Research Methods in Clinical Psychological Science
Psychology 675
Spring 2024
Mondays 1:30-4:20
PSYC 3102 or https://purdue-edu.zoom.us/j/99838660402

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Readings

All readings can be found on Brightspace.

Course Description

The purpose of this course is to provide an in-depth introduction to the fundamentals of research methods and design. Readings and in-class discussions will focus on theoretical and practical issues involved in the conception, implementation, and evaluation of empirical research in psychology. A secondary goal of the course is to facilitate exchange of methods, interests, and theories between students. The final goal is the completion of a study preregistration that can serve as the foundation for the first-year project or master's thesis.

The content of the course ranges widely. The course begins with a discussion of the scientific approach and its applicability to the science of psychology. From there, the course moves into a discussion of the philosophy of science, the role of theory, and hypothesis testing. Only after these philosophical and theoretical fundamentals are firmly in hand will the course move to methodological issues. The course includes content on the current replication crisis in psychology, the practices that contributed to it, and the means to overcome it. Additionally, the course covers issues in sampling (e.g., randomization and size), measurement (e.g., reliability and validity), and design (e.g., control). The course will examine nonexperimental research as well as experimental and quasi-experimental approaches.

The process of the course will be one of mediated discussion. The instructor will occasionally lecture for some (short) portion of the class, preferring to answer questions and provide clarification as the need arises. The primary vehicle of learning, however, is expected to be student reading, discussion, and interaction. Students will learn more from the readings than they will from any lecture. This process requires active participation and adequate preparation of each and every member of the class. To help ensure this participation, students will be assigned responsibility for leading discussion on certain weeks; this responsibility involves generating discussion points and questions on the assigned topics.

Course Requirements

The requirements for the class are straightforward: regular attendance and participation in class (notice that participation requires preparation), the submission of one reaction paper per week, good performance on two exams, and completion of a preregistration for a study. Additionally, each student must complete and pass the CITI (Collaborative Institutional Training Initiative) Human Research Protections Training Course—specifically the more advanced Social Behavioral Research for Investigators and Key Personnel Learner Group module. Student's performance on each will determine their grade for the course.

1. CITI Training (required for grade): The Collaborative Institutional Training Initiative (CITI)

Human Research Protections Training Course is a self-paced web-based training program covering core ethical concepts and regulatory requirements. Purdue University requires all individuals engaged in the conduct of human subject research to have current CITI certification. Students must complete the Social Behavioral Research for Investigators and Key Personnel Learner Group module (https://www.irb.purdue.edu/training/). Once completed, students must send the instructor a copy of their certification.

2. Participation (20%): Attendance at all class meetings is required. Regular and significant contributions to class discussion are expected (and should be based on the readings). Students will be responsible for certain weeks; this responsibility involves preparation and generation of discussion points and questions of clarification. Students must turn in copies of their questions and discussion points.

3. Reaction papers (10%): Each week students will submit a two-page reaction paper; students must complete 10 of 12. This paper is to be a reaction to or consolidation/appreciation of the readings for the week. At the very minimum, this paper should demonstrate that students have read the assignments and given some thought to them. Ideally, students will use the reaction paper as an opportunity to relate the readings to articles in their content areas, to integrate readings from previous weeks with the current readings, and/or to begin an interesting and important discussion. These papers will be leniently graded from 1-10 points (mostly from 7-10 points).

3. Exams (20% each): Two exams will be given, one on February 20 and the other on April 23. The format of the exams will be essay and short answer (probably 3-4 questions on each exam). Students will receive study guides in advance of the exams in order to help structure their studying.

4. Research preregistration (30%): The primary product of this course will be an OSF (Open Science Framework https://osf.io/) study preregistration, using the relevant OSF preregistration template, that presumably reflects the first-year project or thesis proposal. A preliminary presentation of the proposal will be given on March 21with a draft of the proposal due on April 18. Each draft will be reviewed by two students in the class, and each student will review two different pre-registrations. Each review should consist of 2-3 typed pages of suggestions and constructive criticisms, and will be read by the student submitting the proposal as well as by the instructor.

Academic Integrity

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

Students with Disabilities

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247

Course Outline and Reading Schedule

January 9 Course Overview

January 16 **Thinking About Science (Don)**

Feynman, R. P. (1974). Cargo cult science: Some remarks on science, pseudoscience, and learning how to not fool yourself. *Caltech's 1974 commencement address.* http://calteches.library.caltech.edu/51/2/CargoCult.pdf

Spellman, B. A. (2015). A short (personal) future history of revolution 2.0. *Perspectives on Psychological Science, 10,* 886-899.

