Data, Won't You Be My Valentine? How to Lovingly Collect, Interpret, and Analyze Data in Higher Education

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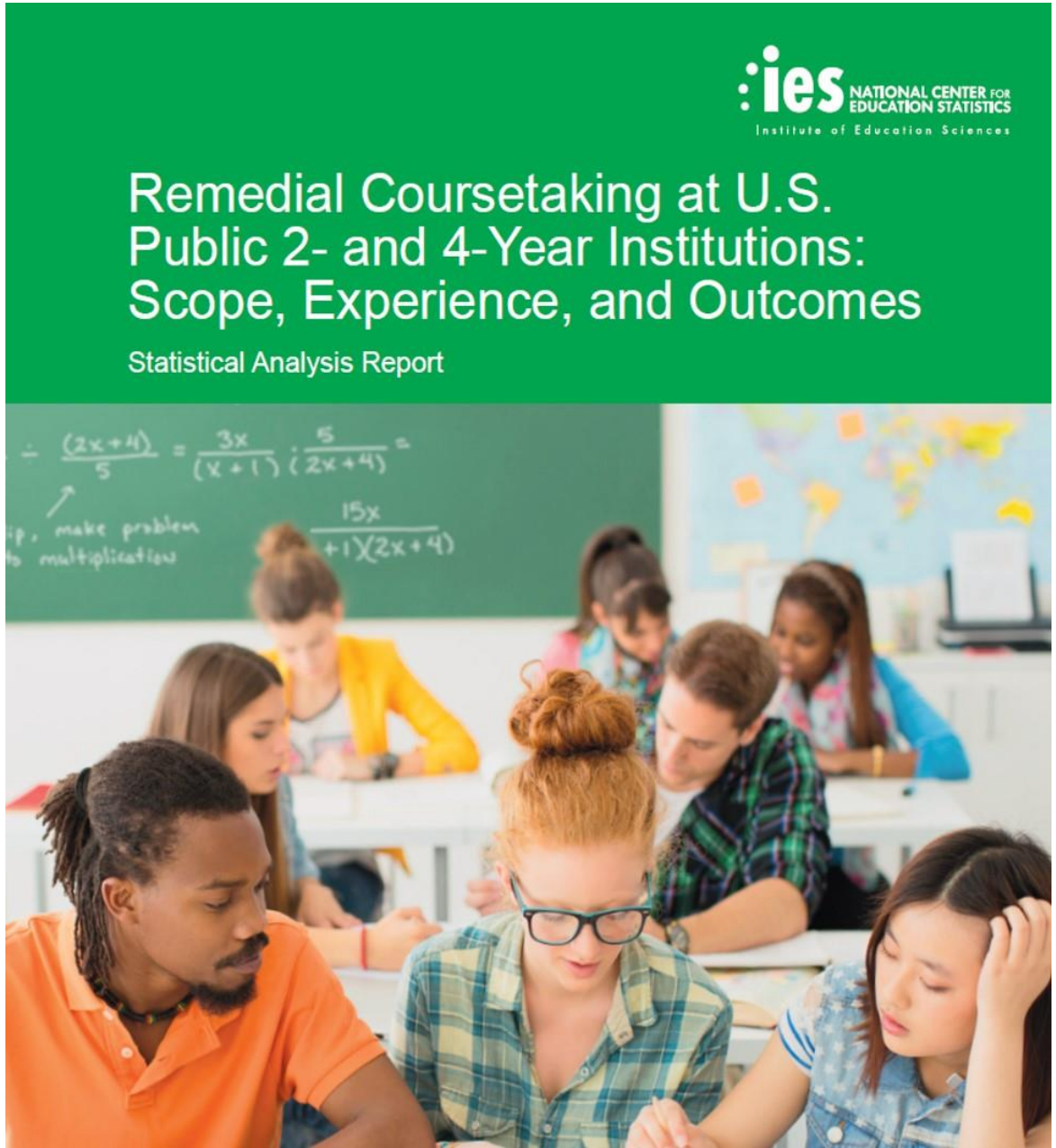
National Association for Developmental Education Webinar
14 Feb 2019 2-3 p.m. ET
communitycollegedata.com @ccollegedata

Welcome!

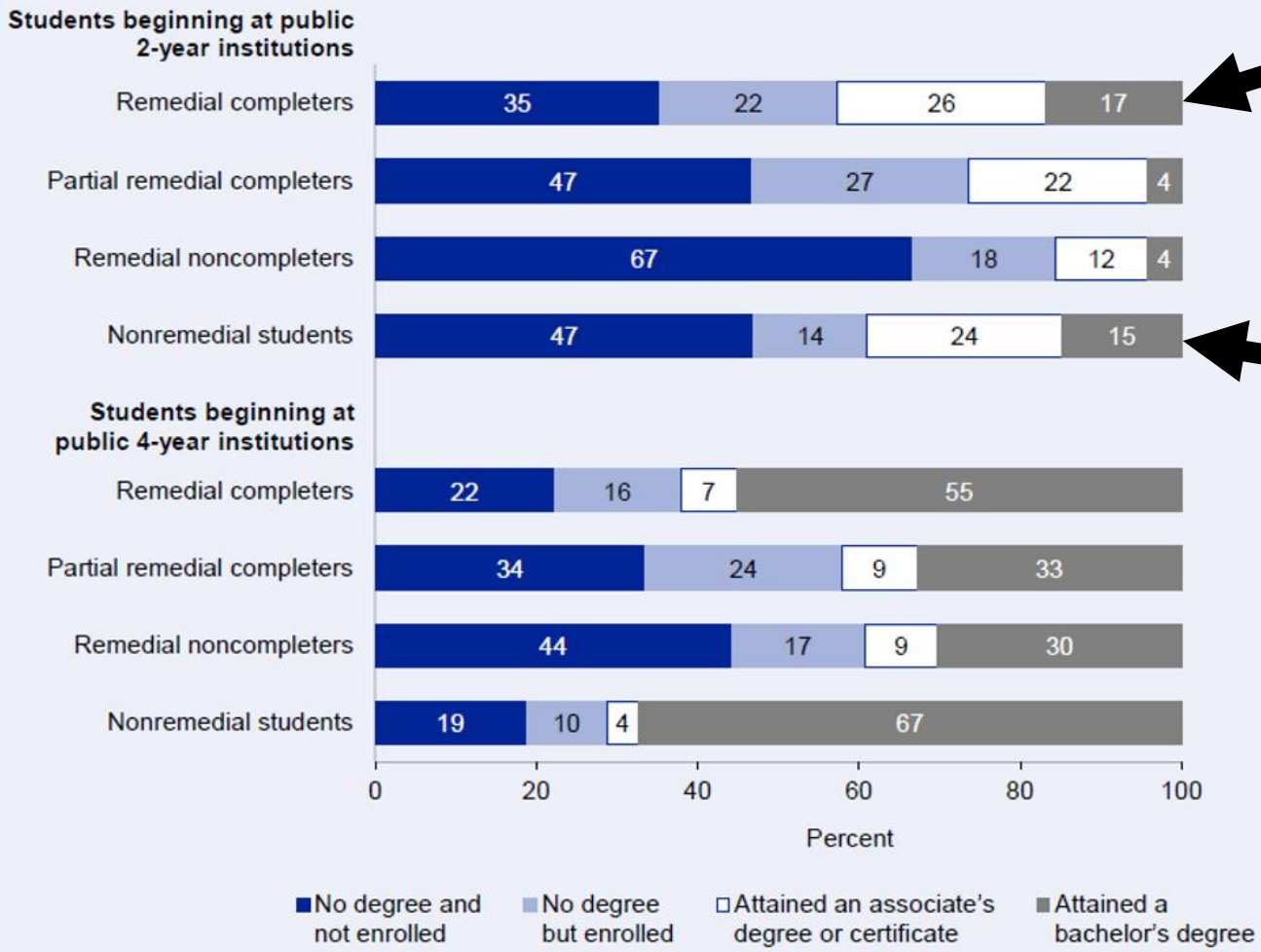
- Happy Valentine's Day!
- And thank you for joining me for Valentine's Day data
- communitycollegedata.com and @ccollegedata
- You are very important people; you have an exponential effect on the lives of thousands of students, the economy, the country, and the world
- We should start with some positive data
- You need to know that you have already been making a difference as educators

USDOE "Remedial Coursetaking" (2016)[1]



USDOE "Remedial Coursetaking" (2016)[1]

Figure 7.
SIX-YEAR PERSISTENCE AND ATTAINMENT: Among 2003–04 beginning postsecondary students who first enrolled in public 2- or 4-year institutions, percentage distribution of students according to their postsecondary persistence and highest degree attainment as of 2009, by remedial course enrollment and completion status: 2003–09



