



New Perspectives for Cluster RCTs under the WWC v5.0 Standards: Joiners & Attrition

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October 18-19, 2022

Asking Questions

- Participant microphones are automatically muted upon entry to limit background noise, unintentional feedback, or interference.
- During this session, you may ask the questions using the chat feature in Zoom.



- If your question is specific to your situation, or you need technical assistance, then the facilitator may respond to you directly in the chat panel.
- If your question is more general, then the facilitator will share your question with the presenter(s) so it can be answered at the appropriate time with the entire group.



Today's Topics

- Understanding changes in sample composition and why they matter
- New perspectives in [*WWC Procedures and Standards Handbook, Version 5.0*](#)
 - When joiners and leavers pose a risk of bias
 - Implications for study design
- Case studies

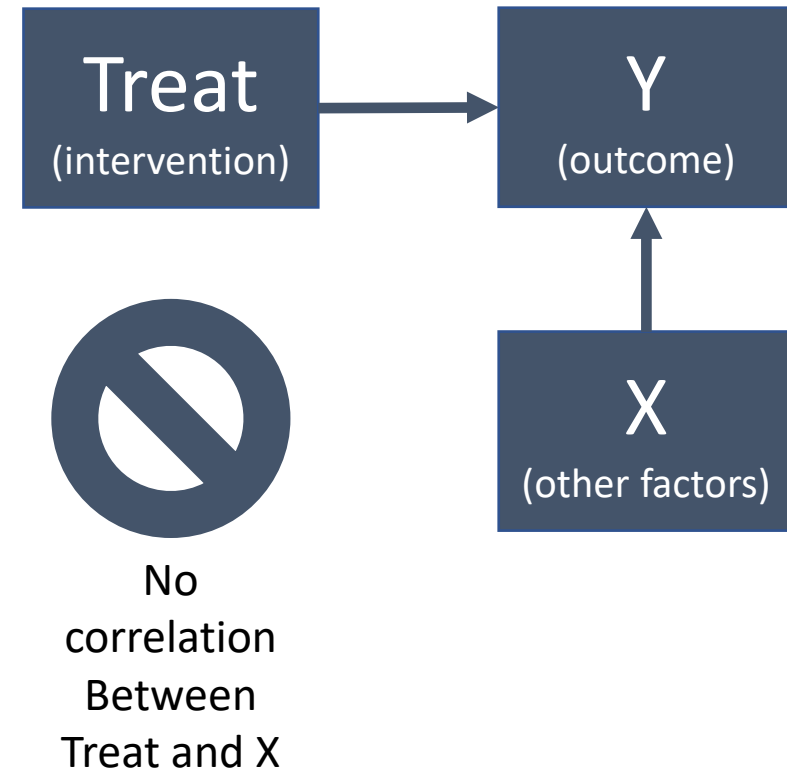


Understanding Changes in Sample Composition and Why They Matter

Randomized Trials Provide Best Causal Estimates



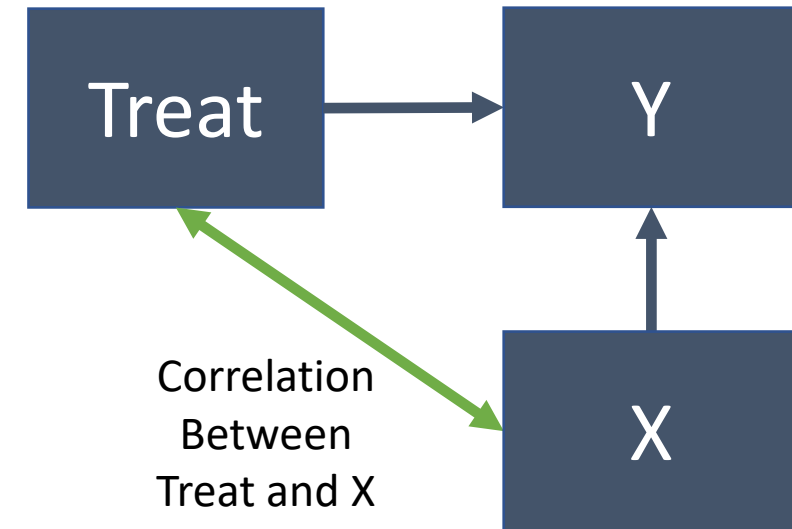
- Randomized trials provide the best causal estimates of impacts on outcome (Y) because the assignment and exposure to the intervention (Treat) is a random process uncorrelated with other factors (X)



If Treatment is Related with Other Factors, Estimates of Effects May be Biased

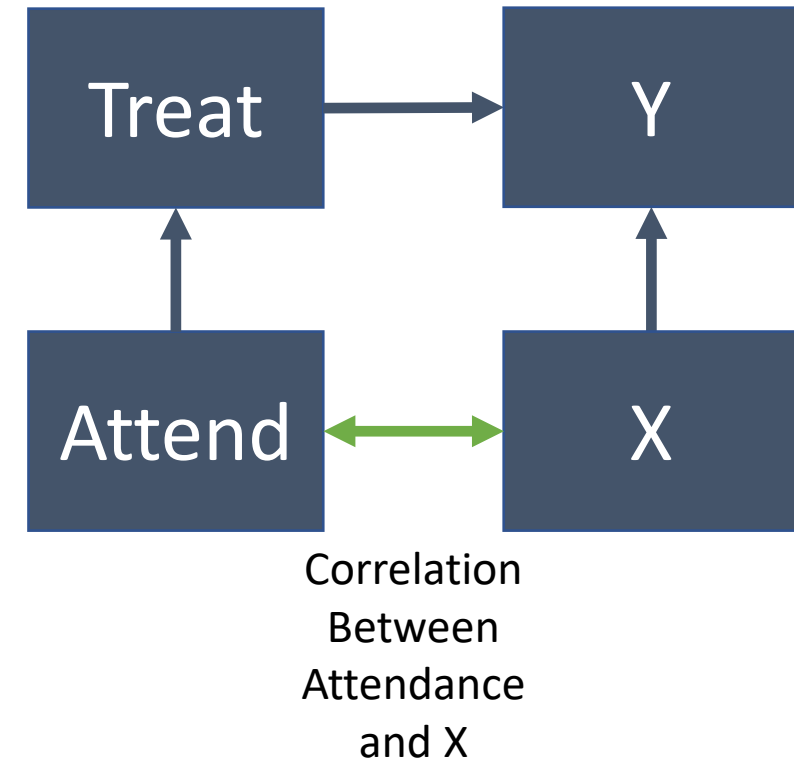


- If exposure to the intervention (Treat) is correlated with other factors (X) that are also correlated with the outcome, the impact estimate is a mix of treatment effects and influences of these other factors



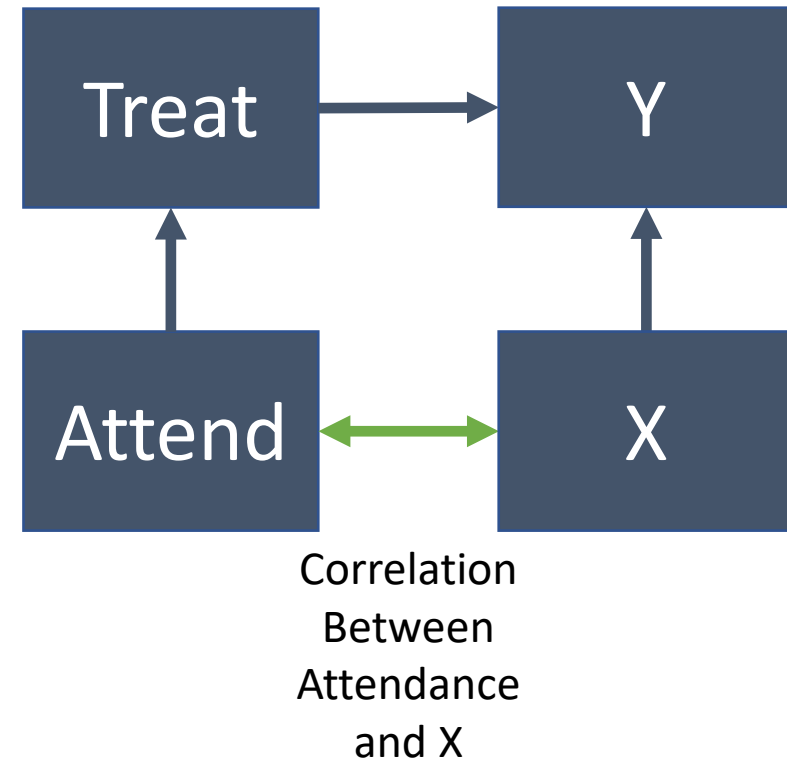
Students Joining and Leaving May Bias Estimates of Intervention Effects...