Gholson, B., & Barker, P. (1985). Kuhn, Lakatos, and Laudan: Applications in the history of physics and psychology. *American Psychologist, 40,* 755-769.

Haig, B.D. (2005). An abductive theory of scientific method. *Psychological Methods, 10,* 371-388.

Holz, P., & Monnerjahn, P. (2016). Falsificationism is not just 'potential' falsifiability, but requires 'actual' falsification: Social psychology, critical rationalism, and progress in science. *Journal for the Theory of Social Behaviour, 47,* 348-362.

January 23 **The Replication Crisis, NHST, & Power (Madelyn)**

Ioannidis, J. P. (2005). Why most published research findings are false. *PLoS Med, 2,* e124.

Open Science Collaboration (2015). Estimating the reproducibility of psychological science. *Science, 349.*

Klein, R.A., et al. (2018). Many Labs 2: Investigating variation in replicability across sample and setting. *Advances in Methods and Practices in Psychological Science, 1,* 443-490.

Border, R.A., Johnson, E.C., Evans, L.M., Smolen, A., Berley, N., Sullivan, P.F., & Keller, M.C. (2019). No support for historical candidate gene or candidate gene-by-interaction hypotheses for major depression across multiple large samples. *American Journal of Psychiatry, 176,* 376-387.

Errington, T.M., Mathur, M., Soderberg, C.K., Denis, A., Perfito, N., Iorns, E, & Nosek, B.A. (2021). Investigating the replicability of preclinical cancer biology. *eLife,* 10:e71601

Cohen, J. (1994). The earth is round ($p<.05$). *American Psychologist, 49,* 997-1003.

Cortina, J. M., & Landis, R. S. (2011). The Earth is not round ($p = .00$). *Organizational Research Methods, 14,* 332-349.

Lakens, D., Adolfi, F. G., Albers, C. J., Anvari, F Apps, M. A. J., … & Zwaan, R. A. (2018). Justify your alpha. *Nature Human Behavior, 2,* 168-171.

Tunç, D.U., Tunç, M.N., & Lakens, D. (2023). The epistemic and pragmatic function of dichotomous claims based on statistical hypothesis tests. *Theory & Psychology, 33,* 403-423.

Abraham, W. T., & Russell, D. W. (2008). Statistical power analysis in psychological research. *Social and Personality Psychology Compass, 2,* 283-301.

Gervais et al. (2015). A powerful nudge? Presenting calculable consequences of underpowered research shifts incentives towards adequately powered designs. *Social Psychological and Personality Science, 6,* 847-854.

January 30 Researcher dfs, and Bias (Kat)

Simmons, J. P., Nelson, L D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. Psychological Science, 22, 1359-1366.

Kerr, N. (1998). HARKing: Hypothesizing after the results are known. *Personality and Social Psychology Review, 2,* 196-217.

Gelman, A., & Loken, E. (2014). The statistical crisis in science. *American Scientist, 102,* 460-465.

John, L. K., Loewenstein, G., & Prelec (2012). Measuring the prevalence of questionable research practices with incentives for truth telling. *Psychological Science, 23,* 524-532.

Ferguson, C.J., & Heene, M. (2012). A vast graveyard of undead theories: Publication bias and psychological science's aversion to the null. *Perspectives on Psychological Science, 7,* 555-561.

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society, 57,* 289-300,

***lecture on NHST.
***illustrate Benjamini and Hochberg FDR approach.

February 6 Open Science Talk

"Implementing Open Science Standards at Peer-Reviewed Journals: The TOP Guidelines" by Dr. Sean Grant. From 2:30-3:45 in Morgan 121 with refreshments from 2-2:30 and a hackathon to follow.

February 13 Fixing Psychology (Sarah)

Nosek, B. A., Spies, J. R., & Motyl, M. (2012). Scientific Utopia: II: Restructuring incentives and practices to promote truth over publishability. *Perspectives on Psychological Science, 7,* 615-631

Wagenmakers, E.J., Wetzels, R., Borsboom, D., van der Maas, H.L.J., & Kievit, R.A. (2012). An agenda for purely confirmatory research. *Perspectives on Psychological Science, 7,* 632-638.

Chambers, C. D., et al. (2014). Instead of "playing the game" it is time to change the rules: Registered Reports at AIMS Neuroscience and beyond. *AIMS Neuroscience, 1,* 4-17.