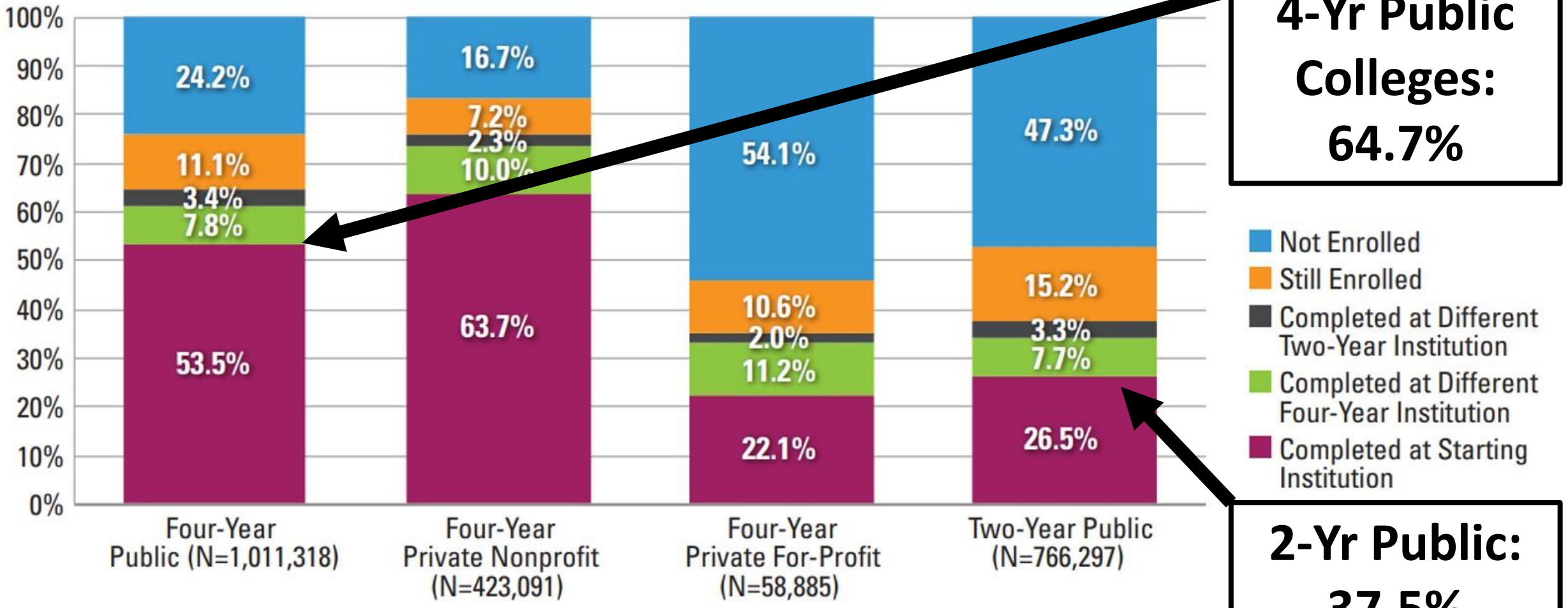
Remedial Completers (49%) 6-Yr Grad Rate: 43%

Nonremedial Grad Rate: 39%

Overall Rem. Grad Rate: 33%

NSCRC "Completing College" (2017)[2]

Figure 8. Six-Year Outcomes by Starting Institution Type (N=2,259,591)*

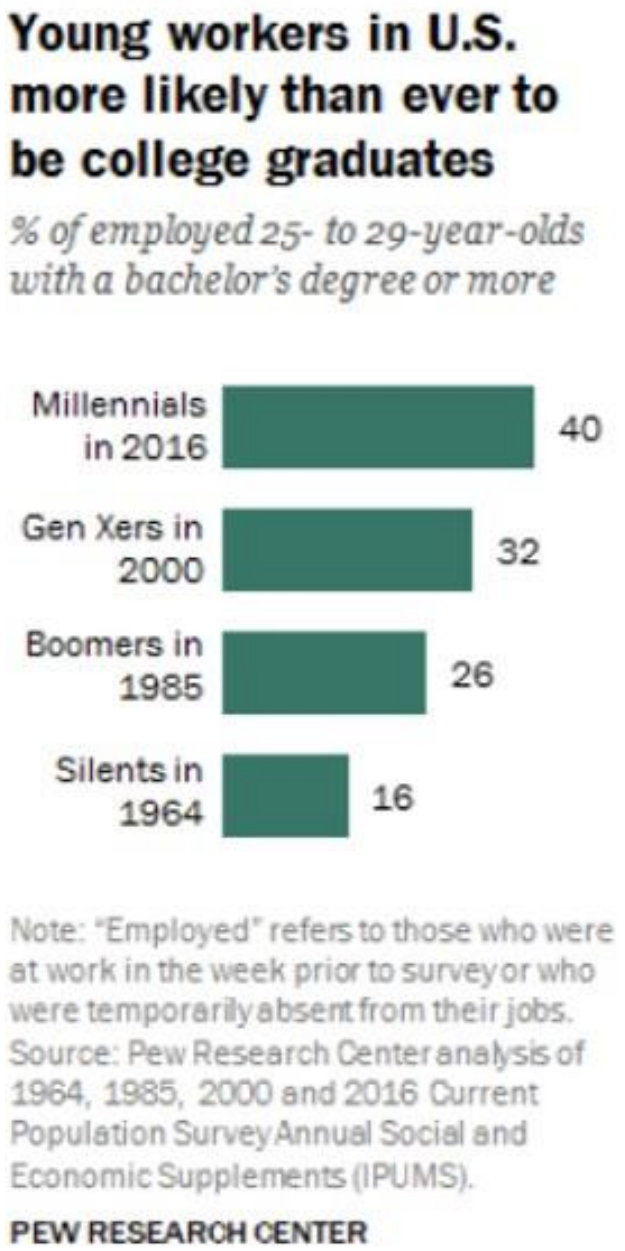


*This figure is based on data shown in Appendix C, Table 15.

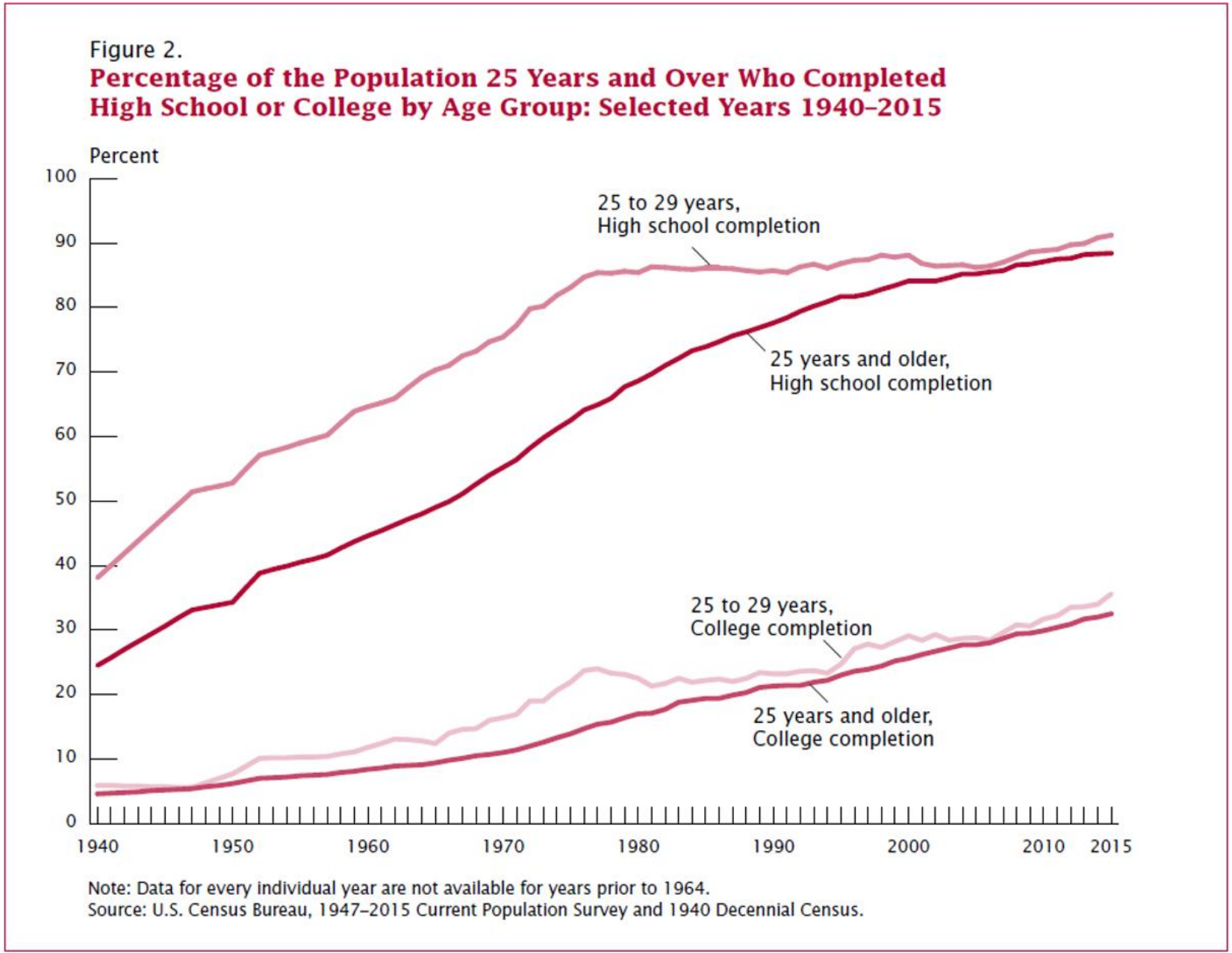
Grad Rate at 4-Yr Public Colleges: 64.7%