- In cluster RCTs, the intervention is assigned to schools or classrooms
- This means attendance (Attend) is strongly associated with intervention exposure
- Therefore, changes to who attends the school via attrition or joining could also bias estimates



...When the Intervention Influences Joining or Leaving

- Thus, when interventions (or lack thereof) attract or repel students with a set of X attributions to a school, there is change in composition which introduces non-random elements into the intervention exposure.



Hard to Tease Apart True Effects and Compositional Change

- The observed difference between treatment and control schools, δ , can be a mix of true treatment effects, Δ , and compositional change, ζ .
- In practice, it's hard to tease these two elements apart



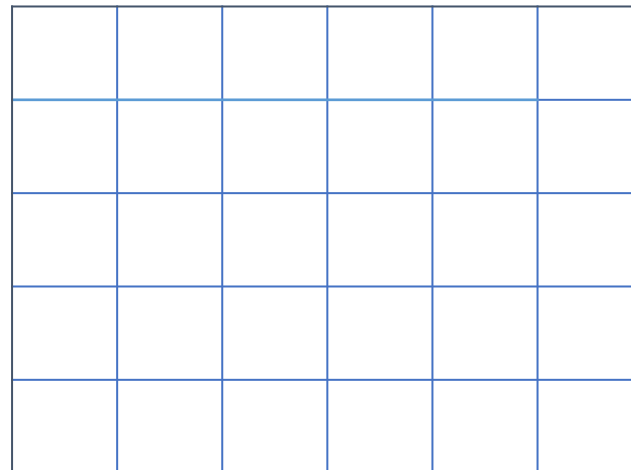
An Illustration of Leaving and Joining on Estimated Effects

- In this example, there is no treatment effect, but “effects” are generated with compositional change

