. To evaluate the intervention, the program used an idiographic controlled trial (ICT, which is described in more detail in the next section). This RCE approach allowed for rapid data analysis and iterative, formative feedback to improve the intervention.

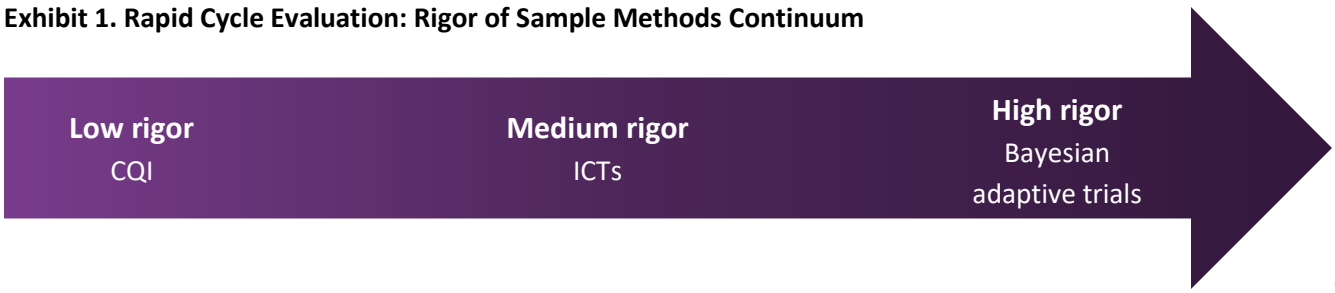
Although the program's target outcome was to increase the rate of referrals, referral data are collected too infrequently to be used formatively. Instead, a short-term outcome was selected—home visitors' self-efficacy in decision making to meet identified needs.

To measure home visitor self-efficacy, the program administered an instrument to home visitors weekly. Results were assessed biweekly and adjustments were made to the intervention based on the findings (i.e., modifying training content, revising guidance to home visitors, enhancing the services provided by the mental health consultant). The program modified the intervention until all home visitors reached a high degree of self-efficacy in decision making. Within 6 months, the program increased by 20 percent the rate of appropriate referrals to mothers who screened positive for depression. While the findings cannot conclusively be attributed to the intervention changes, they can be used formatively to modify the intervention iteratively until the desired outcome is achieved.

What designs can be used in RCE?

Many methods may be suitable to use within the RCE framework. All involve iterative data collection to answer specific questions quickly, often to support program improvement. The methods fall along a continuum of rigor, depending on the extent to which they can determine causal relationships using validated reliable measures. Exhibit 1 presents examples of three common RCE approaches.

Exhibit 1. Rapid Cycle Evaluation: Rigor of Sample Methods Continuum



Continuous quality improvement (CQI) uses cycles of planning, testing, refining, and retesting (sometimes referred to as Plan-Do-Study-Act cycles) to examine improvements to a system or process. Data are collected continuously, and changes are assessed over time. CQI falls within the RCE framework, but it is a low rigor method. CQI is not typically used as a means to evaluate the efficacy of a novel intervention, but rather to make iterative improvements to an existing system. It works best when rigorous research already exists on the improvements to be tested, or when minimal resources are required because the proposed modifications are slight.

Idiographic controlled trials (ICTs) follow a modified quasi-experimental form of single case design that is less rigorous but more flexible than randomized control trials. ICTs use time rather than a separate control group, comparing results during and after an intervention to a baseline period.[2] Strict rules are established for the collection of baseline, treatment, and posttreatment data. ICTs use statistical techniques that allow for the inclusion of certain variables and the assessment of effect size. Data may be fed back to the intervention to improve it.

Bayesian adaptive trials combine prior information (i.e., information from previous trials, scientific research, expert opinion) with emerging study data to make timely and efficient inferences about participant outcomes. Integrating all available data allows the study design to be adapted to efficiently identify elements that change outcomes for different families or situations.[3] For example, random assignment may be modified over time to assign more people to likely effective treatment conditions and fewer people to ineffective treatment conditions.

How does an RCE approach look in practice?

RCE approaches can efficiently answer formative evaluation questions. Programs can build evidence over time about what works best for whom and under what conditions. For example, programs can use various RCE approaches to test different strategies for engagement, program completion, or service delivery. RCE can inform precision approaches that use evidence-based strategies to meet the needs of particular groups of individuals and families. Below is an illustration of how a research question could be answered using RCE or a traditional method to inform a precision approach to home visiting.

Background. Two home visiting programs reported a high dropout rate among two-parent rural families. Home visitors reported that the curriculum was not resonating equally within those families. They suggested delivering all sessions to primary caregivers and delivering only certain sessions to both caregivers.

