Title:

Enhancing clinical trials by incorporating side effects

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Evidence-based medicine is often seen as a model for evidence-based education, and deservedly so, but evaluators in education have been slow to adopt one of its salient features, attention to side effects. Many education evaluations focus almost exclusively on efficacy, that is on achievement test scores.

Regardless of domain, all interventions produce collateral effects beyond those sought by the interveners. As we continue to learn in medicine, in agriculture, and in warfare, failure to consider collateral effects may and often does lead to ill-advised recommendations.

Acknowledging that educational interventions produce side effects raises two key questions for those seeking to incorporate them in evaluations: 1. Which side effects? 2. How can they be assessed?

The best way of answering the first question is by taking the medical context as our guide while acknowledging one significant disanalogy between the two contexts: while physicians aim only to avoid negative side effects, educators aim both to avoid negative and to produce positive side effects.

Most drugs produce myriad side effects, but some common ones (e.g. fatigue) are normally deemed relatively insignificant when measured against a drug’s effectiveness. On the
other hand, side effects such as heightened risk of stroke or heart attack become significant because those put the patient’s life at risk, and therefore challenge a positive evaluation based on efficacy alone.

The problem in education is not the absence of collateral learning but its abundance? Evaluators ought to be obliged to assess the collateral learning which suffices to call into question a verdict based on measures achievement measures alone. One kind of collateral learning unequivocally meets this requirement, namely motivation to continue learning (hereafter, CM). A reduction in CM need not always outweigh a gain in academic achievement. However, evidence concerning the strengthening or weakening of CM is always relevant to, and may overturn a verdict based solely on achievement measures. Two considerations support this claim: Of all the side effects produced by an educational program or policy, CM is the one that is undeniably at the core of the academic mission of the school, a mission that almost all consider the raison d’etre of the school in the first place. Moreover, following Edward Deci’s classic experiments on the role of rewards in reducing intrinsic motivation, a line of evidence from psychology gives us reason to doubt whether policies and reward structures which induce higher test scores (e.g. paying teachers or students) necessarily induce growth in CM. (I answer the second question below under Findings/Results)

**Research Design:**
*Description of research design (e.g., qualitative case study, quasi-experimental design, secondary analysis, analytic essay, randomized field trial).*

Analytic essay

**Data Collection and Analysis:**
*Description of plan for collecting and analyzing data, including description of data.*

Not relevant

**Findings/Results:**
*Description of main findings with specific details.*

There are three main ways of assessing CM: the survey or questionnaire, the longitudinal study, and the experiment. Examples of each show their relative strengths and limitations. Experiments, incorporated into clinical trials, offer a reasonable trade-off between the greater validity and cost of the longitudinal study on the one hand and the limited validity and low cost of the survey on the other. I suggest a couple of randomly controlled experiments designed to assess continuing motivation in reading and mathematics. These experiments test interest in continuing study in the face of attractive alternatives, and willingness to produce effort as evidence of continuing motivation.
Conclusions:
We are now learning, sometimes to our sorrow, that medical drugs and procedures must not only be efficacious for the conditions they address, but that such efficacy must outweigh any adverse effects they cause. Likewise, evaluations of programs and policies designed to boost academic success would be irresponsible if they failed to take losses as well as gains in CM into account. I do not deny that educational experiences strengthen or weaken other important dispositions and the more of them that evaluators can incorporate, the better, but assessing CM ought not to be optional.
Appendix A. References

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