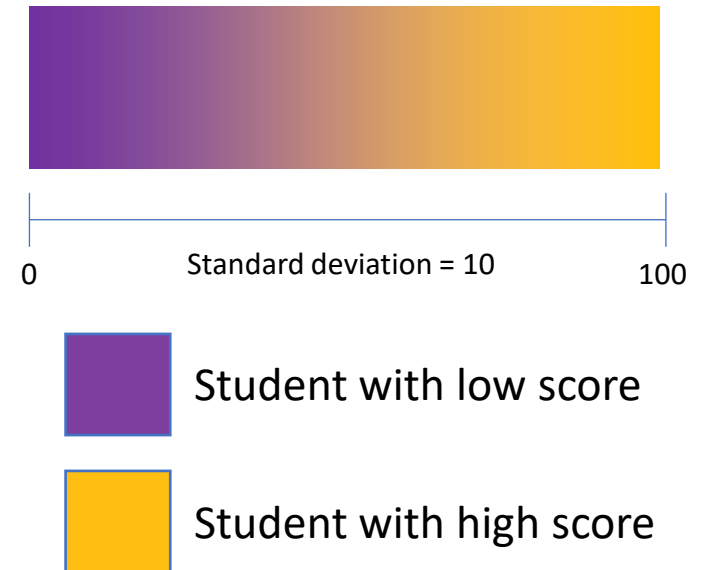
1 Student



1 School with 30 Students



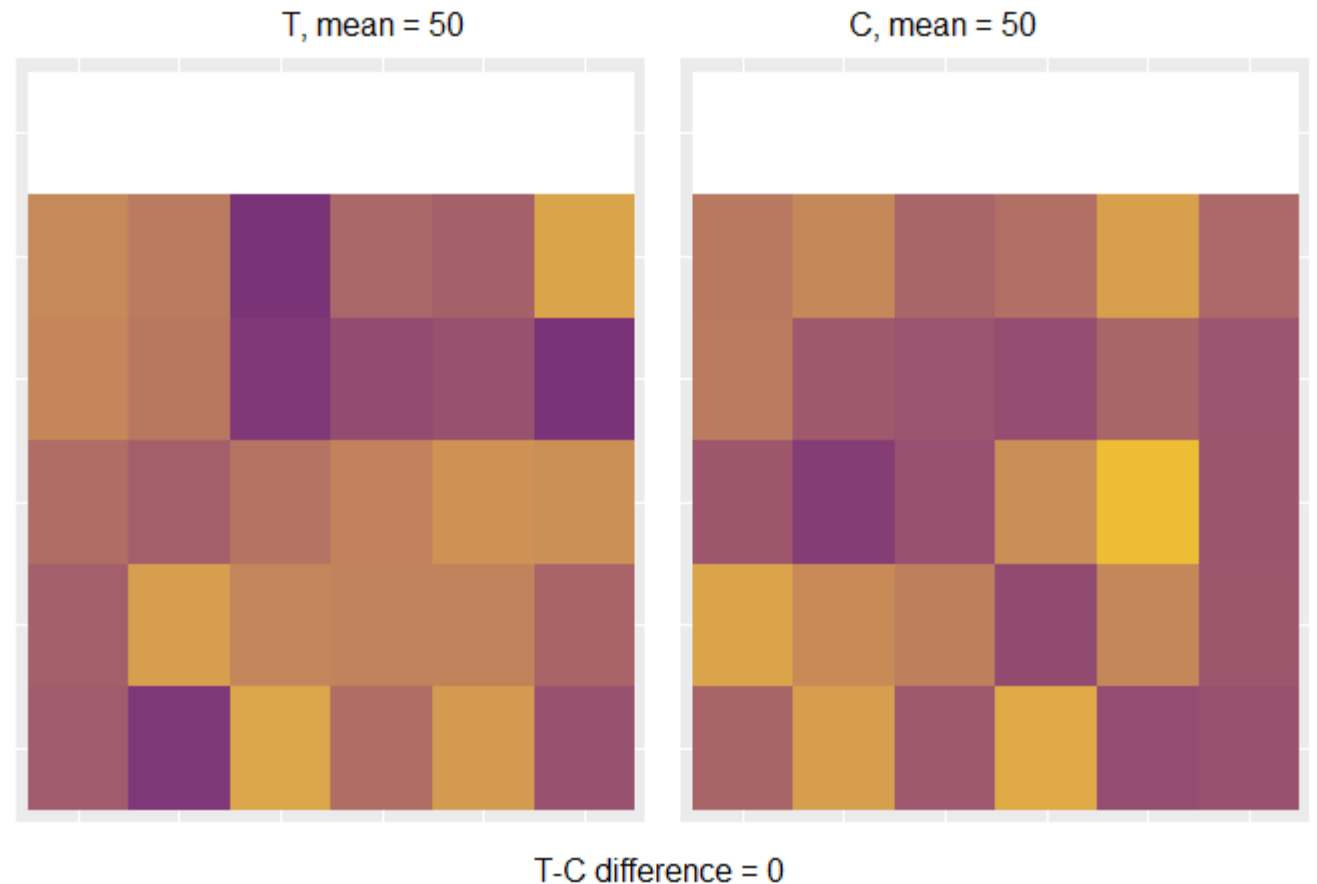
Reading Test Scores



An Illustration of Leaving (Attrition) and Joining on Estimated Effects



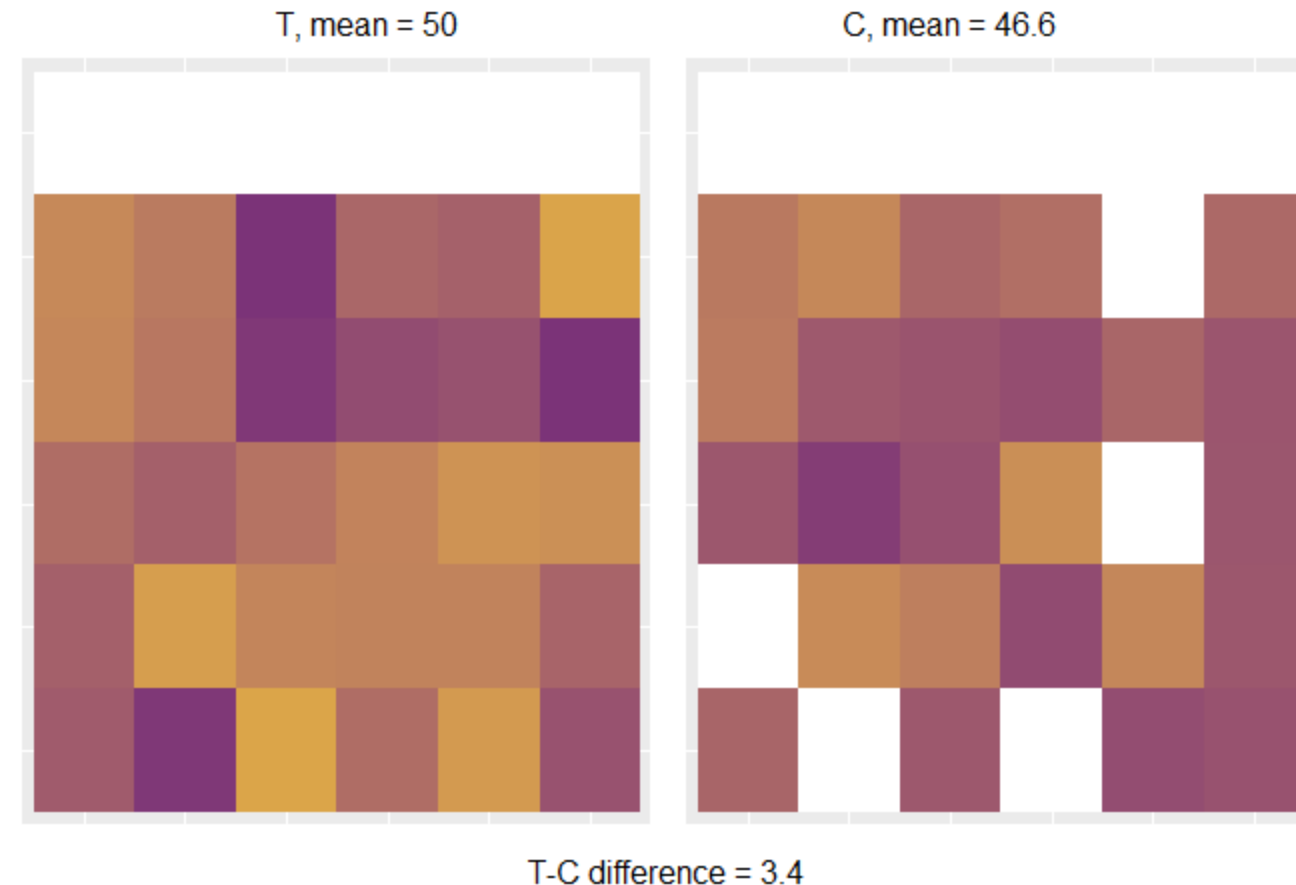
- Suppose two schools, each with 30 students
- The mean of each school, treatment and control, is 50
- The difference between schools is 0



Example of Attrition: When High Scoring Students Leave Control Schools

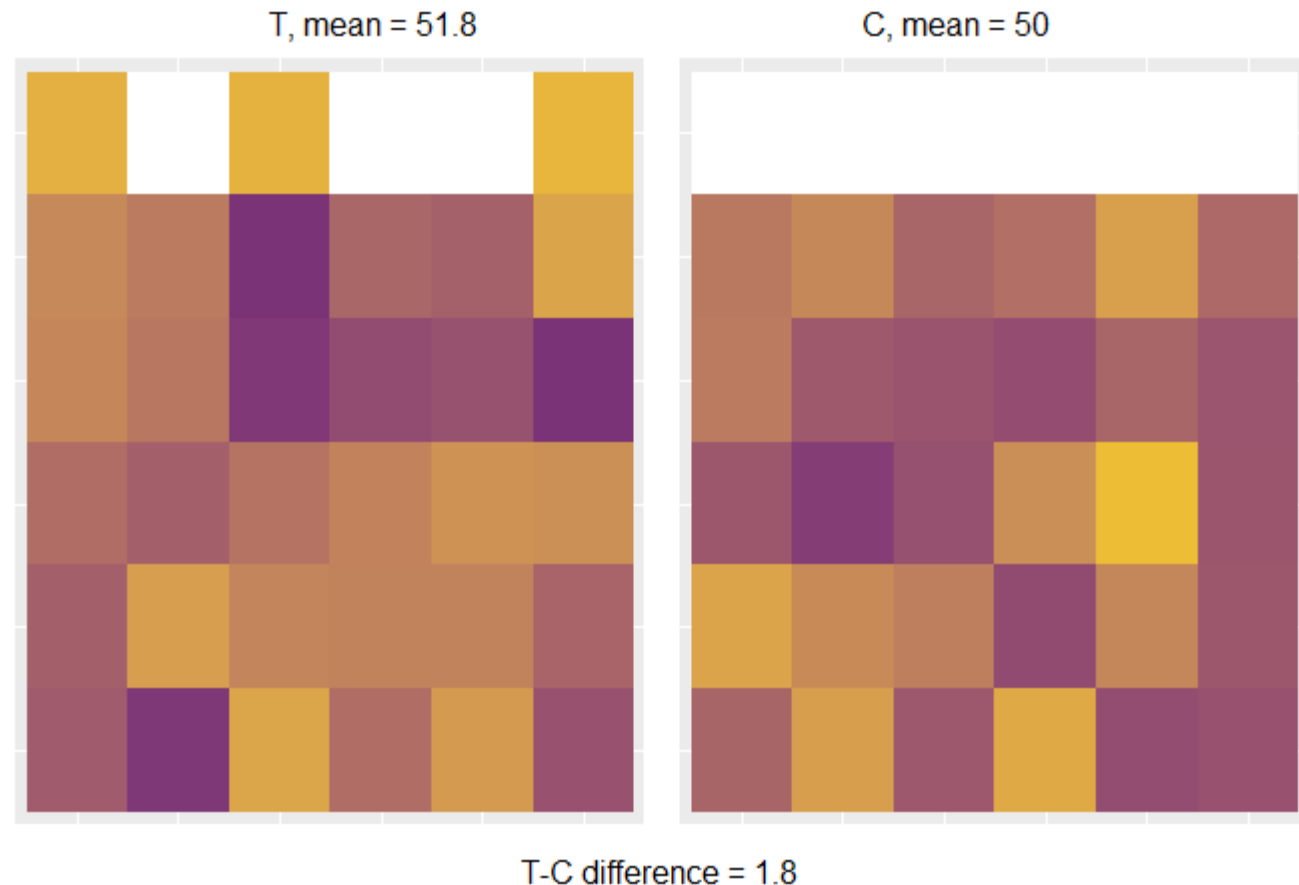


- Suppose 5 students with scores above 60 moved away from the control school
- The control school mean is lower, which creates a T-C difference
- In this example, the effect size is .34