2-Yr Public: 37.5%

Pew Research "Today's Young Workers" (2017)[3]



U.S. Census Bureau (Ryan & Bauman, 2016)[4]



“Highest Educational Attainment Levels”[5]

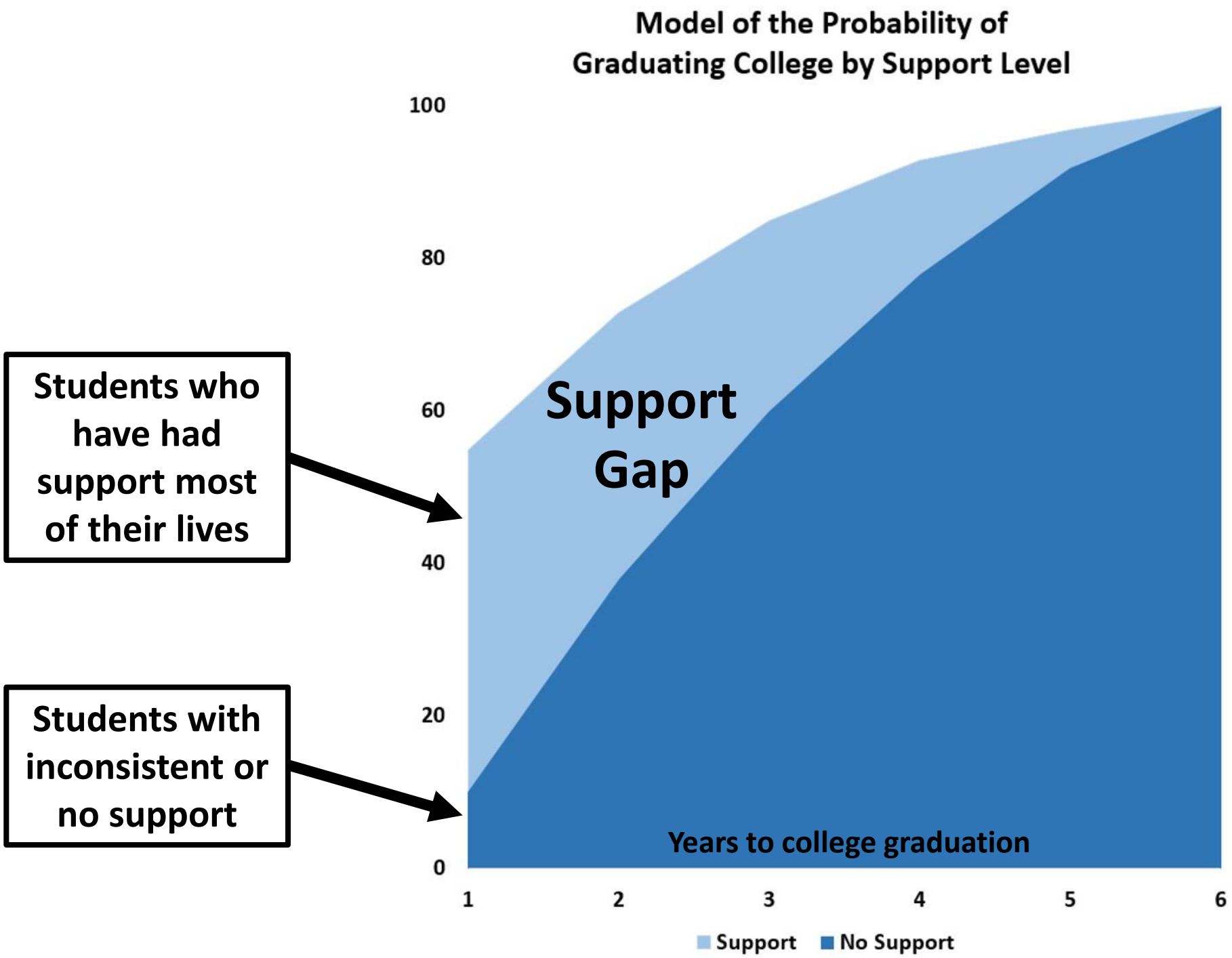
More Good News

- So overall 4-year grad rates are on the rise; remedial completers' grad rates are higher than nonremedial
- Moreover, the National Student Clearinghouse Research Center (2017)[2] recently reported updated 8-year completion rates for two-year public colleges
- Public two-year graduation rate after 6 years is **38%**
- Public two-year graduation rate after 8 years is **44%**

We Can Still Improve

- There are still pervasive and persistent problems, especially with students of color and at-risk students in general[6,7]
- However, we now know that support for at-risk students needs to be well-funded and sustained to be effective[8,9,10]
- At-risk students in college face what I call a long-term

Support Gap



We Can Still Improve

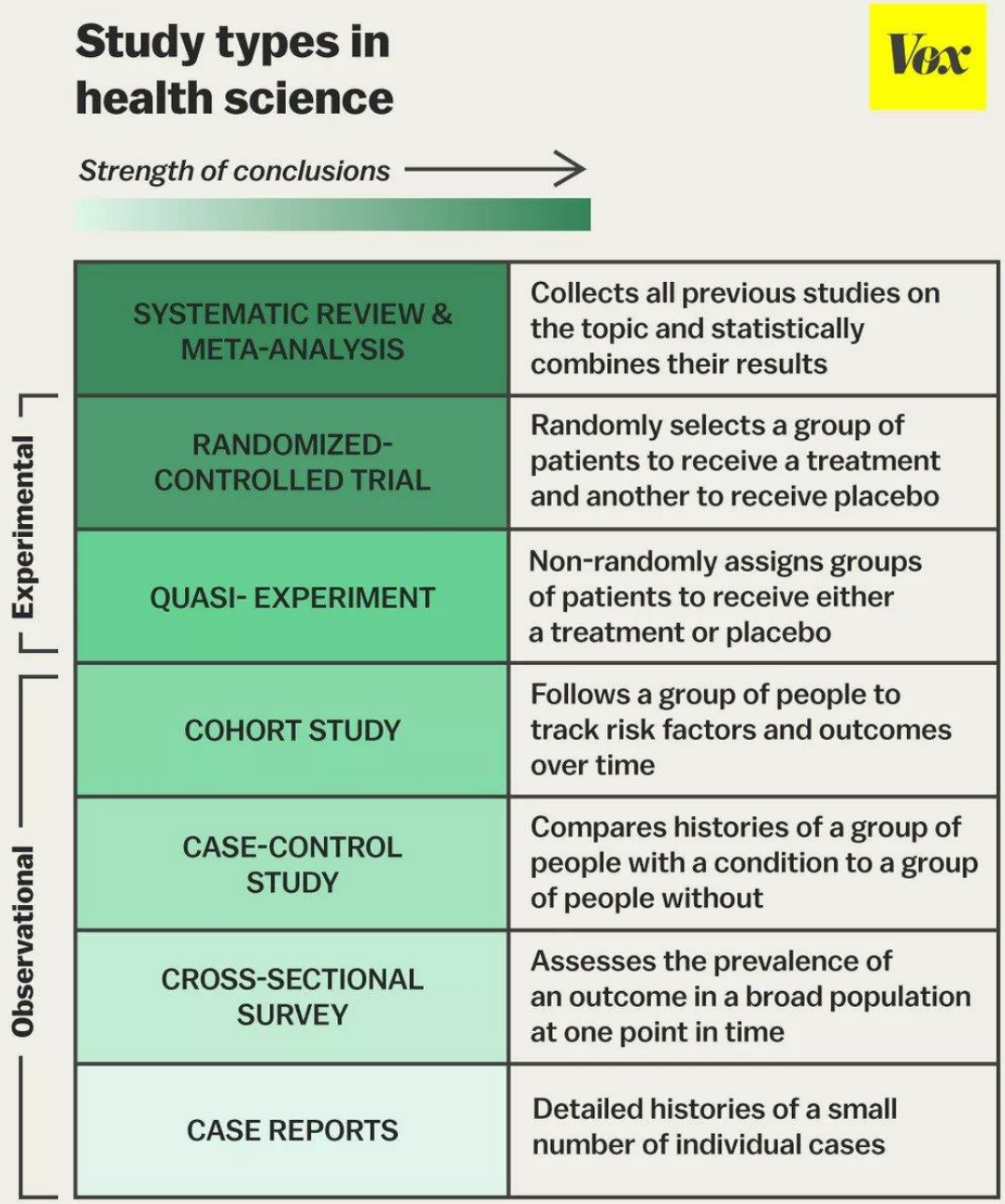
- How can we reduce the **Support Gap**?
- Again, we know that well-funded and integrated holistic reform is ideal, when we have a lot of money[8,9,10]
- The question is what to do when there is no money!
- This means you all have to design, run, and analyze studies and data to make small changes to improve
- This presentation will give you the basics on all these, as well as what common problems to avoid

