

Advancing Evidence-Based Reforms in Federal Math and Science Education Programs

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The Coalition for Evidence-Based Policy

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Coalition for Evidence-Based Policy

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Problem: Social programs, set up to address important problems, often fall short by funding ineffective practices

- ◆ When gov't-funded interventions are evaluated in rigorous studies, many are found to have small or no effects.
- ◆ Interventions producing meaningful, sustained effects on important outcomes tend to be the exception.
- ◆ This pattern also occurs in other fields where rigorous evaluations are conducted (e.g., medicine, psychology).

Why It Matters: We've made little progress in many areas of social policy

- ◆ U.S. has made no significant progress versus drug/alcohol abuse since 1990.
- ◆ U.S. has made very limited progress in raising K-12 achievement over past 30 years.
- ◆ U.S. poverty rate today is higher than in 1973.



Congressionally-Established Academic Competitiveness Council (ACC)

- ◆ Established by Congress in 2006
- ◆ Comprised of cabinet secretaries and other top officials from the 13 federal agencies that manage federal STEM education programs.
- ◆ Charged with evaluating and improving the effectiveness and coordination of these programs.

One Result ...

- ◆ Office of Management and Budget (OMB) has asked all federal STEM programs to submit information on their ongoing and planned rigorous evaluations.
- ◆ OMB will consider these plans in making FY 08 budget decisions.

What constitutes a “rigorous evaluation”:

- ◆ Well-designed randomized controlled trials as the highest quality evaluation to determine program impact.
- ◆ Well-matched comparison-group studies as a second-best alternative when randomized controlled trials are not feasible.

(Comparison-group studies are sometimes called “quasi-experimental” studies.)

Less rigorous study designs:

◆ Less rigorous study designs include:

- Unmatched or partially-matched comparison-group studies; and
- Pre-post studies

◆ Such designs can be very useful in generating hypotheses about what works, but often produce erroneous conclusions.

Job Training Partnership Act: Impact on Earnings of Male Youth (Non-arrestees)