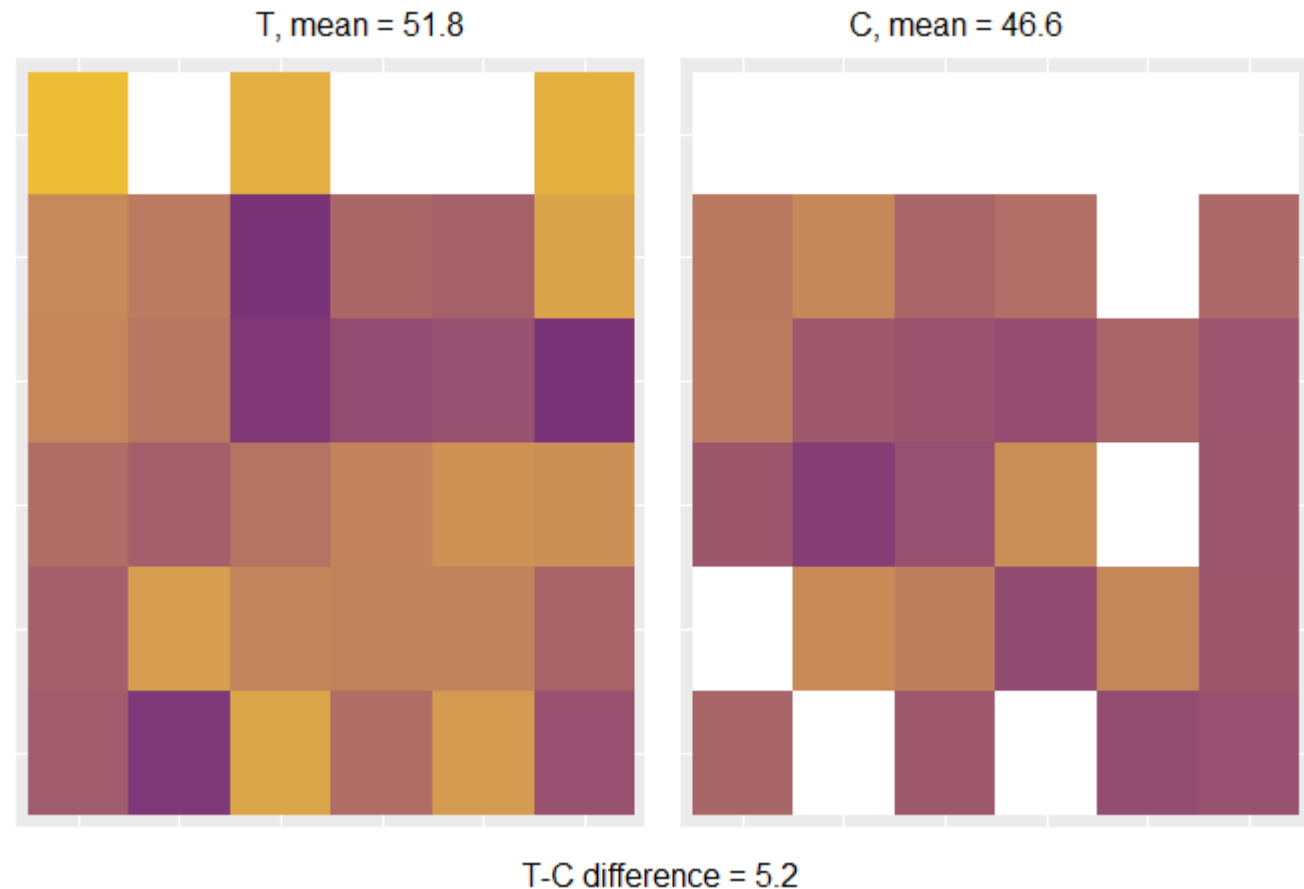
Example of Joiners: When High Scoring Students Join Treatment Schools

- Or suppose 3 students moved to the treatment school, with average scores of 70
- The T-C difference is now .18 standard deviations



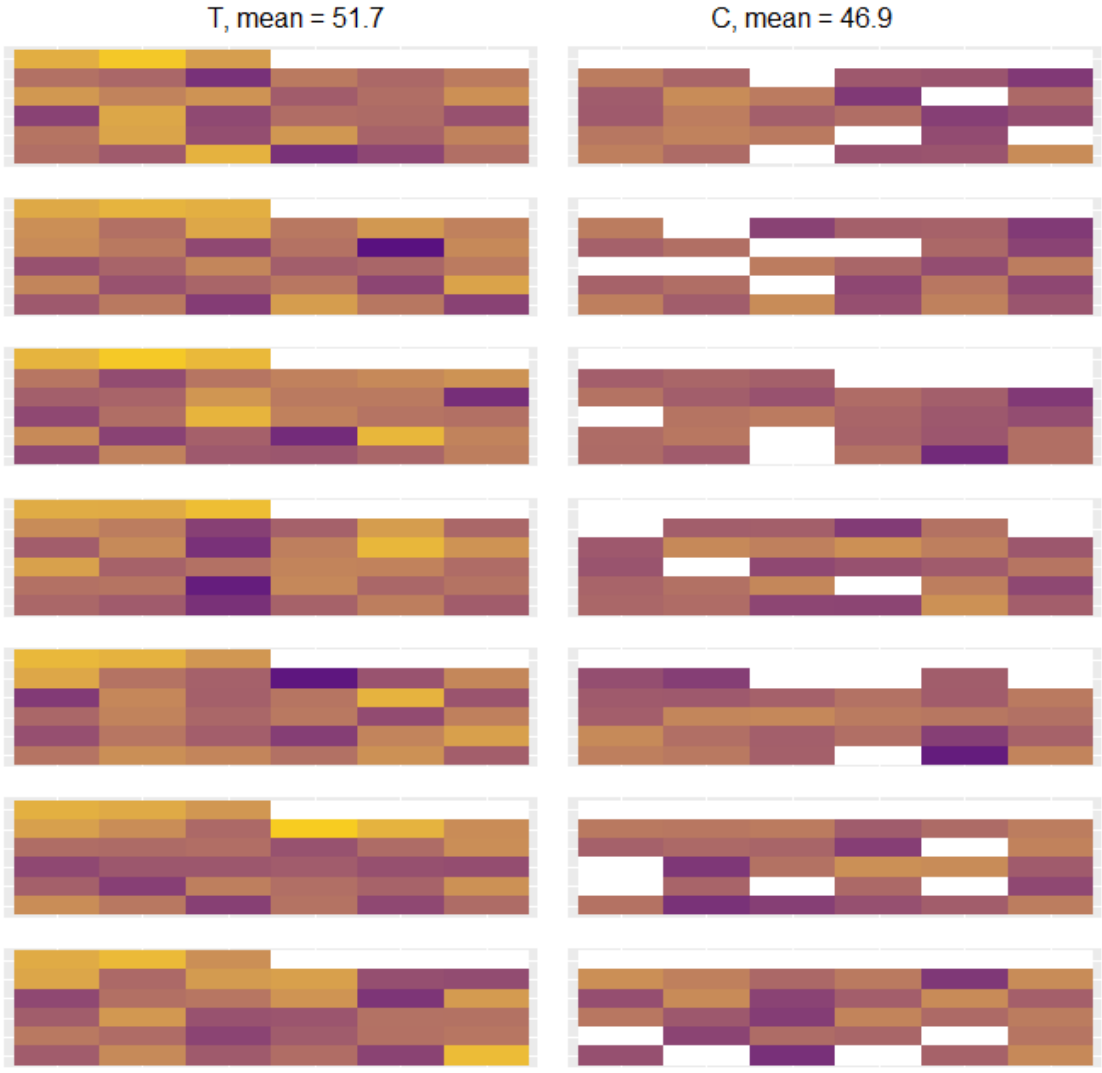
Example of Attrition and Joining

- Combined, attrition and joining can create large effect sizes
- Suppose the control school lost students with high scores, and the treatment school gained 3 students with high scores
- This produced an effect size of .52



Attrition and Joining In Cluster Randomized Trials (CRTs)

- Compositional changes—students joining and leaving—can occur cluster by cluster
- Here, we have 7 treatment and 7 control clusters
- Producing biased impact estimates



T-C difference = 4.8



Risk of Bias from Changes in the Composition of Students in Clusters – *New Perspectives in WWC v5.0 Standards*



VERSION 5.0

What Works Clearinghouse
Procedures and Standards
Handbook, Version 5.0

Current Standards Version 5.0, August 2022

A Publication of the National Center for Education Evaluation at IES

What Works Clearinghouse™

Standards Handbook,
Version 4.1

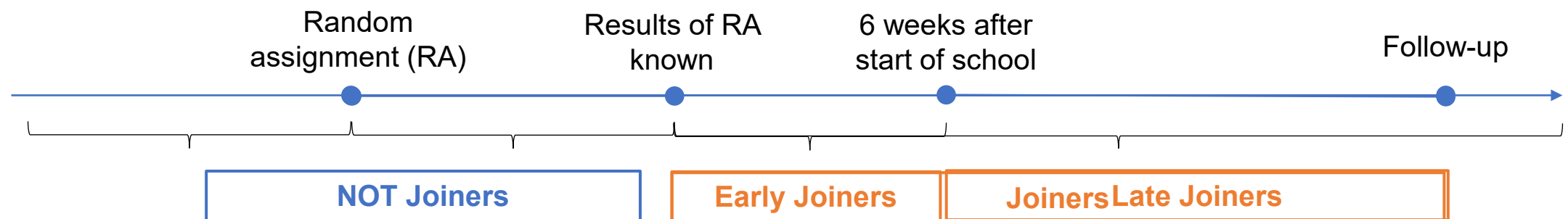
Version 4.1, October 2020

Compositional Changes – How Do They Affect WWC Ratings?

