Office of Adolescent Health

Lessons Learned from Cohort 1

Russell Cole
Senior Researcher
Mathematica Policy Research

Presentation at the TPP Tier 2 Orientation
November 10, 2015

OFFICE OF ADOLESCENT HEALTH

Framing

- Goal of Evaluation TA
  - Evidence of program effectiveness that meets HHS evidence standards with the highest possible rating
  - Positive and statistically significant program impacts
- Many lessons learned from last round of grantees that may have influenced progress on these goals
- Not comprehensive or applicable to all designs/evaluations – but hopefully some “pearls” here for everyone
- Note: We will address particular nuances with your designs during one-on-one TA

OFFICE OF ADOLESCENT HEALTH

Outline (Categories of “Lessons”)

- Design
- Data Collection
- Implementation/Effective Contrast
- Statistical Power
- Analysis

OFFICE OF ADOLESCENT HEALTH

Design

Imbalance Resulting from RA

- Issue: Movement of individuals assigned to one condition to other condition after random assignment (RA) to improve balance.
- Problem: Analysis of condition received (moved to) instead of initially assigned effectively compromises random assignment
- Solution: “Once randomized, always analyzed”
  - Figure out what matters to you in terms of “balance”
  - Block on that, and then randomly assign
  - Don’t shuffle anyone post RA
  - Conduct impact analyses on initial random assignment status (i.e. an “intent-to-treat” analysis)
  - Adjust for baseline differences

OFFICE OF ADOLESCENT HEALTH

Siblings RA'd to Different Conditions

- Issue: Individual random assignment study, one sibling assigned to T, one sibling assigned to C
- Problem: Logistical nightmare for families – likely attrition for one/both members of family; contamination
- Solution: Document siblings as "clusters", and assign siblings as clusters
  - Analytic solution 1: only analyze one sibling (based on a rule) in the final impact analysis
  - Analytic solution 2: aggregate (average) siblings together, to keep units of analysis aligned with units of assignment
  - Analytic solution 3: treat siblings as clusters in a cluster RCT design

OFFICE OF ADOLESCENT HEALTH

Cluster RCTs with "Joiners"

- Issue: Clusters RA'd to condition, but impact analysis includes individuals not in clusters at time of random assignment (i.e. "joiners")
  - Schools RA'd one time, and then multiple cohorts enrolled
  - Centers RA'd one time as "empty shells", and then youth subsequently enroll to centers
- Problem: Impact analysis includes individuals who may have chosen their condition (rather than being manipulated to treatment)

OFFICE OF ADOLESCENT HEALTH

Joiner Issue Visualized (Multi-Cohort)