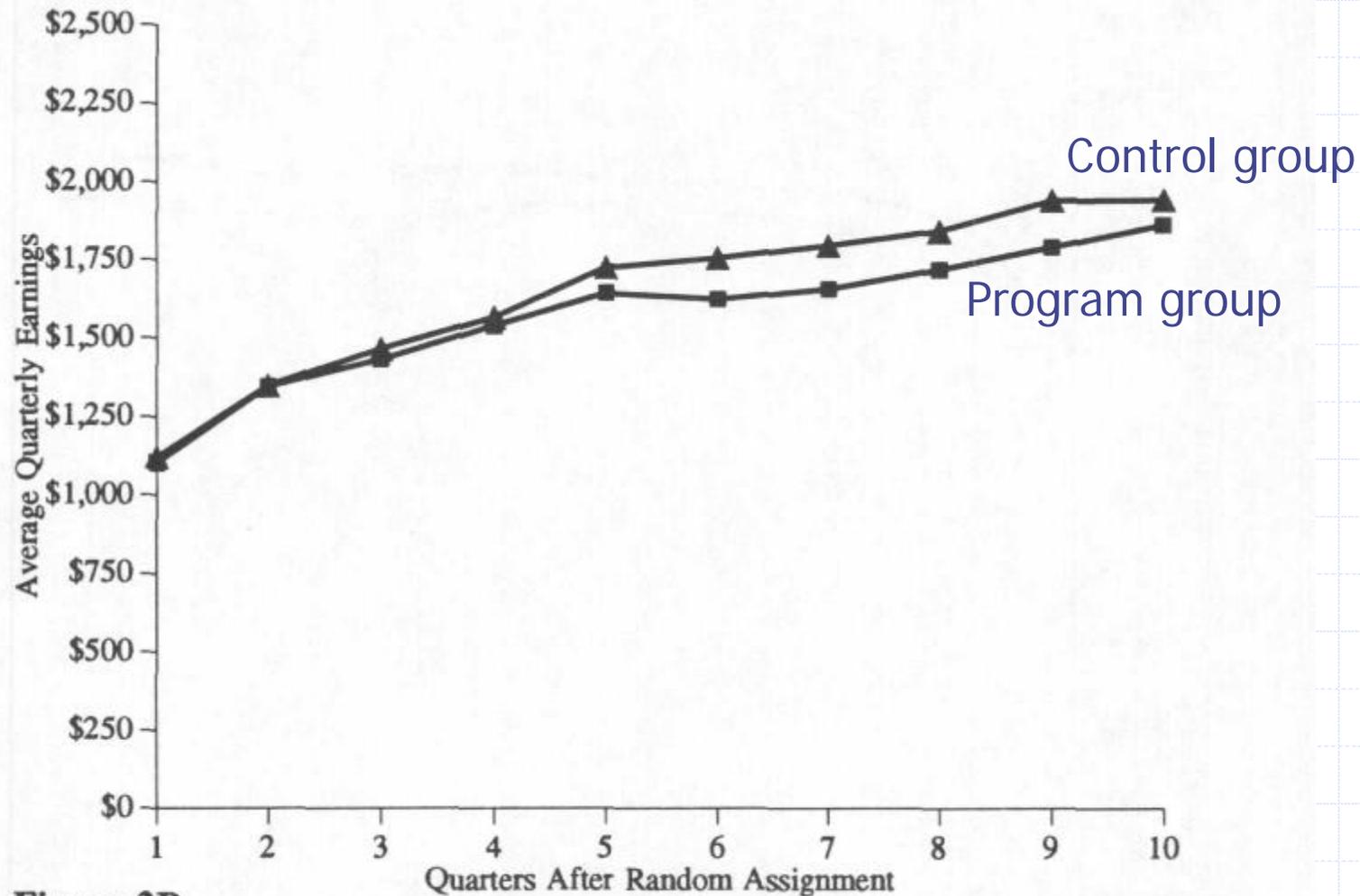
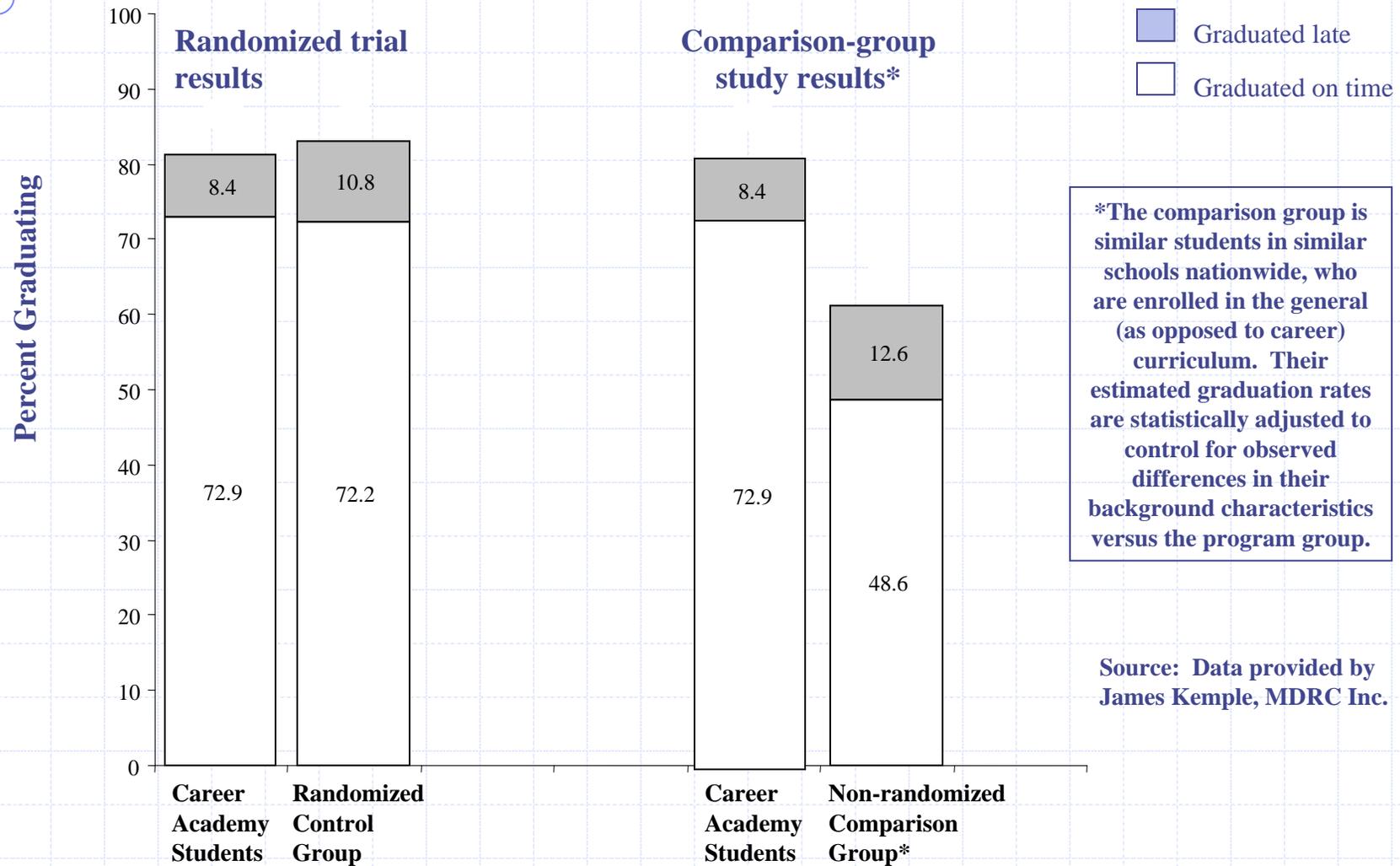