- In cluster RCTs, if there are no compositional changes
 - Intervention effects can be attributed to direct effects on individuals
 - Can meet WWC standards *without* reservations
- If compositional changes cannot be ruled out
 - Effects may be the result of composition changes
 - *there may be a “risk of bias” from joiners or attrition*
 - Cannot meet WWC standards *without* reservations
 - Can meet WWC standard *with* reservations
- WWC Standards v5.0 define when changes pose a risk of bias

How Does the WWC Define “Joiners”?

- The WWC defines a “joiner” as
 - any individual who enters a cluster after the results of random assignment are known to...
 - any individual who could plausibly influence individuals’ placement into a cluster (e.g., parents, students, teachers, or principals).

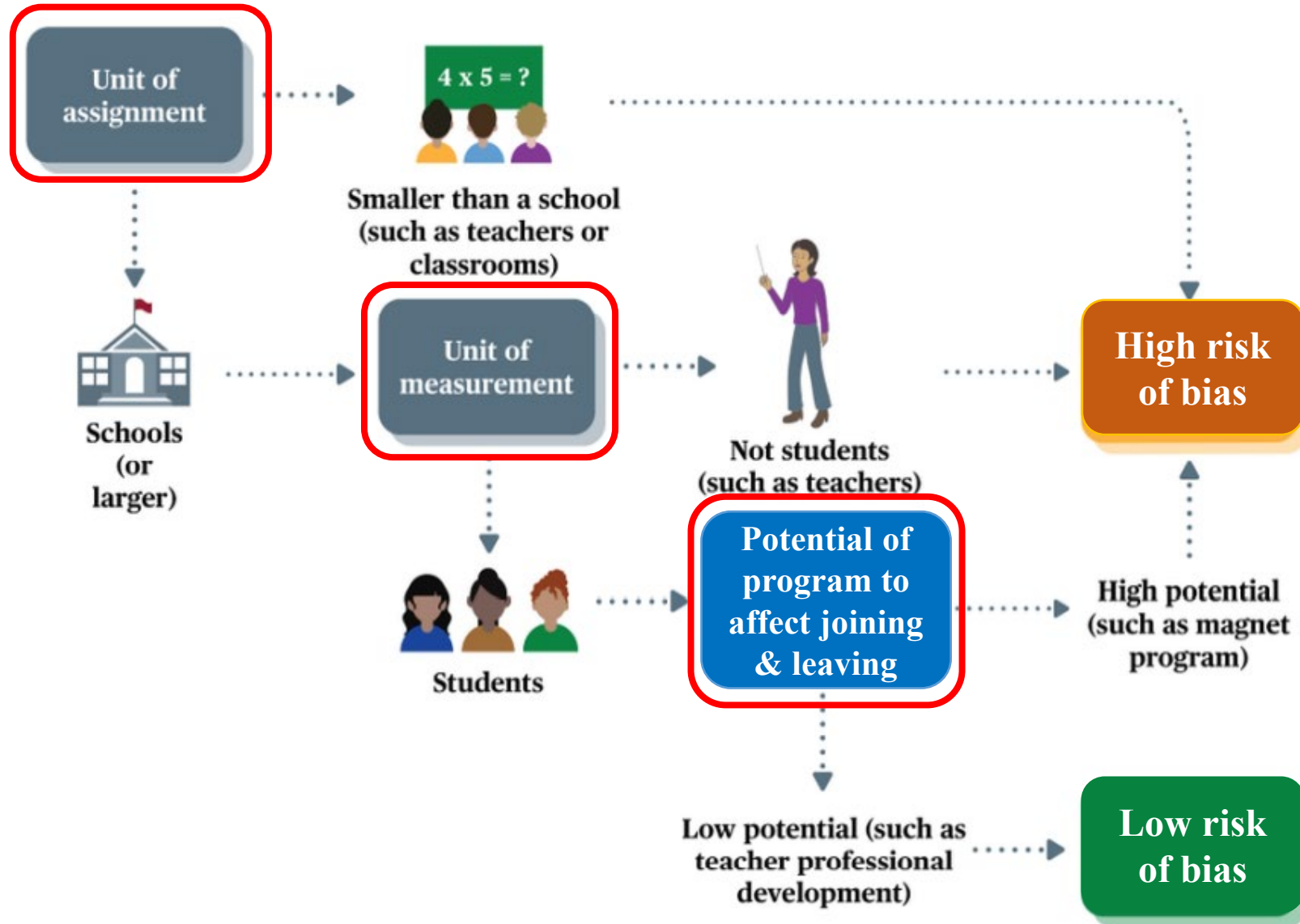


How Does the WWC Define “Attrition”?

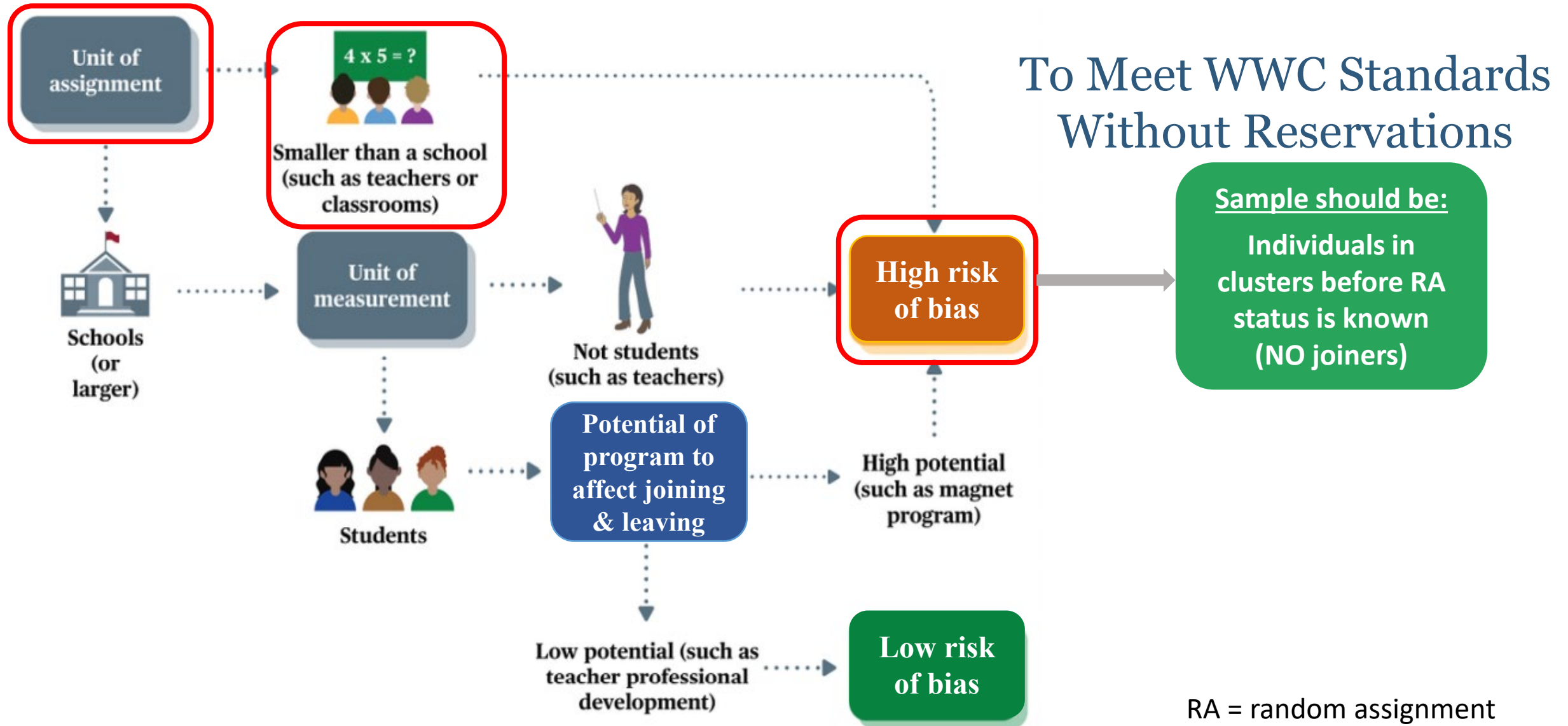


- Percentage of randomized units without outcome data
 - Overall & by condition
 - At cluster and individual levels for cluster RCTs
- Two sources of individual-level attrition
 - Leaving clusters after random assignment (“leavers”)
 - Missing outcome data (still present in clusters at follow up)