Cohort 1

Treatment

Control

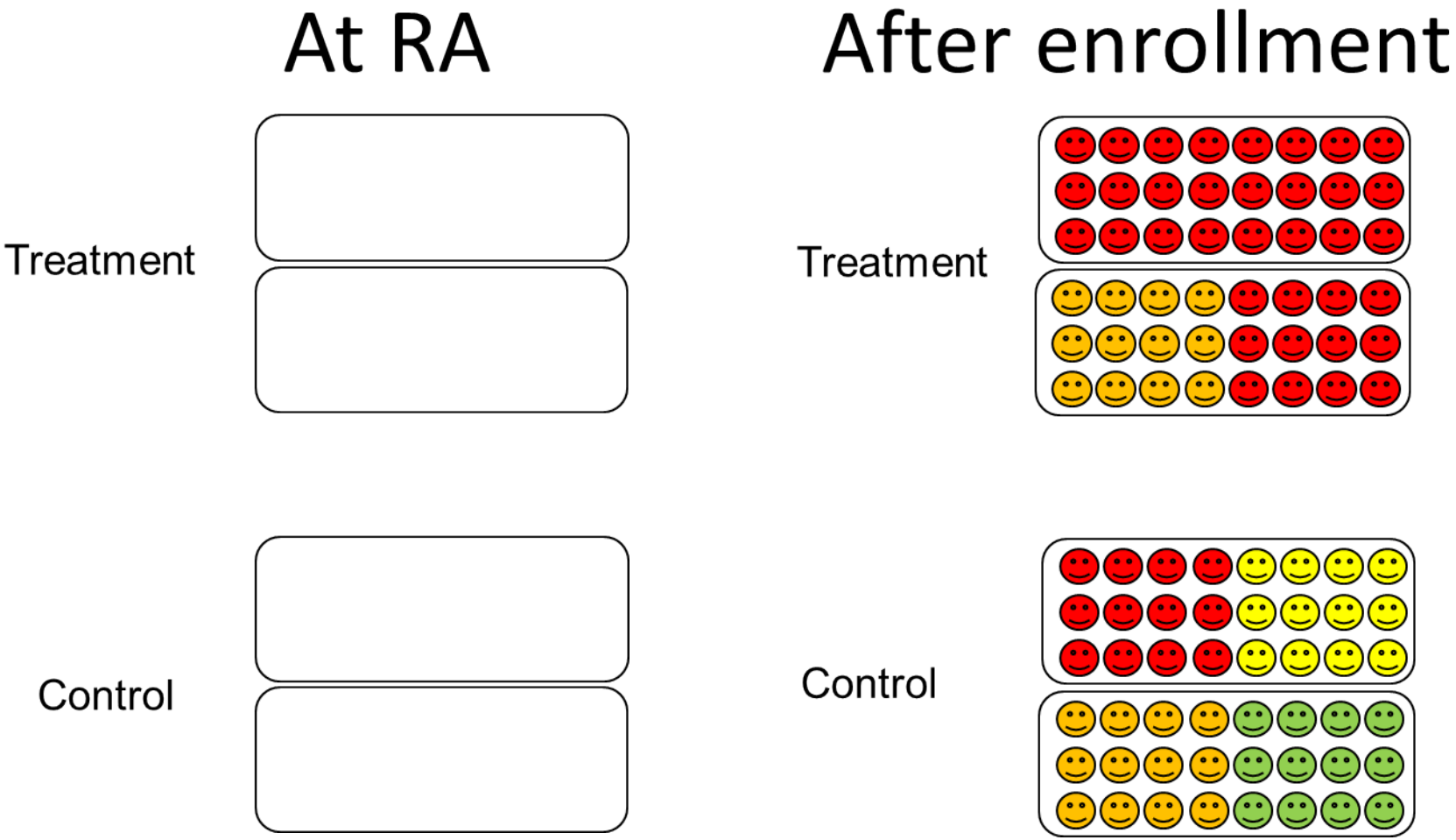
Cohort 2

Treatment

Control

OFFICE OF ADOLESCENT HEALTH

Joiner Issue Visualized (Empty Shell)



OFFICE OF ADOLESCENT HEALTH

Cluster RCTs with "Joiners" - Solution

- Potential solution for multi-cohort designs: Re-randomize clusters for each new cohort
  - Mitigates selection internal validity threat
  - Massive increase in statistical power
- Potential solution for empty-shell designs:
  - Conduct neutral programming in all clusters initially to obtain initial rosters
  - Conduct RA of clusters once rosters are in hand
  - Estimate impacts limiting analytic sample to those youth on initial rosters
- The devil is in the details – talk about this with your TA Liaisons

OFFICE OF ADOLESCENT HEALTH

Complex RA Procedures

- Problem: Complex RA procedures don't always work as intended (and are difficult to describe to non-research audiences)
- Solution: Use a parsimonious, effective procedure
  - Block on what you really want to block on
  - RA as late as possible, and trust randomization
  - Adjust for any differences at baseline

OFFICE OF ADOLESCENT HEALTH

Varying the Probability of Random Assignment

- Problem: Without careful documentation of varying P(T) across individuals, final impact estimate can be biased
- Solution: When P(T) varies, document it in your data and adjust for it analytically
  - First and foremost – include P(T) as a variable in your individual level dataset
  - If RA occurs within groups, and P(T) varies by group, keep group indicators in your dataset
  - Several analytic approaches for addressing varying P(T)

OFFICE OF ADOLESCENT HEALTH

Data Collection

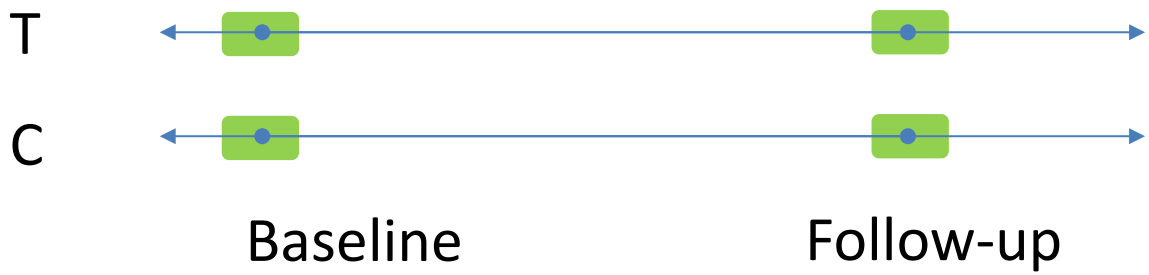
Timing of Data Collection Varies Across Conditions