Wicherts, J.M., Veldkampo, C.L.S., Augustjen, H.E.M., Bakker, M., van Aert, R.C.M., & van Assen, A.L.M. (2016). Degrees of freedom in planning, running, analyzing, and reporting psychological studies: A checklist to avoid p-hacking. *Frontiers in Psychology, 7*:1832. doi: 10.3389/fpsyg.2016.01832

Scheel, A.M., Schijen, M.R.M.J., & Lakens, D. (2021). An excess of positive results: Comparing the standard psychology literature with registered reports. *Advances in Methods and Practices in Psychological Science, 4,* 1-12.

Benning, S.D., Bachrach, R.L., Smith, E.A., Freeman, A.J., & Wright, A.G.C. (2019), The registration continuum in clinical science: A guide toward transparent practices. *Journal of Abnormal Psychology, 128,* 528-540.

Van den Akker, O.R., Weston, S.J., Campbell, L., Chopik, W.J., Damian, R.I., David-Kean, P.E., Hall, A.N., Kosie, J.E., Kruse, E., Olsen, J., Ritchie, S.J., Valentine, K.D., van't Veer, A.E., & Bakker, M. (2021). Preregistration of Secondary data analysis: A template and tutorial. *Meta-Psychology,*

5, MP.2020.2625
Moher, D., Liberati, A., Tezlaff, J., Altman, D.G., & The PRISMA group (2009). Preferred reporting items for systematic reviews. *Journal of Clinical Epidemiology, 62*, 1006-1012.
OSF Preregistration Template

February 20 **Ethics (Luis)**

First Exam

Levenstein, M. C., & Lyle, J. A. (2018). Data: Sharing is caring. *Advances in Methods and Practices in Psychological Science, 1,* 95-103.
Meyer, M. N. (2018). Practical tips for ethical data sharing. *Advances in Methods and Practices in Psychological Science, 1*, 131-144.
American Psychological Association (2002). Ethical principles of psychologists and code of conduct. *American Psychologist, 57*, 1060-1073.
Fine, M.A. & Kurdek. L.A. (1993). Reflections on determining authorship credit and authorship order on faculty-student collaborations. *American Psychologist, 48,* 1141-1147.

February 27 **No Class**

March 5 **Diversity, Equity, and Inclusion in Clinical Psychology Research (Sophia)**

Henrich, J., Heine, S.J., & Norenzayan, A. (2010). The weirdest people in the world *Behavioral and Brain Sciences, 33*, 61-83.
Muthukrishna, M., Bell, A.V., Henrich, J., Curtin, C.M., Gedranovich, A., McInerney, J., & Thue, B. (2020). Beyond Western, Educated, Industrial, Rich, and Democratic (WEIRD) psychology: Measuring and mapping scales of cultural and psychological distance. *Psychological Science, 31*, 678-701.
Roberts, S.O., Bareket-Shavit, C., Dollins, F.A., Goldie, P.D., & Mortenson, E. (2020). Racial inequality in psychological research: Trends of the past and recommendations for the future. *Perspectives on Psychological Science, 15*, 1295-1309.
Rad, M.S., Martingano, A.J., & Ginges, J. (2018). Toward a psychology of Homo sapiens: Making psychological science more representative of the human population. *Proceedings of the National Academy of Sciences, 115*, 11401-11405.
Simons, D. J., Shoda, Y., & Lindsay, D. S. (2017). Constraints on generality (COG): A proposed addition to all empirical papers. *Perspectives on Psychological Science, 12*, 1123-1128.

***lecture on identifying bias.

March 12 **Spring Break**

March 19 **Psychometrics: Reliability (Don)**

LeBreton, J.M., & Senter, J.L. (2008). Answers to 20 questions about interrater reliability and interrater

agreement. *Organizational Research Methods, 11*, 815-852.
Revelle, W., & Condon, D.M. (2019). Reliability from α to ω: A tutorial. *Psychological Assessment, 31*, 1395-1411.
Shavelson, R.J., Webb, N.M., & Rowley, G.L. (1989). Generalizability theory. *American Psychologist, 44*, 922-932.