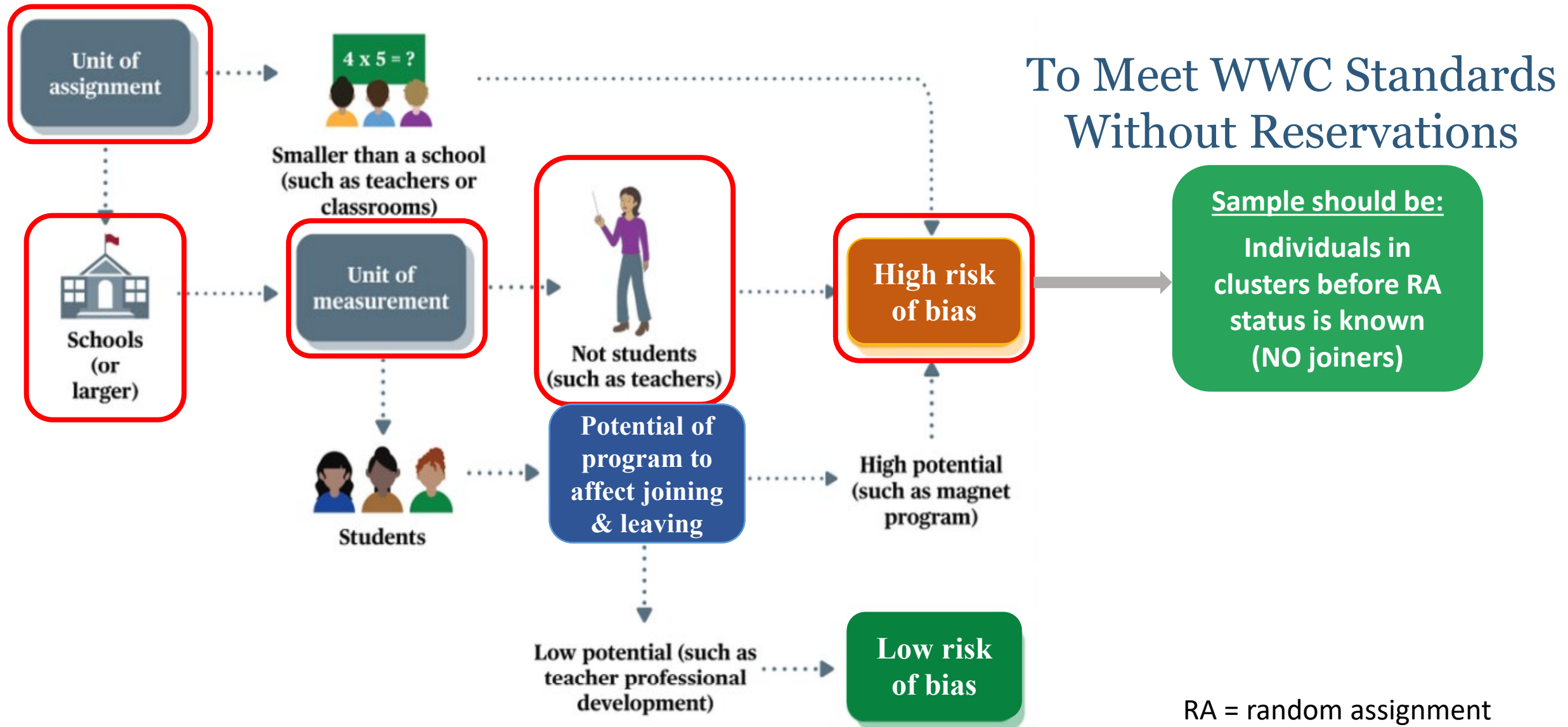
WWC v5.0: Risk of Bias from Compositional Change (Joiners & Leavers)