- Issues:
  - Dissimilar amounts of time allotted for data collection across conditions
  - Dissimilar amounts of time between baseline and follow-up across conditions
  - Dissimilar periods of data collection
- Problem: Potential "confounding factor"
- Solution: Plan to make data collection procedures identical for each condition
  - Similar amount of time/effort for each data collection period
  - Similar spans of time between baseline and follow-up (and long-term follow-ups)
  - Similar periods of data collection

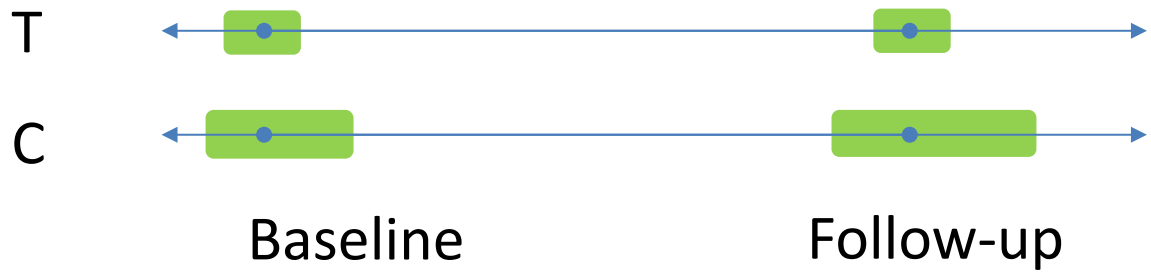
OFFICE OF ADOLESCENT HEALTH

Timing of Data Collection

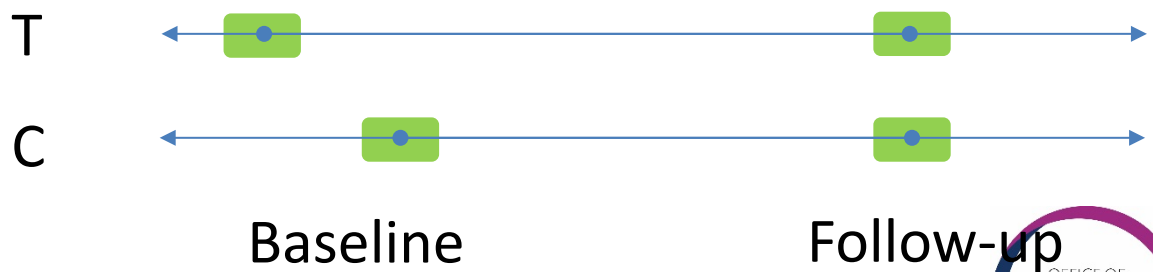
Optimal



Unequal effort



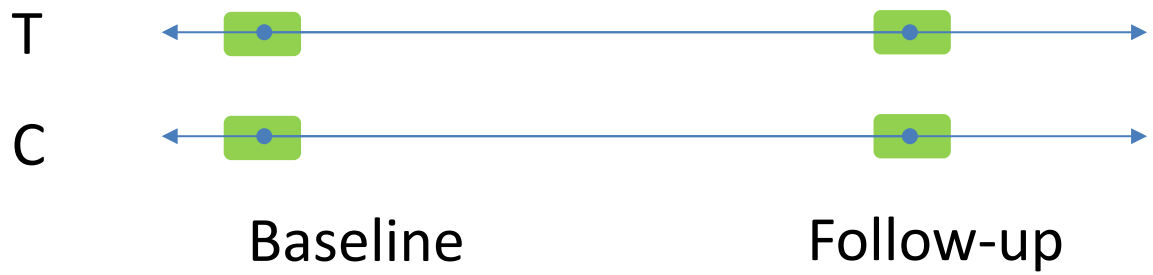
Unequal period of time between events



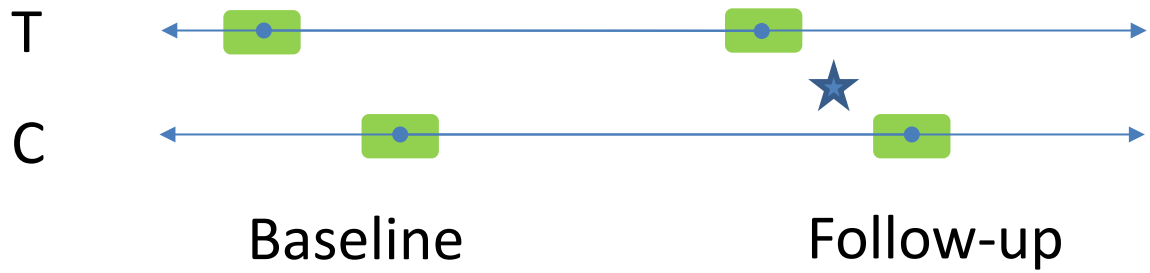
OFFICE OF ADOLESCENT HEALTH

Timing of Data Collection (cont.)