***lecture on reliability calculations.

March 26 Psychometrics: Validity (Maggie)

Clark, L.A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment, 7*, 309-319.
Cronbach, L.J., & Meehl, P.E. (1955). Construct validity in psychological tests. *Psychological Bulletin, 52*, 281-302.
Flake, J. K., & Fried, E. I. (2020). Measurement schmeasurement: Questionable measurement practices and how to avoid them. *Advances in Methods and Practices in Psychological Science, 3*, 456-465.
Haynes, S. N., Richard, D. C. S., & Kubany (1995). Content validity in psychological assessment: A functional approach to concepts and methods. *Psychological Assessment, 7*, 238-247.
Smith, G.T., McCarthy, D.M., & Zapolski, T.C.B. (2009). On the value of homogeneous constructs for construct validation, theory testing, and the description of psychopathology. *Psychological Assessment, 21*, 272-284.

April 2 Experimental Design (Niamh)

Kazdin, A.E. (2003). *Research Design in Clinical Psychology (4th edition)*. Boston, MA: Allyn & Bacon. Chapter 2: Drawing Valid Inferences I.
Kazdin, A.E. (2003). *Research Design in Clinical Psychology (4th edition)*. Boston, MA: Allyn & Bacon. Chapter 3: Drawing Valid Inferences II.
Kazdin, A.E. (2003). *Research Design in Clinical Psychology (4th edition)*. Boston, MA: Allyn & Bacon. Chapter 4: Sources of Artifact and Bias.
Kazdin, A.E. (2003). *Research Design in Clinical Psychology (4th edition)*. Boston, MA: Allyn & Bacon. Chapter 6: Experimental Research.
Hsu, L.M. (1989). Random sampling, randomization, and equivalence of contrasted groups in psychotherapy outcome research. *Journal of Consulting and Clinical Psychology, 57*, 131-137.
Mook, D.G. (1983). In defense of external invalidity. *American Psychologist, 38*, 379-387.

April 9 **Nonexperimental Approaches I (Ronnie)**

Rohrer, J. (2018). Thinking clearly about correlations and causation: Graphical causal models for observational research. *Advances in Methods and Practices in Psychological Science, 1*, 27-42.
West, S. G., & Thoemmes, F. (2010). Campbell's and Rubin's perspectives on causal inference. *Psychological Methods, 15*, 18-37.

Mediation/Moderation:
Baron, R.M. & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 5*, 1173-1182.
MacKinnon, D.P., Krull, J.L., & Lockwood, C.M. (2000). Equivalence of the mediation, confounding, and suppression effect. *Prevention Science, 1*, 173-181.
O'Laughlin, K.D., Martin, M.J., & Ferrer, E. (2018) Cross-sectional analysis of longitudinal mediation processes. *Multivariate Behavioral Research, 53*, 375-402.

Hoyle, R. H., Lynam, D. R., Miller, J. D., & Pek, J. (2023). The questionable practice of partialing to refine scores on and inferences about measures of psychological constructs. *Annual Review of Clinical Psychology, 19*, 155-176.
Fiedler, F., Schott, M., & Meiser, T. (2011). What mediation can(not) do. *Journal of Experimental Social Psychology, 47*, 1231-1236.
Westreich, D., & Greenland, S. (2013). The table 2 fallacy: presenting and interpreting confounder and modifier coefficients. *American Journal of Epidemiology, 177*, 292-298.

***Lecture on perils of partialling.

April 16 **Nonexperimental Approaches II (Don)**

Draft of Pregistration is Due

Longitudinal Studies:
Maughan, B., Taylor, A., Caspi, A., & Moffitt, T.E. (2004). Prenatal smoking and early childhood conduct problems. *Archives of General Psychiatry, 61*, 836-843.

Natural Experiments:
Caspi, A., Lynam, D., Moffitt, T.E., & Silva, P. (1993). Unraveling girls' delinquency: Biological, dispositional, and contextual contributions to adolescent misbehavior. *Developmental Psychology, 29*, 19-30.
Evans, G.W., Bullinger, M., & Hygge, S. (1998). Chronic noise exposure and physiological response: A prospective study of children living under environmental stress. *Psychological Science, 9*, 75-77.

Behavioral Genetics:
Rutter, M. (2005). Environmentally mediated risks for psychopathology: Research strategies and findings. *Journal of the American Academy of Child and Adolescent Psychiatry*, *44*, 3-18.