What Works Clearinghouse (WWC) Training

- This presentation uses some of the USDOE's Institute of Education Sciences What Works Clearinghouse (WWC) training framework for understanding basic research, creating rigorous research design, and analyzing data
- https://ies.ed.gov/ncee/wwc/onlinetraining *12,13*
- The WWC uses common standards that we can all agree to and start applying uniformly to ensure valid results and reduce potential bias and problems
- Please watch the videos and complete the certification

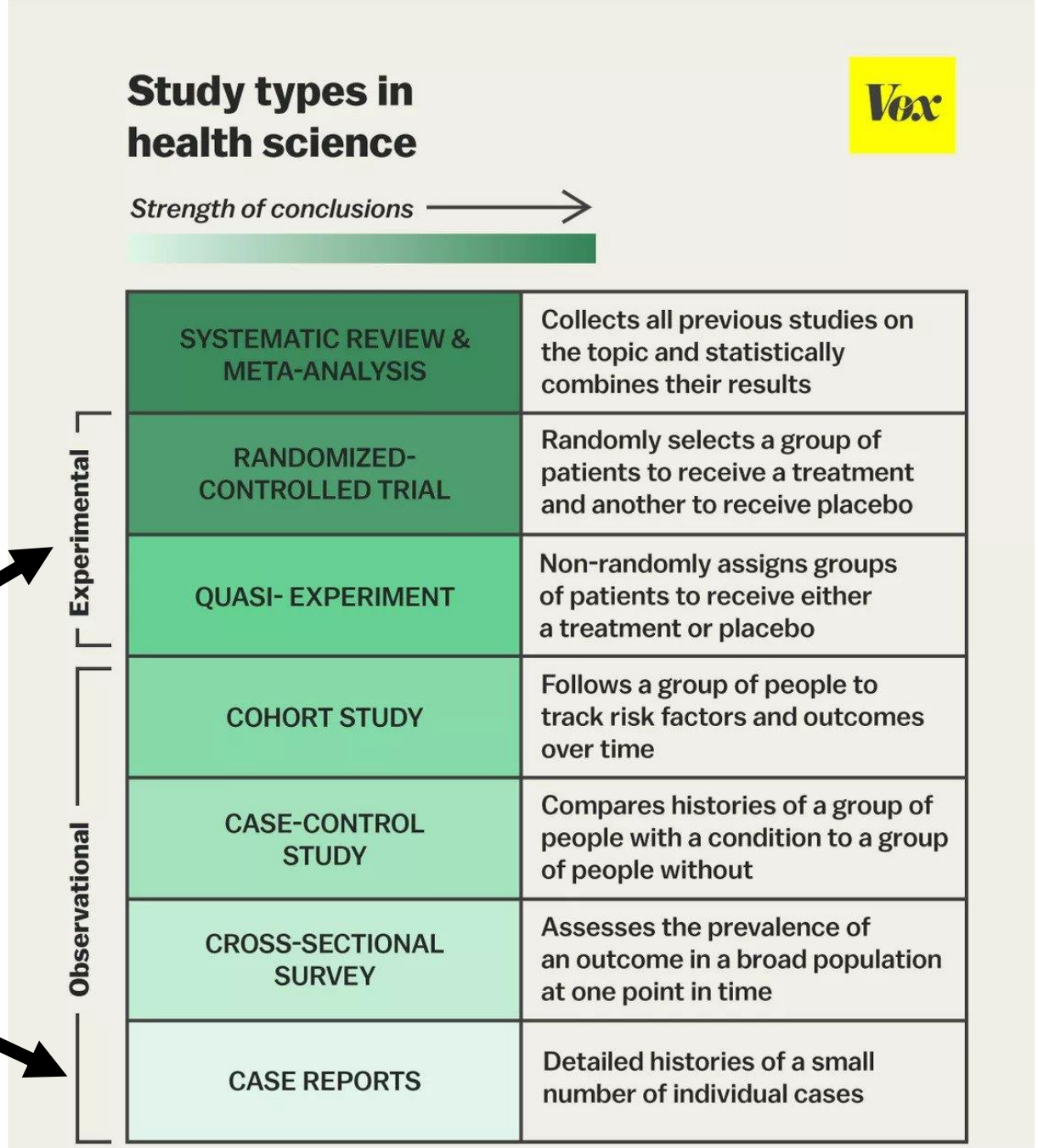
What are the most common types of study designs?

“The One Chart You Need to Understand Any Health Study” (Belluz & Hoffman, 2015)[14]



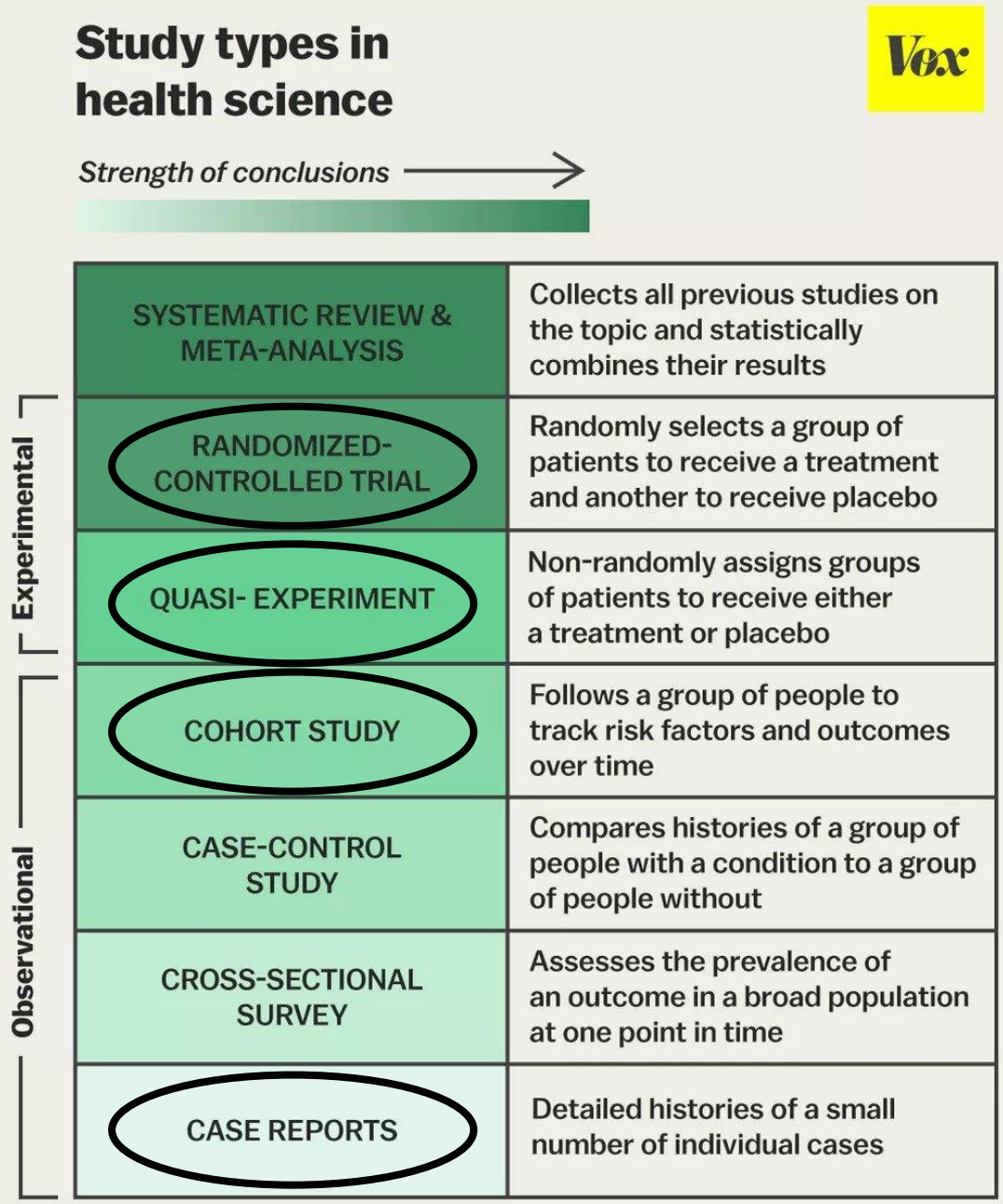
"The One Chart You Need to Understand Any Health Study" (Belluz & Hoffman, 2015)[14]