Optimal



Potential external event influencing outcomes



Low Response Rates

- Problem: Low response rates cause two major problems for evaluations
  - Threatens internal validity (attrition bias)
  - Compromises statistical power
- Solutions:
  - Plan on multiple modes of data collection (e.g. group, web, in-person, abbreviated survey by phone)
  - Collect extensive contact data at enrollment and update it
  - Offer incentives
  - Lots of ideas here – but the main idea at this early phase is to plan for the future

OFFICE OF ADOLESCENT HEALTH

Effective Contrast/Implementation

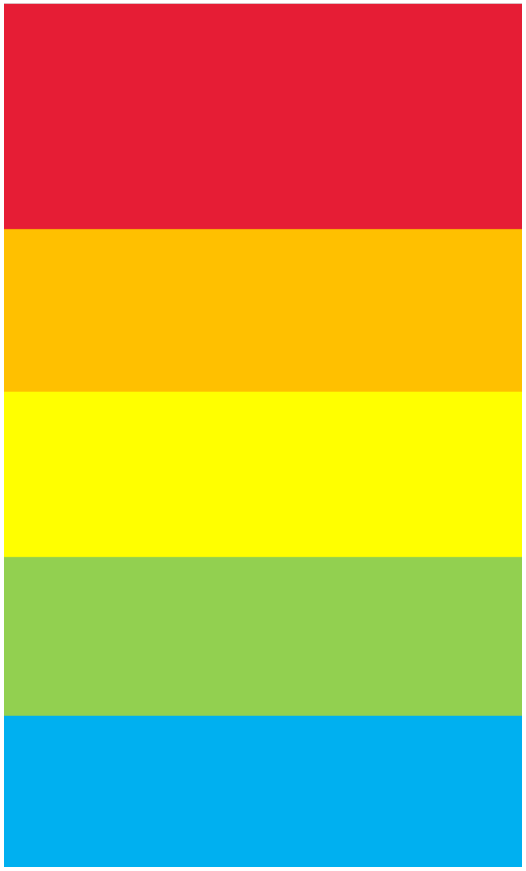
Strong Counterfactual

- Issue: Intervention and Comparison condition have lots of overlapping components (very similar programs)
- Problem: Weak contrasts are going to produce small differences in outcomes (and are unlikely to be statistically significant)
- Solution:
  - Try not to have a strong counterfactual ;)
  - Understand the counterfactual early on
  - Collect data throughout the program from both T and C groups to be able to describe the difference in services
  - <u>Increase statistical power</u>