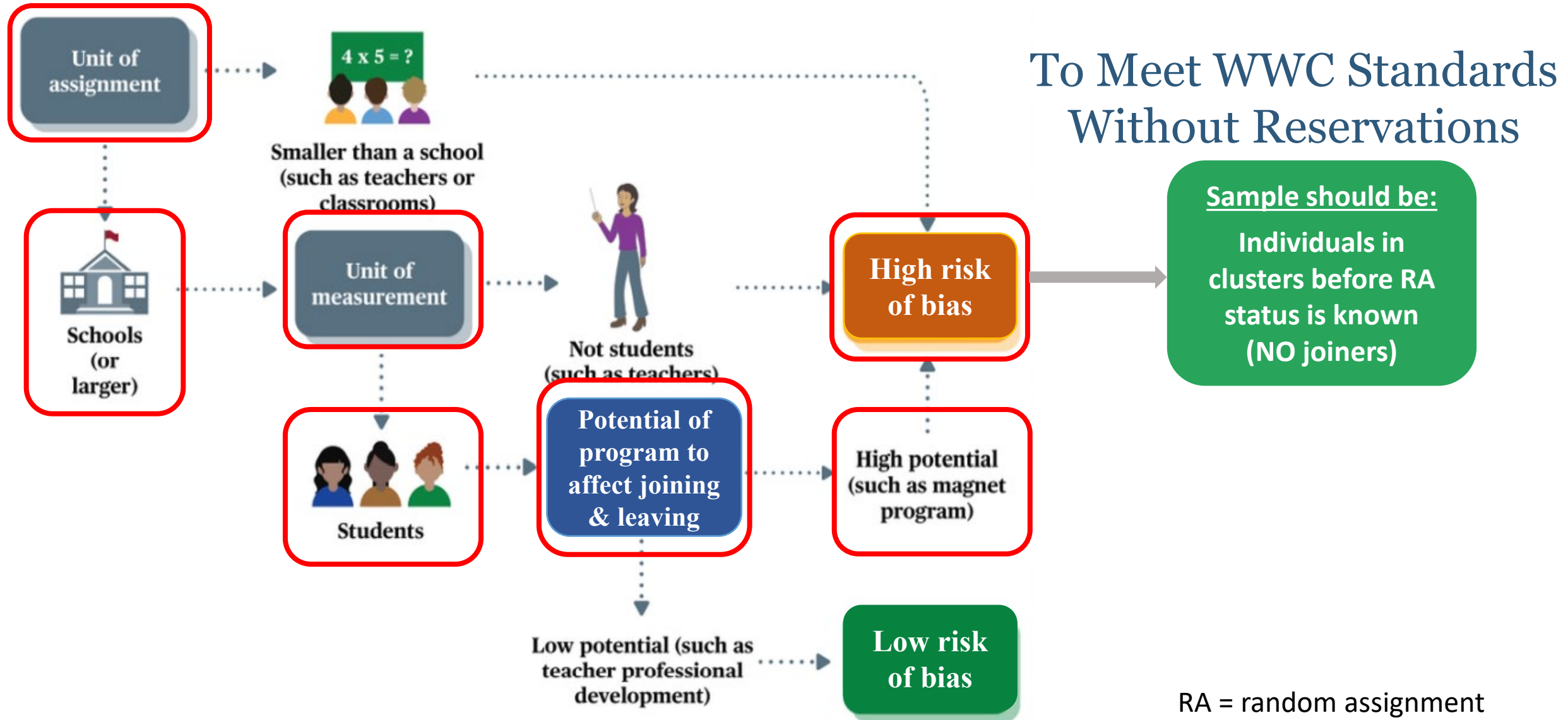
Unit of Assignment



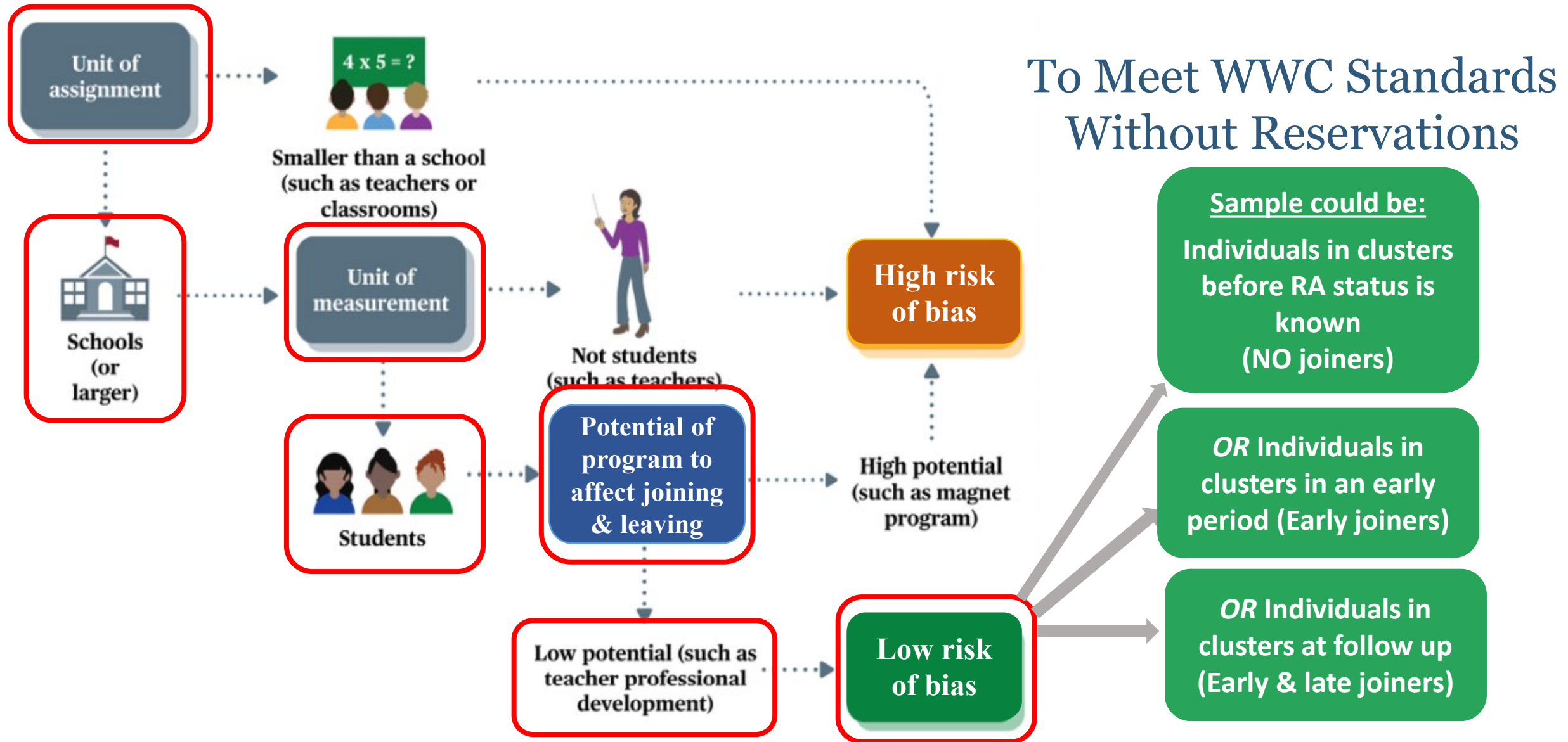
Unit of Assignment & Measurement



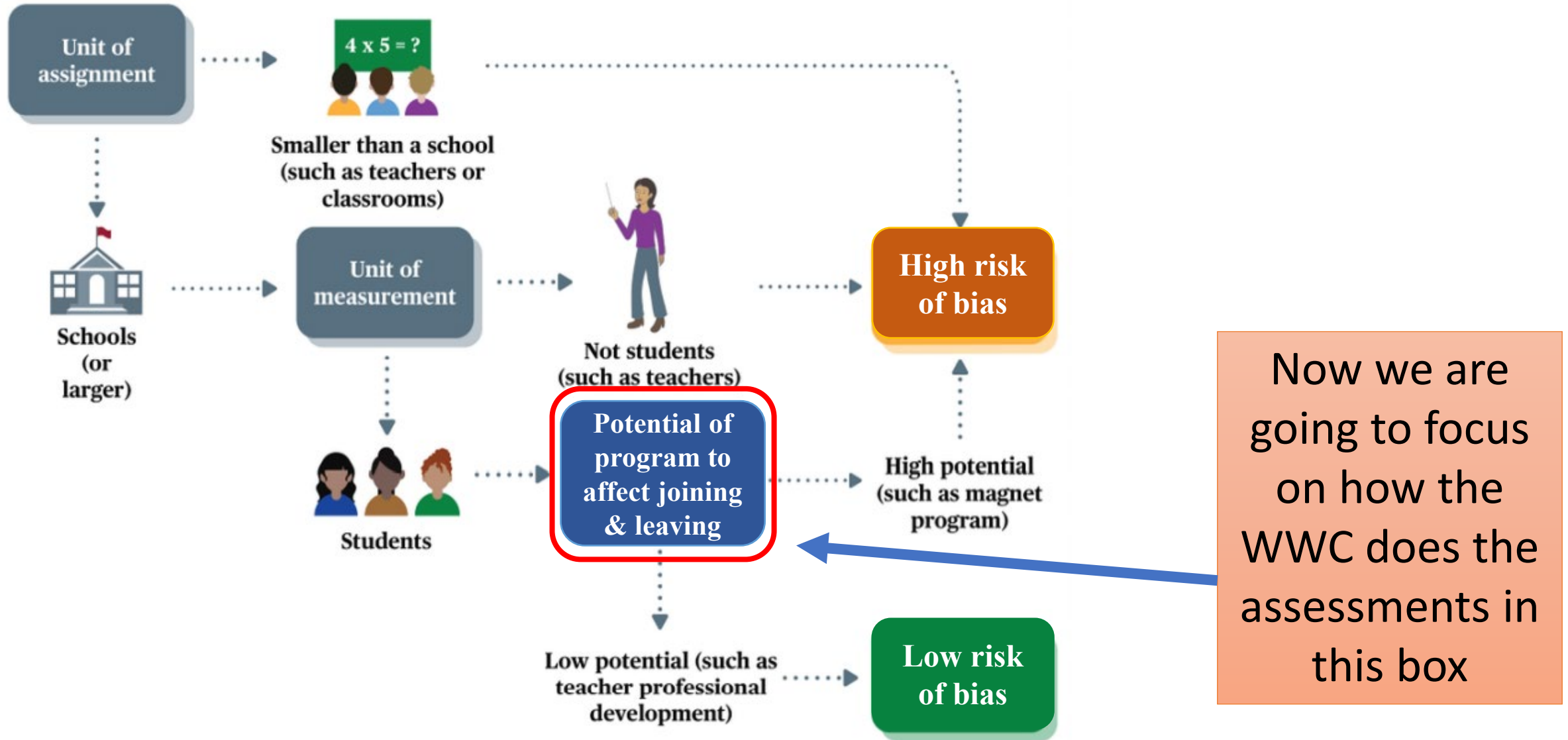
Assignment, Measurement, & Potential for Joining/Leaving



Assignment, Measurement, & Potential for Joining/Leaving⁽²⁾



WWC v5.0: Potential of Program to Affect Joining and Leaving



WWC v5.0 – *What Can Affect Joining?*



Program's Visibility & Desirability

- Known to those who can influence joining AND
- Considered important

Enrollment Flexibility

- Easy to join after RA

Programs Likely to Influence Joining (High risk of bias)