Figure 2B
Mean Earnings, by Quarter: Male Youth Non-arrestees

Impact of Career Academies on High School Graduation Rates



Our Review of Evaluations of Federal STEM Education Programs/Projects For ACC

- ◆ We reviewed 100+ evaluations submitted by 41 federal programs.
- ◆ 10 were rigorous evaluations, of which 4 found meaningful positive effects.
- ◆ 65 were less-rigorous evaluations; almost all concluded that the intervention being evaluated was effective.
- ◆ 25 were not evaluations of effectiveness.

Examples of STEM Educational Interventions Shown Effective In Rigorous Evaluations

- ◆ University of Michigan program creating research partnerships between faculty and undergraduates (randomized trial of 1300 students).
- ◆ Direct Instruction in teaching 3rd and 4th graders how to design a simple, unconfounded scientific experiment (randomized trial of 112 students).
- ◆ Incorporating peer-guided, small group sessions into an undergraduate general chemistry course (well-matched comparison-group study of 264 students).

Suggestions on Evaluation Strategy For STEM Education Program Officials

- ◆ Focus rigorous evaluations on most promising interventions (as opposed to evaluating everything).
- ◆ Make sure the type of evaluation is appropriate for the stage of an intervention's development (e.g., early-stage development vs. scale-up of mature intervention).
- ◆ Recognize that well-designed randomized trials can sometimes be done at modest cost (e.g., \$50,000).
- ◆ Start by trying to get a small number of rigorous evaluations underway (e.g., one or two).

Evidence-Based Policy Help Desk for OMB/Agencies:
www.evidencebasedpolicy.org

WWC's Evidence-Based Education Help Desk
www.whatworkshelpdesk.ed.gov

Social Programs That Work:
www.evidencebasedprograms.org

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