Quantitative to Qualitative Spectrum



“The One Chart You Need to Understand Any Health Study” (Belluz & Hoffman, 2015)[14]

We will focus on these four types (as applied to education)



Study Type 1: Randomized Controlled Trial (RCT)

Study Type 1: Randomized Controlled Trial (RCT)

- Researchers randomly select students (or clusters of students) to participate in an *intervention*
- Put other like students or clusters into a *control group*, which will not receive the intervention
- Make the entire group as similar as possible before randomizing the students or clusters
- Compare groups at the beginning and end of the study with an objective metric such as a standardized test

WWC Training: Module 1 (2019)[12]

:ies INSTITUTE OF EDUCATION SCIENCES

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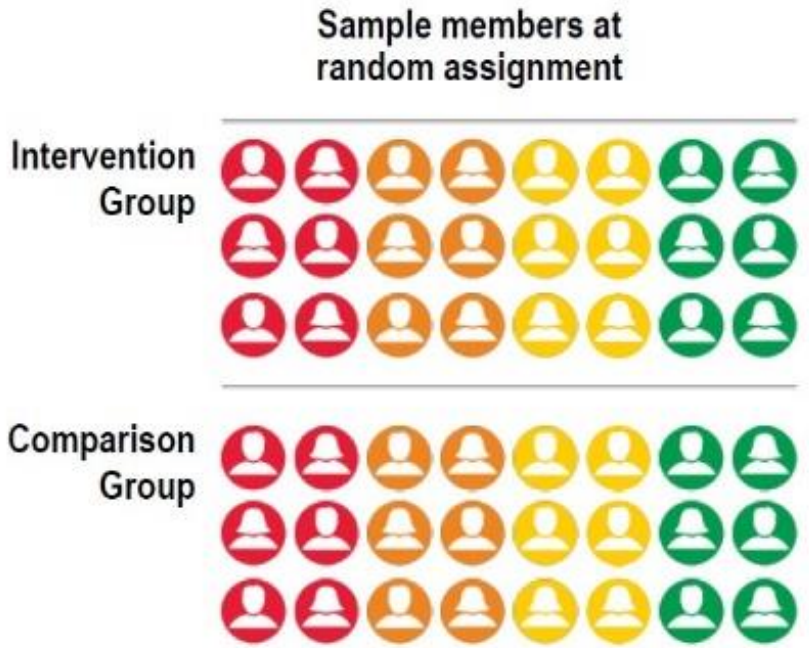
Randomized Controlled Trials (RCTs)

- **RCTs use a random process to assign units. Types of units include:**
  - Individuals such as teachers or students
  - Clusters of individuals such as classes or schools
- **Well-executed randomization creates groups that are similar on observed and unobserved characteristics.**
  - Therefore, observed differences in outcomes are due to the intervention, not preexisting differences between groups.



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Example of an RCT Study in Higher Education: Logue, Watanabe-Rose, & Douglas, 2016[15]

- A recent study (Logue, Watanabe-Rose, & Douglas, 2016)[15] used a randomized controlled trial for remediation:
  - It explored the effects of adding a structured 2-hour lab to two intervention groups: an elementary algebra and a college-level statistics course, both of which were taken by similar remedial students according to a placement test
- Here is a chart showing its results:

Example of an RCT Study: Logue, Watanabe-Rose, & Douglas, (2016)[15]

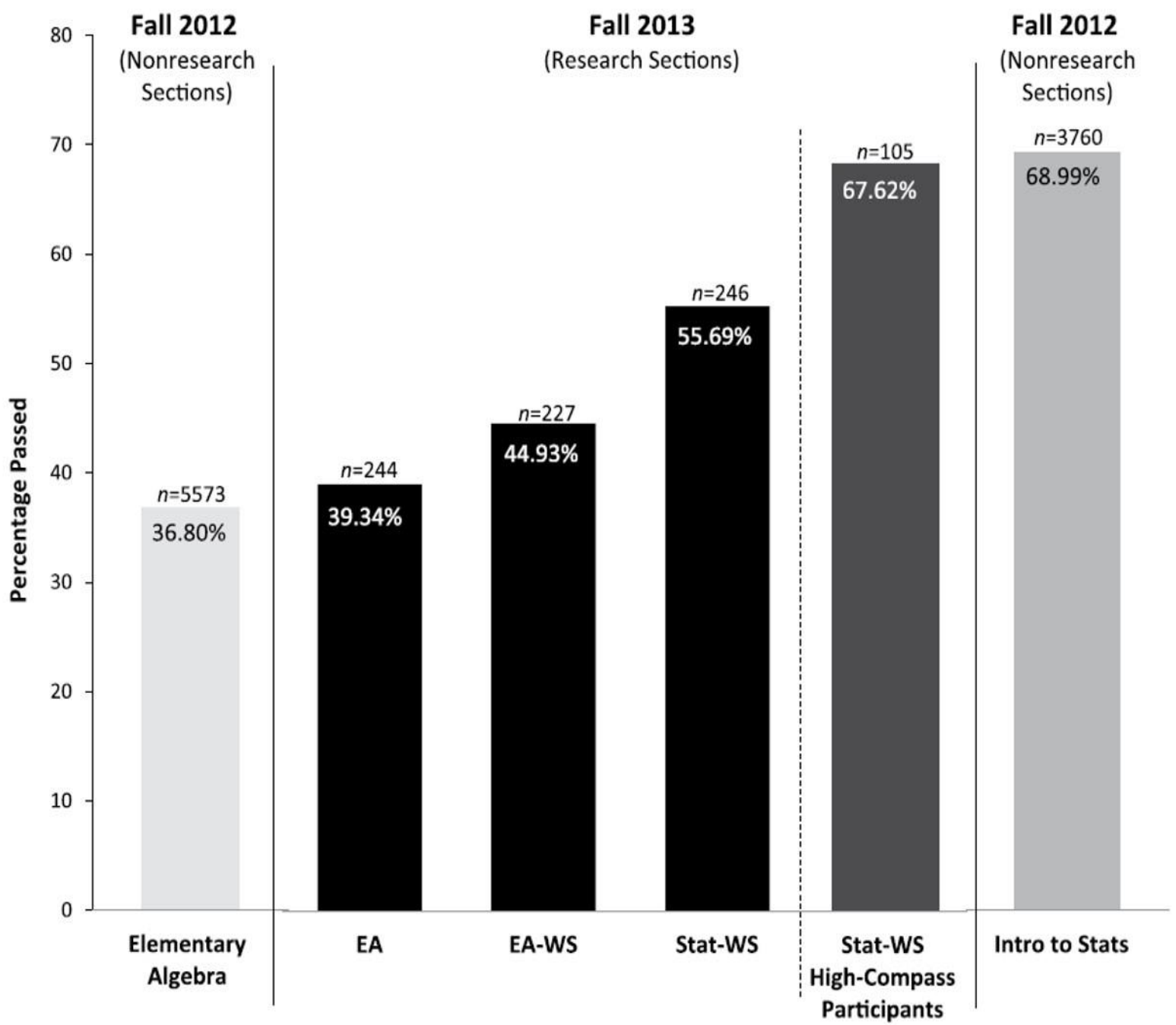


FIGURE 2. *Course pass rates.*

Example of an RCT Study: Logue, Watanabe-Rose, & Douglas, (2016)[15]