Research question. What engagement strategies are most effective in increasing participation for two-parent rural families enrolled in a home visiting program?

Study description. Engagement strategies are tested with two-parent rural families to determine if they increase program engagement and completion in 3 years.

Study using RCE. Program A uses an RCE approach that relies on ICT to test and modify different strategies for different families. Parents initially receive a standard engagement protocol to establish a baseline. They are then randomized into two groups: one receives all sessions, and the other receives selected sessions. Data are collected on the number of visits completed, home visitor perception of engagement, and curriculum components. For both groups, the program reviews the data weekly, makes modifications to components that indicate poor engagement, and adjusts which parents receive which sessions. It analyzes the effect on outcomes at the conclusion of the study.

Study using a traditional research approach. Program B uses a randomized controlled trial with two treatment groups: one receives all sessions, and the other receives selected sessions. A control group receives a standard engagement session. Participants were randomized across the three groups. Data are collected on the number of visits completed, home visitor perception of engagement, and curriculum components. The program reviews the data annually and analyzes the effect on outcomes at the conclusion of the study.

Using RCE Findings

Program A found that delivering only certain sessions to both caregivers increased engagement, and focusing those sessions on coparenting decision making yielded the best results. Nonprimary caregivers continued with the program when the content was prioritized for them, and they found the time commitment to attend fewer sessions more manageable. Overall outcomes improved.

RCE allowed the program to test and refine its real-world observations, and to use the findings to confidently tailor its approach for new two-parent rural families.

Exhibit 2 summarizes the differences between RCE and a traditional research approach using this example.

Exhibit 2. Comparison of an Idiographic Controlled Trial and a Traditional Research Approach

Study feature	RCE approach	Traditional research approach
Research method	ICT	Randomized controlled trial
Sample size	30 families	Two treatment groups include 30 families: 15 families receive strategy A, and 15 families receive strategy B. A control group includes 30 families from similar programs with similar context and characteristics.
Adaptation	Program uses interim data to test design modifications	No modifications are permitted.
Interim analysis	Weekly	Annually
Cost	Lower cost: data collection for 30 participants at one site	Higher cost: data collection for 90 participants at multiple sites
Duration	3 years	4 years (including longer ramp-up for multisite study)

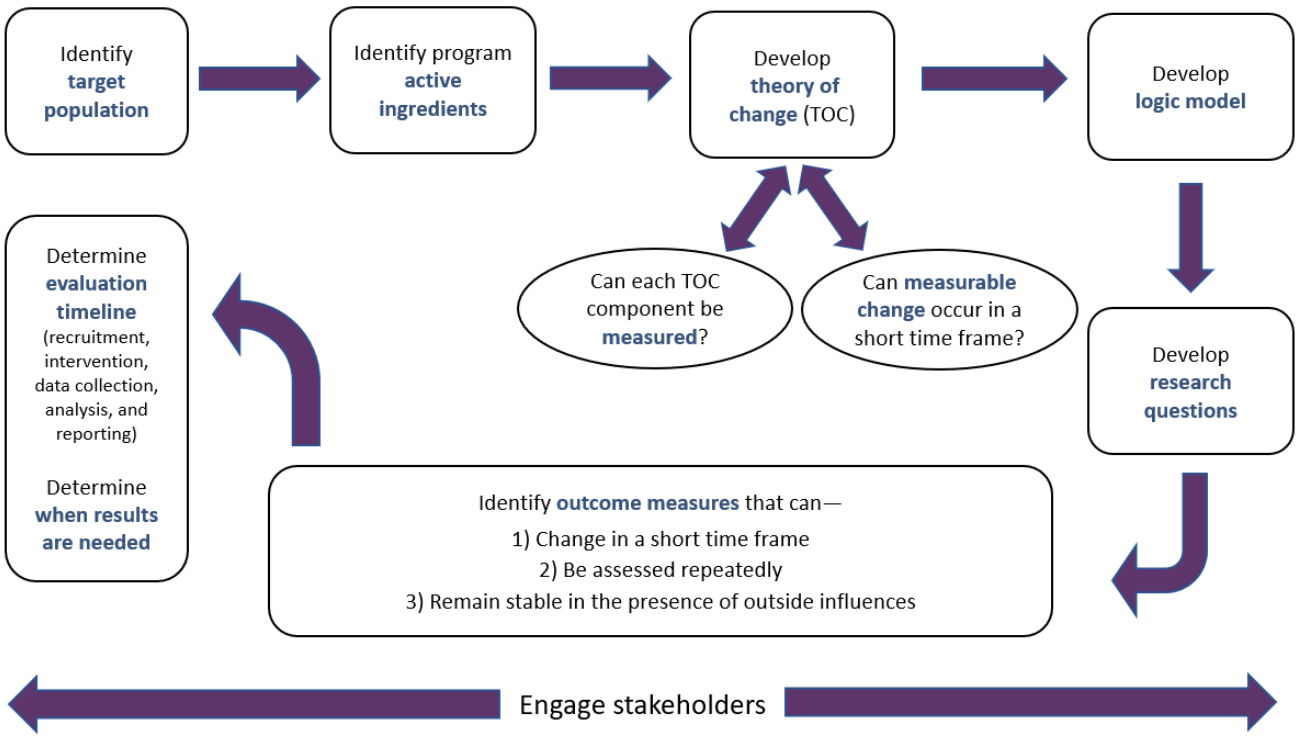
How can you prepare to conduct RCE?

