Schield 2021 Planned Presentations

USCOTS Workshop: June 26: 1:30-3:30 pm ET
Title: **Statistical Literacy: Teaching Confounding**
Presenter: Milo Schield, Augsburg University

Abstract: Confounding is the elephant in the intro statistics classroom. Confounding is used to show that association isn't causation -- and then it disappears. Confounding isn't mentioned in the index of most statistics textbooks. But most students in introductory statistics deal with social statistics, observational studies and big data. For them confounding is a much bigger influence than random sampling error. This workshop argues that we need to offer a confounder-based statistical literacy course alongside the traditional statistical inference course. This workshop introduces the topics involved in a confounder-based statistical literacy course: crude associations, confounding, mechanisms, effect size, the Cornfield conditions, study design, hypothetical thinking about plausible confounders, conditional probability using ordinary English (percent, percentage and likely grammars), multivariate regression (standardization) without needing computer software, and the influence of confounding on statistical significance. Presents MATH 1300: a confounder-based statistical literacy course offered this fall at the University of New Mexico. This course has less than a 30% overlap with the traditional inferential statistics course. Designed for students in non-quantitative and observational majors. Audience: statistical educators who want to provide more value for their students by offering an alternative to statistical inference. No pre-requisite or technology required. Audience interaction via periodic chat, surveys and a statistical literacy assessment. Decide whether confounder-based statistical literacy is the next big thing in statistical education.

USCOTS Birds of a Feather Proposal.   Date/Time: TBD
Presenter: Milo Schield, Augsburg University
Title of discussion topic: **Designing a Confounder-Based Statistical Literacy Course**

Abstract: A confounder-based statistical literacy course is different: less than a 30% overlap with a traditional statistical inference course. Students see more value in a confounder-based course than in an inference-based course. Participants will discuss the statistical needs of students in various majors, why confounding is more relevant than statistical inference for most students, why the denominator should be called the diabolical denominator, how students can work multivariate problems without a computer or calculator, and what are the necessary conditions for a confounder to nullify or reverse an association (the Cornfield conditions).

JSM Contributed Paper. Date/Time: TBD
Presenter: Milo Schield, University of New Mexico
Title: **Univ. of New Mexico Offers New Confounder-Based Statistical Literacy Course**

Abstract 317757: A new confounder-based statistical literacy course will be offered in fall 2021 by the Dept. of Mathematics and Statistics at the Univ. of New Mexico (UNM). This catalog course (Math 1300) satisfies a mathematics requirement in the UNM core curriculum and in the statewide general education curriculum. This confounder-based statistical literacy course is different: less than a 30% overlap with a traditional inference-based statistics course. Less statistical inference; more on confounding and confounder control: effect size, study design, ratios, conditional probability (selection), standardization and the Cornfield conditions. Students work problems showing how statistical significance can change to insignificance (and vice-versa) after controlling for a confounder. Everything taught without needing computer software. This is the first time such a course has been offered at a large public university. This paper reviews the differences between this course and a statistical inference course, the steps involving course approval at UNM, and the importance of teacher training in teaching students to "Take CARE": hypothetical thinking about Confounding, Assembly, Randomness and Error.

Schield 2021 Planned Presentations

JSM Birds of a Feather Proposal
Presenter: Milo Schield, Augsburg University
Date/Time: TBD. Virtual: Before or After JSM. Around noon or afternoon.
Title: **Confounded About Teaching Confounding?**
Abstract: Introductory statistics teachers: Consider giving your course more authenticity by including confounding. Most students deal with observational data where confounding is often more of an influence than randomness. Yet confounding is absent from most statistics textbooks. Margin of error decreases as sample size increases, but confounder influence remains unchanged. So the bigger the data, the more important is confounder influence relative to sampling error. Teaching confounding without multivariate regression and without a computer seems most difficult -- if not impossible. But simple tools are available. Two weighted-average techniques are introduced: These techniques allow students to work problems. Attendees will discuss the value and teachability of each topic.

ISI Invited Session: IPS181, Statistical and Data Literacy in Policy-Making
Presenter: Milo Schield, Augsburg University
Date/Time: TBD
Topic: **Statistical Literacy for Policy Makers**
Abstract: Information literacy, data literacy and statistical literacy overlap when they deal with data as evidence in arguments. To effectively evaluate data as evidence, policy makers need to untangle data and statistics from arithmetic numbers. Statistics are numbers in context -- where the context matters. Statistics are socially constructed and presented by people with motives, values and goals. Statistical literacy studies statistics as evidence in arguments. Policy makers need to evaluate quantitative evidence using the same skills they use in evaluating non-quantitative evidence. Ask questions! Policy makers can start by asking five questions: 1) How was the data generated (defined, selected, counted, measured, grouped, summarised and presented)? 2) How is the data being compared? Compared to what? 3) Are ratios involved? Per what? 4) What confounders are controlled by the study design or by selection, ratios or standardization? Control of what (controlling for what)? Finally, they need to think hypothetically. 5) What other choices could have been made? What plausible confounders could be influencing the data? This paper gives examples of each of these questions.