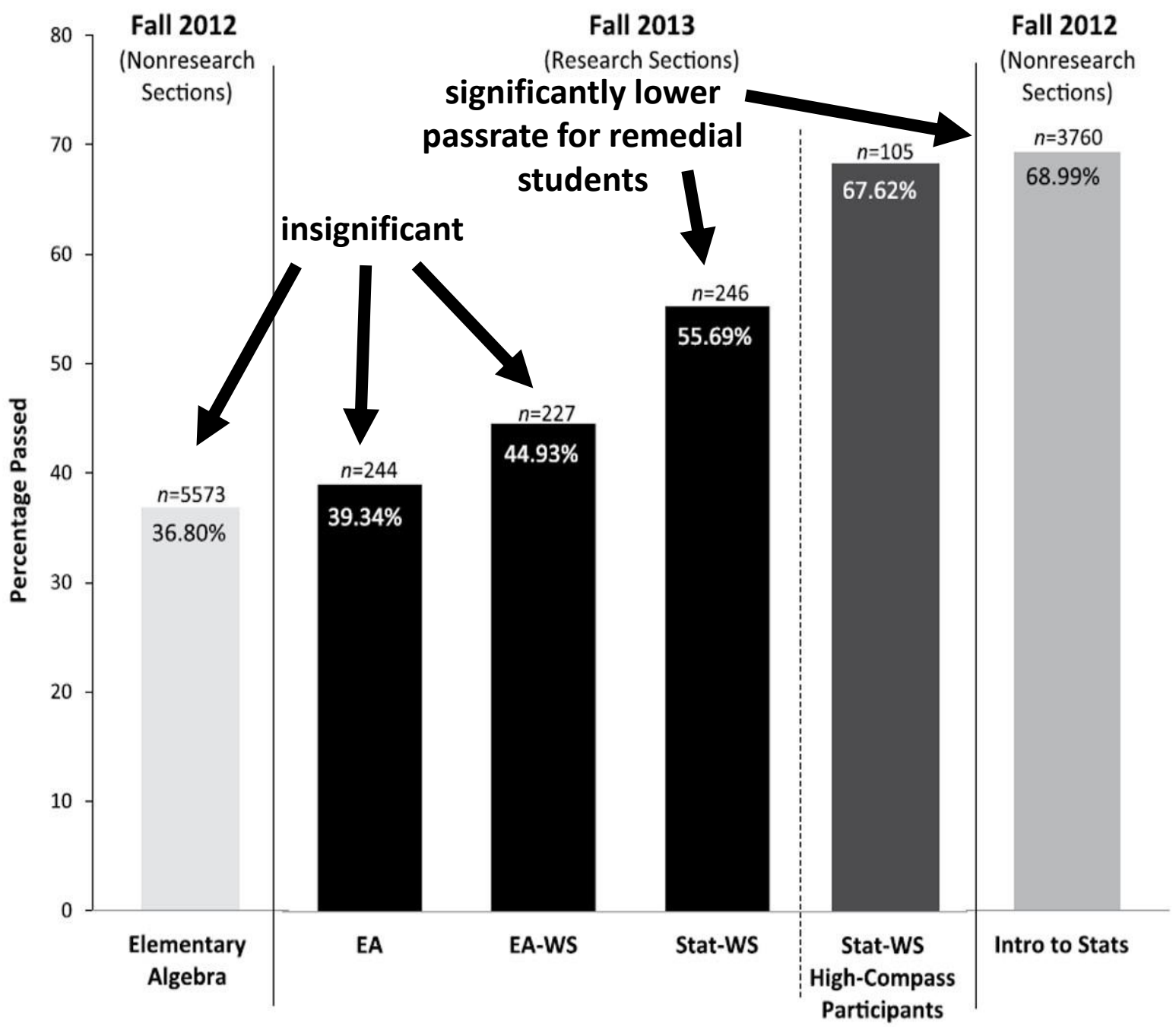


FIGURE 2. *Course pass rates.*

Study Type 1: Randomized Controlled Trial (RCT)

- How can you design an easy RCT? Here is one idea:
  - If one instructor teaches six sections of the same course during one semester, three of the sections could be assigned an intervention, and three of the sections could be the control groups
  - However, according to the WWC, states that only one instructor, one intervention group, and one control group would not be an acceptable design

WWC Training: Module 4 (2019)12

Non-Confounding Factor: Single Unit in Both Conditions

- A single study unit that appears in both conditions is *not* a confounding factor.

- Example of a non-confounding factor: One teacher with three intervention classes and three comparison classes.
- Example of a confounding factor: One teacher with one intervention class and one comparison class

Ms. Smith's Math Classes	
Intervention Period 1 Period 3 Period 4	**Comparison** Period 2 Period 5 Period 6

Study Type 1: Randomized Controlled Trial (RCT)

- Another idea for how to design an easy RCT:
  - Of all sections of a particular course one semester, half of the classes are randomly assigned to implement one change (not dependent on instructor)
  - For example, half of all remedial WRT098 sections on campus could be assigned to use a particular method; the pretest is the same as the posttest; all clusters of students test before and after; a statistician will help you calculate baseline equivalency and outcomes

Potential RCT Problems When Reading Articles and Creating Studies

- The intervention group and control group are not equal (researchers must establish baseline equivalency using a standardized metric before the intervention starts)
- The two groups have too much attrition at the end of the study (the WWC has a formula for this), meaning too many students in the intervention group dropped out so it may skew the results of the intervention's results
- The *n* is too low, a common error in many studies (*n* = the number of students or clusters in a study)

Study Type 2: Quasi-Experimental Design (QED)

Study Type 2: Quasi-Experimental Design (QED)

- Researchers collect data on a number of students or clusters of students from a past *intervention*
- Collect data on a number of students or clusters who are statistically similar to the intervention group (*control*)
- Statistics experts can help you create the *control group*
- However, the WWC states that "there is persuasive evidence that the most common comparison-group designs produce erroneous conclusions in a sizeable number of cases" (p. 3)[13]

Study Type 2: Quasi-Experimental Design (QED)

- Therefore, the WWC does not allow any QEDs to attain its highest rating because they are not sure the intervention's results are due to the intervention and not unobserved differences between the two groups
- Here are the three ratings the WWC uses to rank studies:
  - Meets WWC Group Design Standards Without Reservations
  - Meets WWC Group Design Standards With Reservations
  - Does Not Meet WWC Group Design Standards

Example of a Problematic QED Study: Cho, Kopko, Jenkins, & Jaggars (2012)[16]

- In 2010 and 2012, the Community College Research Center conducted a QED study on the Community College of Baltimore County's Accelerated Learning Program (ALP)
- They attempted to create a comparison group after ALP students volunteered to be in the intervention
- The WWC rated this and several other CCRC studies as "Does Not Meet WWC Group Design Standards" due to imputed data in baseline equivalency metrics

Example of a Problematic QED Study: Cho, Kopko, Jenkins, & Jaggars (2012)[16]

Table 6
Descriptive Characteristics of Balanced Matched Cohort

Variable	ALP (1)	Non-ALP (2)	Difference (1−2) (3)
Student Demographics			
Female	60.1%	60.1%	0.0%
Age	21.32	21.29	0.03
Black	49.8%	49.5%	0.3%
White	51.2%	48.0%	3.2%
Hispanic	1.9%	1.2%	0.7%
Asian American	3.5%	2.7%	0.8%
Socioeconomic Background			
Median household income in student's Census block (2010 Census)	$59,794	$58,294	$1,500
FAFSA family income	$22,851	$22,251	$600
Received any financial aid	70.9%	71.6%	−0.7%
Received Pell grant	59.5%	59.8%	−0.3%
Grant amount	$3,525	$3,563	−$38
Loan amount	$1,403	$1,453	−$51
Financial aid amount	$5,217	$5,301	−$84
Family size	2.20	2.13	0.08
Enrollment Characteristics			
Full-time in first term	60.0%	63.9%	−3.9%
Transferred any credits to CCBC	5.1%	5.2%	−0.2%
ENGL051 attempt	8.1%	8.8%	−0.7%
Number of courses taken before ENGL052	1.40	1.56	−0.16
Academic Preparation			
English placement score	72.49	73.05	−0.56
Reading placement score	68.66	69.06	−0.40
Math placement score	44.40	43.19	1.21
Total Students	**592**	**592**	

Bailey et al. (WWC), (2016), p. 91[17]

EDUCATOR'S PRACTICE GUIDE
A set of recommendations to address challenges in classrooms and schools

WHAT WORKS CLEARINGHOUSE™

Strategies for Postsecondary Students in Developmental Education – A Practice Guide for College and University Administrators, Advisors, and Faculty

Appendix D. Appendix Table 4 *(continued)*

Recommendation 4. Compress or Mainstream Developmental Education with Course Redesign.