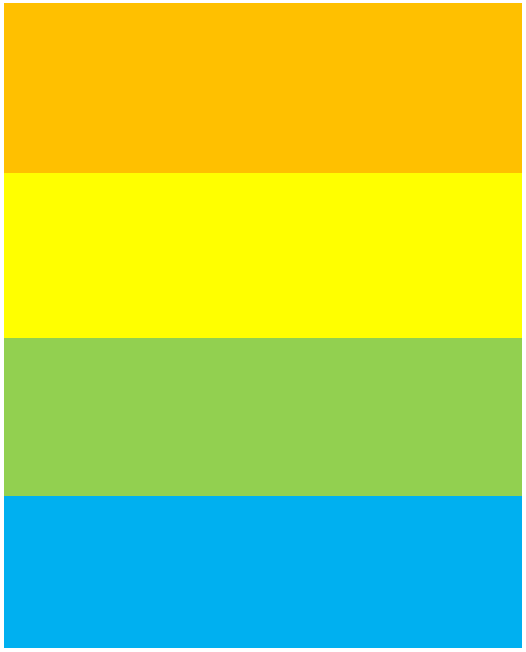
OFFICE OF ADOLESCENT HEALTH

Effective Contrast

Treatment



Control



Effective Contrast

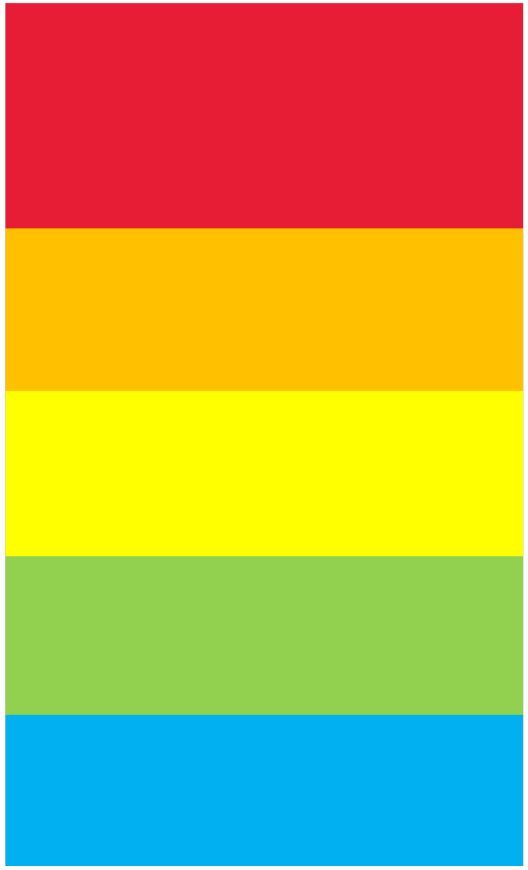
Low Attendance/Poor Implementation

- Issue: When attendance/implementation is low/poor, the effective contrast in experiences across conditions gets even weaker
- Problem: Weakened contrast means smaller differences in experiences, which makes differences in outcomes unlikely
- Solutions:
  - Enroll youth who are interested in attending the program
  - Incentivize/encourage attendance
  - Train for high fidelity of implementation

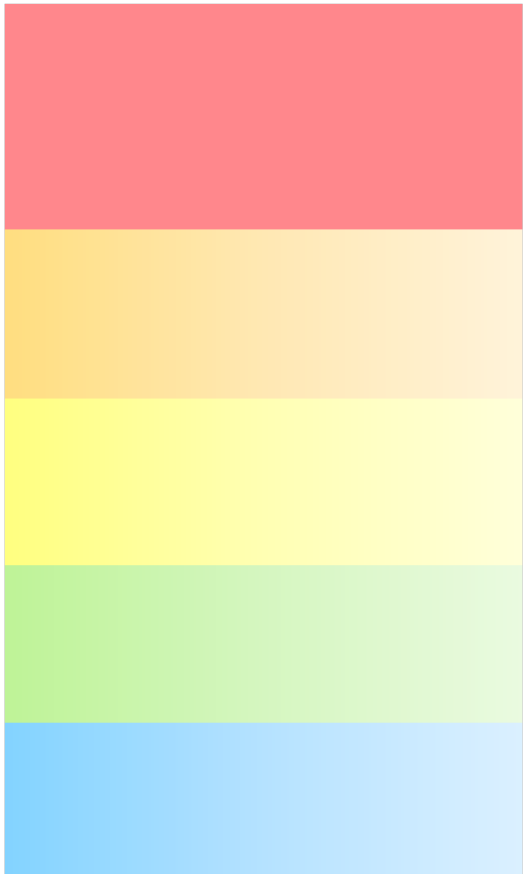
OFFICE OF ADOLESCENT HEALTH

Attendance Can Compromise Program Content

Intended Treatment



Effective Treatment



OFFICE OF ADOLESCENT HEALTH

Statistical Power

Ingredients to a Statistically Significant Impact

- Inferential test of program impact =

$$\frac{\text{Difference in outcomes}}{\text{Standard error of the difference}}$$

- Difference in outcomes caused by
  - Differences in the content/services provided
  - Implementation/attendance
- Standard error of the difference caused by
  - Sample size
  - Variability of the outcome (and variance explained)
  - (Lots of other stuff)

OFFICE OF ADOLESCENT HEALTH

Where Do Things Go Wrong?

- Small differences in the outcomes
  - Weak contrast
  - Poor attendance/dosage/implementation
  - Outcomes indirectly aligned with intervention
- Big standard error
  - Recruitment targets not hit
  - Low response rates
- Solution for standard error
  - Enroll more youth (especially more clusters in cluster designs)
  - Collect extra baseline data that is correlated with outcomes

OFFICE OF ADOLESCENT HEALTH

Analysis

Endogenous Subgroups

- Issue: Plan on testing impact of intervention on use of condoms among sexually active sample
- Problem: Intervention may affect which sets of youth initiate sex
  - The sexually active subset of the initially assigned sample at follow-up is called an "endogenous subgroup"
  - An impact estimate of condom use on this sample will provide a biased test of the effect of the intervention.
- Solution: Plan to conduct impacts on either:
  - Full samples (e.g. impacts on "risky sex")
  - Samples defined by baseline covariates (e.g. impacts of condom use on the sample who had ever had sex at baseline)

OFFICE OF ADOLESCENT HEALTH

For More Information

- Russell Cole
  - RCole@mathematica-mpr.com