- School choice
- Highly publicized school program
- Elective or selective courses, such as AP
- Outside of school hours
- Increasing participation is a goal

Programs Unlikely to Influence Joining (Low risk of bias)

- Teacher PD program
- Supplemental or targeted program
- During school hours
- In both conditions
- Increasing participation is not a goal

WWC v5.0 – *What Can Affect Leaving?*



Program Focus

- Supports induce students to stay
- Burdens motivate students to leave

Enrollment Flexibility

- Easy to leave after RA

Programs Likely to Influence Leaving (High risk of bias)

- Dropout prevention
- Elective or selective courses
- Outside school hours
- Other programs intended to influence retention

Programs Unlikely to Influence Leaving (Low risk of bias)

- Teacher PD program
- Supplemental or targeted program
- During school hours
- Short duration

Potential to Affect Leaving Determines WWC Boundaries for High Attrition



Cautious Boundary

- Dropout prevention
- School choice
- Elective/selective courses
- Outside of school hours

Optimistic Boundary

- Supplemental intervention
- Targeted intervention during school hours
- PD program

Potential to Affect Leaving Also Determines Samples for Calculating Attrition



Risk of Bias Due to Leavers	Attrition Boundary	Allowable Reference Samples
High risk	Cautious	(1) Individuals in non-attrited clusters before RA status is known (2) Individuals in non-attrited clusters in first 6 weeks of school
Low risk	Optimistic	Samples (1), (2), or (3) Individuals in non-attrited clusters at follow-up

RA = random assignment

Use Reference Sample Best Aligned with Selection of Student Sample

- Multiple reference samples may be allowable
- Use the one that best aligns with selection of student sample

Sample with NO joiners

Use reference sample (1) –
Students in clusters before RA status known

Sample from fall rosters or consent

Use reference sample (2) –
Students in clusters on fall rosters or consent attempted

Sample of all students at follow up

Use reference sample (3) –
Students in clusters at posttest



Putting It All Together



WWC v5.0 – *What Types of Interventions Can Influence Joining or Leaving Schools or Districts?*

	Likely to Influence Joining <i>(High risk of bias)</i>	Unlikely to Influence Joining <i>(Low risk of bias)</i>
Likely to Influence Leaving <i>(High risk of bias)</i>	<ul style="list-style-type: none"> • Outside of school hours • Elective or selective courses • Grade level/cross-school transitions • Postsecondary or adult learner programs • Long time span between RA & outcomes • School choice or magnet program 	<ul style="list-style-type: none"> • Provides benefits & supports that may induce students to stay <ul style="list-style-type: none"> • Dropout prevention • Imposes burden that may motivate students or families to leave <ul style="list-style-type: none"> • Challenging math course
Unlikely to Influence Leaving <i>(Low risk of bias)</i>	<ul style="list-style-type: none"> • Highly publicized school turnaround initiative • Highly publicized program for struggling readers 	<ul style="list-style-type: none"> • Teacher PD • Supplemental or targeted K-12 program during school hours • No grade level/cross-school transitions • Short time span between RA & outcomes



Samples in RCTs with Assignment of Schools or Districts that Can Meet WWC Standards Without Reservations

	Likely to Influence Joining <i>(High risk of bias)</i>	Unlikely to Influence Joining <i>(Low risk of bias)</i>
Likely to Influence Leaving <i>(High risk of bias)</i>	<ol style="list-style-type: none"> 1. Students in clusters before RA status known 	<ol style="list-style-type: none"> 1. Students in clusters before RA status known 2. Students in clusters in an early period (such as on fall rosters)
Unlikely to Influence Leaving <i>(Low risk of bias)</i>	<ol style="list-style-type: none"> 1. Students in clusters before RA status known 	<ol style="list-style-type: none"> 1. Students in clusters before RA status known 2. Students in clusters in an early period 3. Students in clusters at follow-up



Case Studies: Elective or Selective Courses

- Offered in treatment schools only
- Offered in both treatment and control schools with enhancement in treatment school

Elective Offered in Treatment Schools Only: High Risk of Bias



- Intervention may attract students to schools
- High risk of bias
- Sample must exclude joiners to meet WWC standards without reservations

Elective Offered in Both Conditions, with Enhancement in Treatment Schools



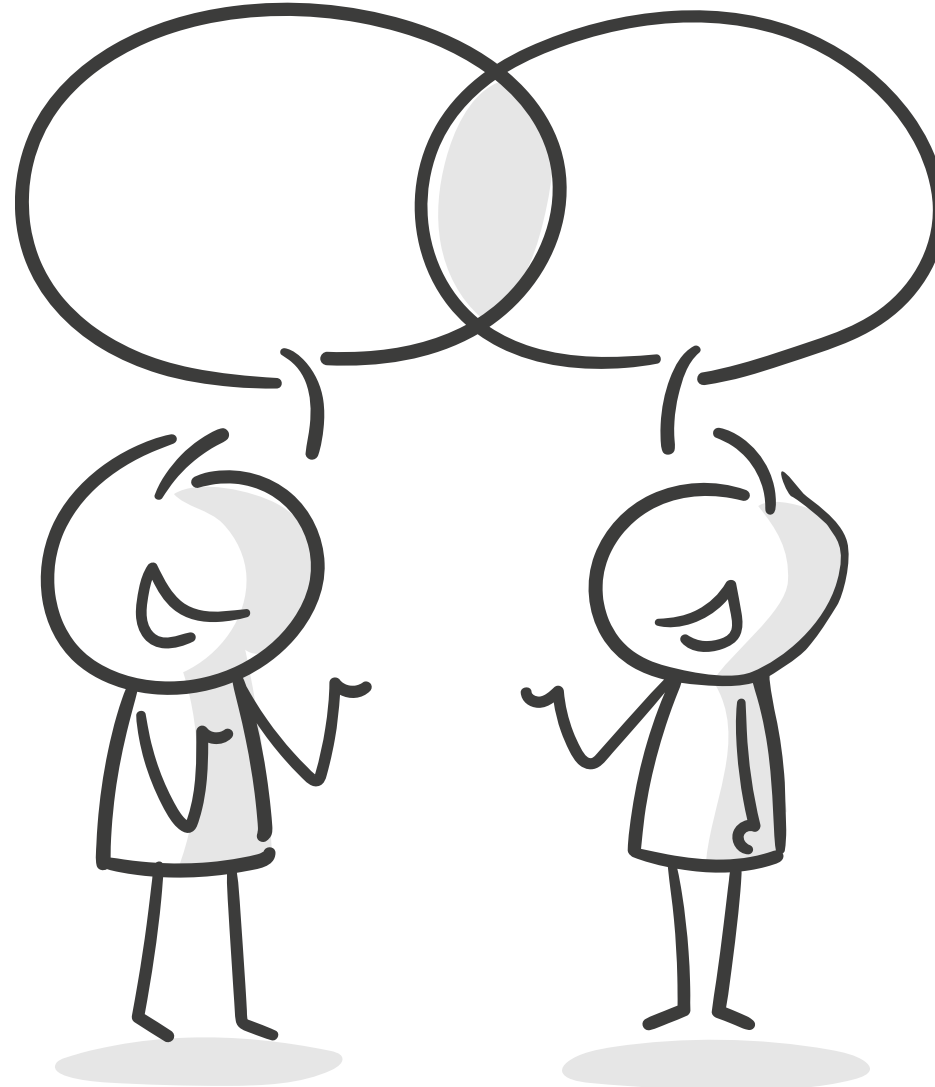
- Intervention unlikely to attract students to schools
- Composition of students in school is unlikely to change, even if intervention changes who takes the course
- Sample can include joiners
- **If sample includes all eligible students in the school**



Do Not Exclude Non-Participating Students from a School RCT

- In a school RCT...
 - If...
 - Sample includes only the students who enroll in an intervention course or elective, and
 - Enrollment in the course may have been affected by random assignment status
 - Then...
 - Random assignment is compromised
 - Cannot meet WWC standards without reservations

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Questions?

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