Study and design	Participants	Setting	Intervention condition as implemented in the study	Comparison condition as implemented in the study	Outcome domain and effect size
Cho et al. (2012)[14]; Jenkins et al. (2010) QED Does not meet WWC Group Design Standards	1,184 students placed into developmental writing	One community college in the mid-Atlantic	Community College of Baltimore County's Accelerated Learning Program (ALP) mainstreamed developmental-level students into college-level English composition. The students also received supplemental instruction for an additional hour per course meeting. The college-level English and supplemental instruction course are taught by the same instructor with integrated syllabi and activities.	The ALP comparison group was composed of students who were only enrolled in the traditional, highest level developmental English course (ENGL 052).	ALP students outperformed non-ALP students on college-level coursework completion rates and persistence to the next year* (nr). There was not a difference on college-level course grades or on degree attainment/transfer (nr).[15]
Edgecombe et al. (2014)[16] QED Does not meet WWC Group Design Standards	3,529 students in developmental education	One community college in California	A one-semester accelerated course in English was offered as a preparatory course in a pilot learning community, and this group formed the pool for the intervention group in the study. Later, the accelerated option was offered to all students on campus.	The 2-semester traditional pathway consisted of three developmental courses, which was considered "business as usual." Students who enrolled in this course sequence and met propensity-score matching criteria with the intervention group participants formed the pool for the comparison group.	Over a 5-year follow-up period, accelerated course participants were more likely to complete college-level English* (nr), earn more college course credits* (nr), and more likely to earn a degree,* (nr).[17]

[14] This study did not meet WWC standards because the authors used imputation for some covariates and outcomes; the WWC currently does not allow imputation for covariates.

[15] nr indicates not reported. This study did not present information in a way that allows standardized effect sizes to be reported. See Cho et al. (2012), Table 3, p. 10.

[16] This study did not meet WWC standards because an acceptable pre-intervention measure of academic achievement was not available. The authors did control for measures of college achievement and student socioeconomic status.

[17] nr indicates not reported. This study did not present information in a way that allows standardized effect sizes to be reported. See Edgecombe et al. (2014), Table A.2, p. 30.

Example of an Acceptable QED Study (w/Rsrv): Hodara & Jaggars (2014)[19]

Appendix D *(continued)*

Appendix D. Appendix Table 4

Recommendation 4. Compress or Mainstream Developmental Education with Course Redesign.

Evidence Summary of Studies that Investigate the Effects of Mainstreaming, Compression, and Course Redesign in Developmental Education

Study and design	Participants	Setting	Intervention condition as implemented in the study	Comparison condition as implemented in the study	Outcome domain and effect size
Hodara & Jaggars (2014) Quasi-Experimental Design (QED) Meets WWC Group Design Standards With Reservations	7,148 students placed into developmental education courses	Three community colleges in New York City	The intervention was a shortened developmental writing sequence (6–7 credit hours), designed to prepare students for two college-level English composition courses, required of all degree programs. The shorter, accelerated sequence focused on students' writing in response to readings and class discussions. The curriculum did not emphasize a review of grammar or usage rules, or appear to teach writing through discrete skills instruction.	The comparison was the usual developmental writing sequence offered in these colleges (8–12 credit hours), designed to prepare students for two college-level English composition courses, required of all degree programs. In the traditional, longer sequence, the lower-level course emphasized grammar instruction and paragraph development, and the next level of the course sequence offered a review of grammar and emphasis on paragraph and essay writing.	Progress through developmental education: $g = +0.22^{*13}$ Credit accumulation: $g = +0.13^{*}$ Degree attainment: $g = +0.16^{*}$

Potential QED Problems When Reading Articles and Creating Studies

- The intervention group and control group may not be equal (researchers must ensure baseline equivalency)
  - This is the main problem with QED studies; when the intervention is not randomly assigned, it is difficult to conclude that the intervention affected the students
- The *n* is too low (*n* = # is a way of stating how many numbers of students/clusters are in a study)
  - If the *n* is too low, you cannot conclude that the sample represents the population

Example of QED Study with Confounding Factors: Jones & Assalone (2016)[18]

FIGURE 7 UIW CO-REQUISITE MODEL OUTCOMES

Accuplacer Scores & Course Grades

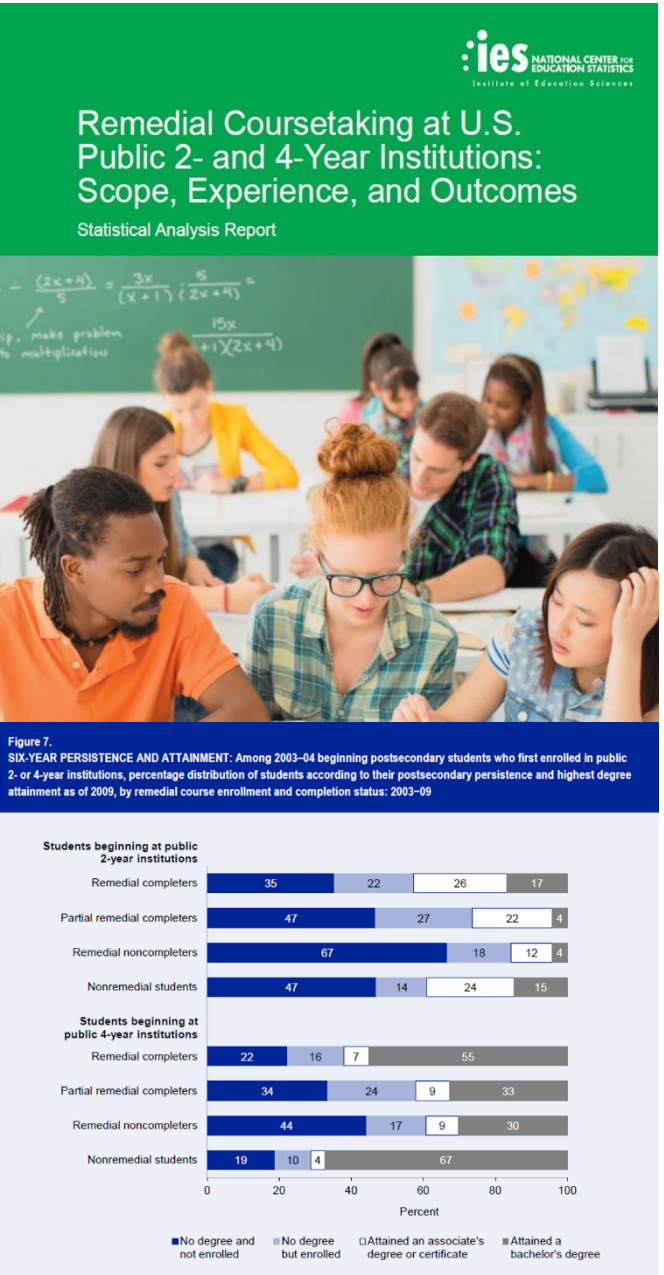
	Starting Accuplacer Score	Final Accuplacer Score	Final Course Grades (Mean)
Program Group	60.15	85.38	77.85
Control Group	60.17	71	81.5
Program Group- N=13 Control Group N=12			

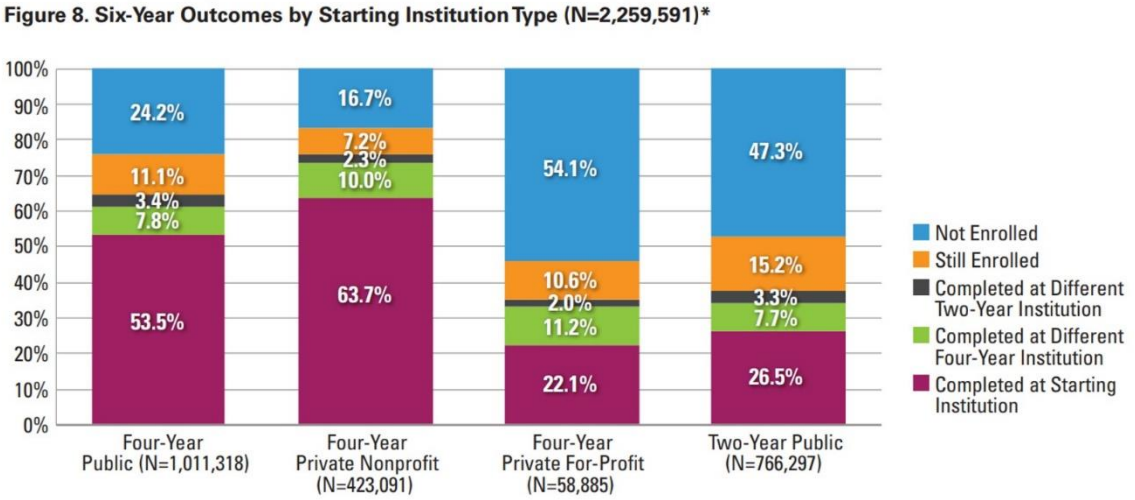
Study Type 3: Observational Studies (Cohorts)