RCE requires significant planning and continuous stakeholder engagement to ensure alignment with program goals and priorities. In particular, key program staff should be involved throughout the process, because many methods within RCE approaches may lead to modifications to the intervention. Researchers must be prepared to do the following:

- Select outcomes to measure that can change quickly (i.e., measures that are sensitive to change in a short timeframe).
- Review and analyze data regularly.
- Communicate frequently with program staff about the data and implications for practice.
- Identify potential adaptions to the study design (e.g., modifying randomization to favor more effective intervention components, modifying dosage, removing ineffective intervention components).

Implementing successful RCE approaches requires key steps to ensure readiness (exhibit 3).

Exhibit 3. Rapid Cycle Evaluation: Steps to Ensure Readiness



What are the benefits and disadvantages of RCE?

RCE approaches offer a number of potential benefits and disadvantages, depending on the design and method chosen.

Benefits include—

- They can foster continuous improvement by allowing data-driven adaptations to the intervention during the study.
- They can use cost-saving methods to efficiently test and adapt interventions to achieve desired outcomes.
- The sample size can be smaller than those typically used in traditional research designs.
- They can inform the development of precision approaches for delivering services shown to be most effective for particular kinds of families.

Disadvantages include—

- Study modifications can make it challenging to attribute causation to a specific intervention; what the intervention "is" becomes blurry.
- A focus on short-term outcomes cannot answer critical questions about longer term outcomes and the overall impact of a whole program.
- Repeated testing may increase data burden for program and/or evaluation staff.

Conclusion

Researchers and programs often seek to determine whether an intervention is effective *and* can be implemented with fidelity. When implementing a new intervention with unknown efficacy or a known intervention in a new context, flexibility may be needed. RCE approaches use interim data in iterative and formative ways to track progress and improve interventions along the way. Programs can assess, modify, and improve interventions in real time while maintaining the integrity of the study, and then use the final findings to deliver precision approaches that are likely to improve outcomes for children and families after the study concludes.

RCE Resources

Cody, S., & Arbour, M. (2019). *Rapid learning: Methods to examine and improve social programs* (OPRE Report 2019-86). Office of Planning, Research, and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services. https://www.acf.hhs.gov/sites/default/files/opre/opre_rapid_learning_methods_august_2019.pdf

Holzwart, R., Skinner, R., & Wright, D. (2019). *Understanding rapid learning methods: Frequently asked questions and recommended resources* (OPRE Report 2019-89). Office of Planning, Research, and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services. https://www.acf.hhs.gov/opre/resource/understanding-rapid-learning-methods-frequently-asked-questions-and-recommended-resources

Mathematica Policy Research (2017). *Rapid-cycle evaluation*. https://www.mathematica-mpr.com/-/media/publications/pdfs/education/2016/if_rce.pdf

[1] Cody, S., & Asher, A. (2014). Proposal 14: Smarter, better, faster: The potential for predictive analytics and rapid-cycle evaluation to improve program development and outcomes. *The Hamilton Project: Policies to Address Poverty in America*, 1–12. Brookings.
[2] Ridenour, T. A., Chen, S-H- K., Liu, H-S., Bobashev, G. V., Hill, K., & Cooper, R. (2017). The clinical trials mosaic: Toward a range of clinical trials designs to optimize evidence-based treatment. *Journal for Person-Oriented Research, 3*(1), 28–48. DOI: 10.17505/jpor.2017.0
[3] Finucane, M.M., Martinez, I., & Cody, S. (2015). What works for whom? A Bayesian approach to channeling big data streams for policy analysis. Working paper 40. Mathematica Policy Research.

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