Meta-analysis:
Quintana, D.S. (2015). From pre-registration to publication:A non-technical primer for conducting a meta-analysis to synthesize correlational data. *Frontiers in Psychologty*, *6*, Article 1549.
Harrer, M., Cuijpers, P., Furukawa, T., & Ebert, D. (2021). *Doing Meta-Analysis with R: A Hands-On Guide*. Boca Raton, FL and London: Chapman & Hall/CRC Press. ISBN 978-0-367-61007-4. https://bookdown.org/MathiasHarrer/Doing_Meta_Analysis_in_R/

April 23 Issues in Psychopathology Don

Exam 2

Chapman, L.C. & Chapman, J.P. (1973). *Disordered thought in schizophrenia*. Englewood Cliffs, N.J.: Prentice-Hall. (Chapter 3: differential deficit sections)
Sher, K., & Trull, T.J. (1996). Methodological issues in psychopathology research. *Annual Review of Psychology*, *47*, 371-400.
Angold, A., Costello, E.J., & Erkanli, A. (1999). Comorbidity. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *40*, 57-87.

Resources available on the internets: Many researchers have turned to the internet as a means for faster and potentially broader dissemination of their research, both content-related and methodological research. In fact, these modes of dissemination are used heavily by many Open Science advocates. I suggest that sudents become familiar with the following resources:

Center for Open Science (https://cos.io) and its affiliated site—*Open Science Framework* (https://osf.io/). These two sites provide information relevant to the Open Science Movement, a platform for posting pregistration, pre-prints, and data. They are also searchable which allows one to read very current research.

*PsyArXiv (*https://psyarxiv.com/). This is a free preprint service for the psychological sciences.

Twitter is an excellent resources for keeping abreast of new research. I suggest following the folks I list below (under blog posts).

Blogs
· Hilda Bastian, "Absolutely Maybe": http://blogs.plos.org/absolutely-maybe/
· Christina Bergmann & Sho Tsuji, "CogTales": https://cogtales.wordpress.com/
· Dorothy Bishop, "Bishop Blog": http://deevybee.blogspot.co.uk/
· Nick Brown: http://steamtraen.blogspot.de/
· Albert Cairo, "the functional art": http://www.thefunctionalart.com/

· Lorne Campbell: http://www.lornecampbell.org/
· Alexander Etz: "The Etz Files": https://alexanderetz.com/
· David Funder, "Funderstorms": https://funderstorms.wordpress.com/
· Roger Giner-Sorolla, "Approaching Signinficance": https://approachingblog.wordpress.com/
· Andrew Gelman, "Statistical Modeling, Causal Inference, & Social Science: http://andrewgelman.com/
· Oliva Guest, "Neuroplausible": http://neuroplausible.com/
· James Heathers: https://medium.com/@jamesheathers
· Daniel Lakens, "The 20% Statistician": http://daniellakens.blogspot.co.uk/
· Alison Ledgerwood, "Incurably Nuanced": http://incurablynuanced.blogspot.com/
· Leif, Simmons & Simonsohn, "Data Colada": http://datacolada.org/
· Sara Locatelli, "Deeply Trivial": http://www.deeplytrivial.com/
· Kristoffer Magnusson, "R Psychologist": http://rpsychologist.com/
· Deborah Mayo, "Error Statistics Philosophy": https://errorstatistics.com/
· Richard Morey, "Statistical modeling, Bayesian inference…": https://medium.com/@richarddmorey
· Neuroskeptic: https://blogs.discovermagazine.com/neuroskeptic/
· Jeff Rouder, "Invariances": http://jeffrouder.blogspot.co.uk/
· Guillaume Rousselet, "Basic Statistics": https://garstats.wordpress.com/
· Scheel, Arslan, Elson, & Rohrer, "The 100% CI": http://www.the100.ci/
· Uli Schimmack, "Replicability-Index": https://replicationindex.wordpress.com
· Felix Schonbrodt: http://www.nicebread.de/
· Sanjay Srivastava, "The Hardest Science": https://hardsci.wordpress.com/
· Simine Vazire, "Sometimes I'm Wrong": http://sometimesimwrong.typepad.com/
· Matti Vuore: https://mvuorre.github.io/post/
· E.J. Wagenmakers, "Bayesian Spectacles": https://www.bayesianspectacles.org/
· Tal Yarkoni, "[citation needed]": http://www.talyarkoni.org/blog/
· Rolf Zwaan, "Zeitgeist": https://rolfzwaan.blogspot.de/

Podcasts:
· The Black Goat: http://www.theblackgoatpodcast.com/
· Two Psychologists Four Beers: https://fourbeers.fireside.fm/
· Everything Hertz: https://soundcloud.com/everything-hertz