Study Type 3: Observational Studies (Cohorts)

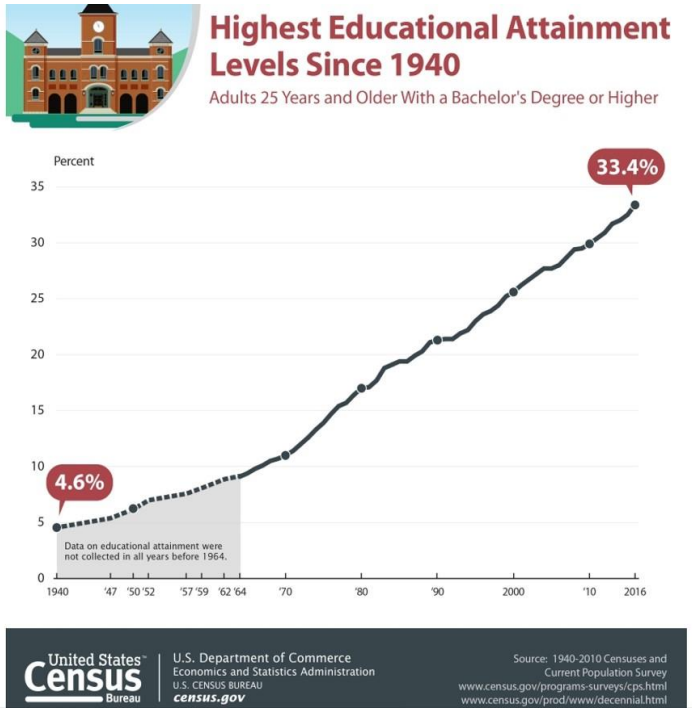
- Observational studies are what the term implies: They are studies that observe groups of students and report on outcomes, behaviors, metrics, etc. (i.e., tracking data)
- They are not designed for generalizability; you are not supposed to apply or generalize the findings from these studies to other situations (sometimes it's reasonable)
- They are only for information or understanding things
- Only supposed to show *correlation*, not *causation* (these are also referred to as *explanatory studies*)

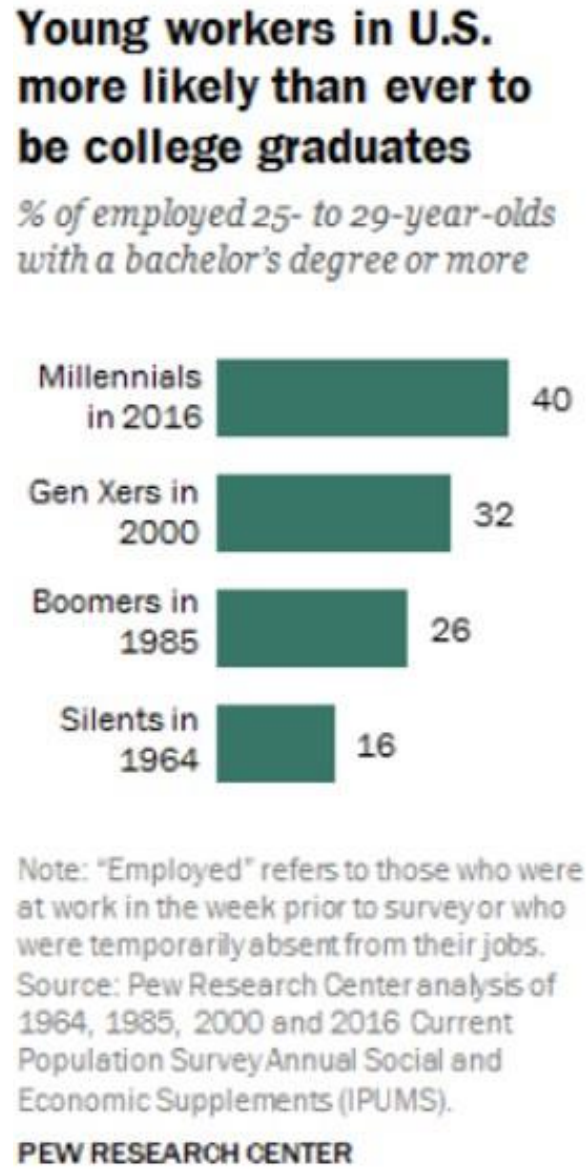
Examples of Observational Studies





*This figure is based on data shown in Appendix C, Table 15.





Observational Study Example: National Baseline Data (Gerlaugh et al., 2007)[11]

Table 2

Retention and Pass Rates of Developmental Students

Subject Area	Developmental Course		Pass Rate First College Credit Course
	Retention Rate	Pass Rate	
Reading	83%	76%	69%
Writing	83%	73%	64%
Math	80%	68%	58%

Potential Observational Study Problems When Reading Articles and Creating Studies

- Many people assume that correlation means causation
  - What looks like causation may only be correlation (remedial coursework “causing” low graduation rates)
  - Other examples of causation/correlation are 15 to Finish and ALP (volunteering is a confounding factor)
- People incorrectly apply one group’s, state’s, or institution’s tracking data to an entire population
- Only use observational studies to understand a problem
- Then conduct RCTs or QEDs to study a solution

Study Type 4: Qualitative Designs

Five Most Common Designs:

Case Study, Ethnography, Phenomenology, Grounded Theory, and Narrative Inquiry/Bio

Study Type 4: Qualitative Designs

- Most qualitative designs are low and range from *n* = 1 to *n* = 10 or 20 (more for ethnographies)
- Not designed for generalizability to overall populations
- They are excellent for learning more about students, experiences, and phenomena (thick, rich descriptions, just like Valentine's Day chocolate should be!)
- I recommend using them to understand more about something, and then design an RCT or QED to investigate how to help

A Randomized Controlled Trial Model: ASAP

- The City University of New York (CUNY) attained funding for a randomized controlled trial (rare in higher ed) and created a holistic reform for at-risk students
- Part of this reform was a learning community model:

  "ASAP provides blocked and linked courses for students in their first year, the goals of which are to enroll ASAP students together in the same courses so that they can meet and support one another and to give program students convenient schedules so they can make the most of their time on campus. While this component does not reach the level of a classical learning community, it is designed to provide some similar benefits, such as better acclimation to the college environment and the formation of meaningful bonds with fellow students" (p. 4)

A Randomized Controlled Trial Model: ASAP

- CUNY's Accelerated Study in Associate Programs (ASAP)[8,9]
- The ASAP program implemented a randomized, controlled study, and the intervention was a comprehensive overhaul of Dev Ed and non-Dev Ed, including the infusion of a great deal of design reform, staffing, and resources ($4,000 to $6,800 per student per year)

A Randomized Controlled Trial Model: ASAP

- ASAP Components
  - Dev Ed courses first
  - Full time requirement
  - Block scheduling
  - Learning communities for first year
  - Group advising sessions every week (150 caseload)
  - Meetings with adviser at least twice per month
  - Mandatory tutoring
  - Career specialist meeting once per semester

A Randomized Controlled Trial Model: ASAP

- ASAP Components
  - Tuition waiver
  - Free MetroCards ($2.75 one-way trip NYC)
  - Free books
  - Free social events
  - Consistent and repeated messages
  - Out of pocket costs for institution are again about $5K-$7K more per student per year
  - Good model for “free community college”

A Randomized Controlled Trial Model: ASAP

- Dev Ed ASAP *n* (number in intervention) and demographics:
  - *n* = 896 students (in original total study before randomization)
  - 44% Hispanic, 34% Black, 10% White, 8% Asian
- Credits and retention results:
  - Increased credits over control group by 25%
  - Increased retention second semester (80 to 90%)

A Randomized Controlled Trial Model: ASAP

- Dev Ed ASAP graduation rates after 3 years:
  - Control Group (no ASAP): **21%**
  - ASAP Intervention Group: **48%**

A Randomized Controlled Trial Model: ASAP

- Non Dev Ed ASAP graduation rates after 3 years:
  - Control Group (no ASAP): **29%**
  - ASAP Intervention Group: **60%**
- Three colleges in Ohio are starting this dev ed program, and early results are starting to be released now (early results from this replication show similar gains in graduation rates: 19% vs. 8% in two years)

Questions!

To allow all participants a question:
Please submit one question
per registrant at first

Thank you!

Keep up the good work!

References below and more reading available:
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Follow me on **@ccollegedata**

(Live links to all sources on next page)

References

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