

UC Berkeley School of Public Health
 Health Issues Seminar (PH 290-06, Spring, 2014, Norm Constantine)
Course Notes on Research Foundations, Issues, and Use
 Introduction & Table of Contents <http://crahd.phi.org/Notes/TOC.pdf>

More and more I have come to the conclusion that the core of the scientific method is not experimentation per se but rather the strategy connoted by the phrase "plausible rival hypotheses."
 –Donald Campbell, foreword to Yin's (1989/2003) Case Study Research (see V2 below)

Scientific inquiry is a long and tortuous process, with many false starts and blind alleys. Combining qualitative insights and quantitative analysis—and a healthy dose of skepticism—may provide the most secure results. –David Freedman (2008/2010) (see F12 below)

I began these course notes for the UCB School of Public Health DrPH 3rd Year Seminar I co-taught spring semester, 2005, and further developed them for our DrPH 1st, 2nd, and 3rd Year Seminars from 2005 through 2011, and then my Ford Foundation Research Fellows Health Issues Seminars from 2011 through 2014. They are still evolving. Most of the notes are just one or two pages, and many are excerpts from longer treatments in my own work, or the works of other authors.

The aim of these notes is to provide clear and illuminating (hopefully) overviews of some of the knottier issues in research and research use that are essential to public health researchers and research consumers alike, yet commonly overlooked or misunderstood by students as well as experienced professionals. The probing discussions of these topics that I've been fortunate to engage in with numerous DrPH students, Ford fellows, and SPH faculty colleagues have been stimulating, rewarding, and immensely helpful in the development of these materials, and in the testing and deepening of my own knowledge and understanding. Additional feedback is always welcome.

1. Research foundations (F)

- F1 - Critical thinking: Attacking faulty reasoning (2 pages)
- F2 - What is evidence? (1 page)
- F3 - Guiding principles scientific inquiry (2 pages)
- F4 - Positivism post-positivism (2 pages)
- F5 - New philosophy of science (1 page)
- F6 - Clues to the puzzle of scientific evidence (1 page)
- F7 - Theory and evidence-based public health: What is theory, and why bother? (3 pages)
- F8 - Theory, evidence, and the dynamics of science (2 pages)
- F9 - Truth and objectivity in scientific inquiry (1 page)
- F10 - Concepts and constructs (1 page)
- F11 - Deduction and induction (1 page)
- F12 - Rethinking social inquiry: Diverse tools, shared standards (4 pages)

2. Research validity (V)

- V1 - Research validity: How might research conclusions be wrong? (2 pages)
- V2 - Plausible rival hypotheses: The core of the scientific method (2 pages)
- V3 - Evaluation and evidence (1 page)
- V4 - Cook vs. Scriven on causation in evaluation (1 page)
- V5 - Association and causation (4 pages)
- V6 - The legend of John Snow (2 pages)
- V7 - Smoking and lung cancer (1 page)
- V8 - Questionable validity of programs-that-work lists (2 pages)
- V9 - Most studies tainted by sloppy analysis (2 pages)

V10 - Plausible explanations for teen birth rate trends and patterns (2 pages)

V11 - Do virginity pledges cause virginity? (9 pages)

3. Research integrity (I)

I1 - Research integrity: How might research conclusions be biased? (2 pages)

I2 - The case for motivated reasoning (2 pages)

I3 - Threats to research integrity (2 pages)

I4 - Wishful thinking: Belief, desire, and motivated evaluation of scientific evidence (3 pages)

I5 - Health care's trick coin (2 pages)

I6 - Medical journals: "A colossal problem of quality" (2 pages)

I7 - Medical journals as an extension of the marketing arm of pharmaceutical companies (3 pages)

I8 - An epidemic of false claims (2 pages)

4. Statistics (S)

S1 - Primer on significance tests and p-values (2 pages)

S2 - Primer on confidence intervals (3 pages)

S3 - Primer on type 1 and type 2 errors (2 pages)

S4 - Fundamentals of null hypothesis significance testing (1 page)

S5 - Can sample size be too large? (1 page)

S6 - Addressing the multiple significance testing problem (2 pages)

S7 - Statistical inference decision matrix (1 page)

5. Understanding risk statistics (R)

R1 - Primer on absolute and relative differences (1 page)

R2 - Primer on probability and odds ratios (2 pages)

R3 - Helping physicians understand screening tests (2 pages)

R4 - Misleading communication of risk (2 pages)

6. Multiple regression (M)

M1 - Five analytic strategies for multiple regression analysis (2 pages)

M2 - Regression assumptions (2 pages)

M3 - Pedhazur quotes (1 page)

M4 - Prediction and explanation (3 pages)

7. Knowledge and certainty (K)

K1 - Stages of epistemic understanding (2 pages)

K2 - Review of *On being certain* (2 pages)

K3 - The certainty epidemic (4 pages)

8. Other topics (X)

X1 - Qualitative sampling strategies (1 page)

X2 - Policy use of research (3 pages)

X3 - Sexual health and sexual rights: WHO definitions (2 pages)

X4 - Science and CBPR (1 page)

X5 - Importance of stupidity in scientific research (1 page)

X6 - Example research questions (4 pages)

X7 - The peer review process (3 pages)

X8 - The elevator talk (1 page)

X9 - A guide for scientists on giving comments to journalists (3 pages)

X10 - An approach to writing style (2 pages)

X11 - Writing Issues and review codes (1 page)

X12 - Research questions 101 (1 page)

9. Related articles

- Constantine, N. A. (2013). [Intervention effectiveness research in adolescent health psychology: Methodological issues and strategies](#). In W. O'Donohue, L. Benuto, & L. Woodward (Eds.), *Handbook of adolescent health psychology* (pp. 295–322). New York, NY: Springer.
- Constantine, N. A. (2012). [Regression analysis and causal inference: Cause for concern?](#) *Perspectives on Sexual and Reproductive Health*, 42, 134-137.
- Constantine, N. A. (2008). [The peer review process](#). In S. Boslaugh (Ed.), *Encyclopedia of epidemiology* (Vol. 2, pp. 794-796). Thousand Oaks, CA: Sage Publishers.
- Constantine, N. A. (2008). [Publication bias](#). In S. Boslaugh (Ed.), *Encyclopedia of epidemiology* (Vol. 2, pp. 853-854). Thousand Oaks, CA: Sage Publishers.
- Constantine, N. A. (2008). [Simpson's paradox](#). In S. Boslaugh (Ed.), *Encyclopedia of epidemiology* (Vol. 2, pp. 973-974). Thousand Oaks, CA: Sage Publishers.
- Constantine, N. A., Jerman, P, & Huang, A. X. (2007, November). [Evidence-biased policy deliberation: A theoretical framework from the sex education debates](#). Paper presented at the 29th Annual Association for Public Policy Analysis and Management Research Conference. Washington, DC.
- Constantine, N. A. & Braverman, M. T. (2004). [Appraising evidence on program effectiveness](#). In M. T. Braverman, N. A. Constantine, & J. K. Slater (Eds.), *Foundations and evaluation: Contexts and practices for effective philanthropy* (pp. 236-258). San Francisco, CA: Jossey-Bass.
- Simons, D. (2012). *Musings on writing*. http://www.dansimons.com/resources/Simons_on_writing.pdf