

M19-551 Systematic Reviews and Meta-Analysis in Public Health and Clinical Medicine

Spring 2024

Fridays, 9:00 am to 12:00 pm (see information below for typical class length)

This syllabus is currently being edited for Spring 2024. Canvas will always have the most up-to-date information.

INSTRUCTORS

Jason Luo, PhD, chongliang@wustl.edu

Graham A. Colditz, MD, colditzg@wustl.edu

Carrie Stoll, MSW, MPH, carolyn.stoll@wustl.edu

OFFICE HOURS (VIRTUAL)

By appointment

CLASS STRUCTURE

In Spring 2024 this class will be held in-person (subject to University policies). Although the class is scheduled from 9 am – 12 pm, most classes will only run 9-10:30 am (see below for exceptions). In order to allow for shorter in-person sessions that focus on interactive learning, students are expected to engage with assigned materials (readings, videos, assignments, etc) prior to class.

Attendance policy: Up to 2 regular classes (NOT workshops) may be missed without affecting your grade, however you must notify us either before the class or within 24 hours after class. However, we understand the importance of flexibility in this challenging time and if this expectation becomes difficult for you to fulfill please reach out to the instructor team and we will address it on a case-by-case basis. In certain situations we will allow you to attend class via Zoom, but you must get approval prior to class. We also record all classes and make the recording available on Canvas.

CLASS COMPONENTS

1. Asynchronous materials: Every week, asynchronous materials (a combination of videos, slide sets, discussion board posts, readings) will be posted on Canvas on Friday afternoons. You are expected to complete these weekly tasks prior to class the following Friday. Each week there will be a list of *key readings* (ones you are expected to be familiar with prior to class) and *recommended readings* (helpful readings but will not necessarily be used in synchronous class). Readings will include articles that you can download via Canvas, and chapters from the textbook (Systematic Reviews in Health Care: Meta-analysis in Context, 2nd Edition, Matthias Egger, George Davey Smith, and Douglas Altman, eds., BMJ Books, 2001, available as an ebook via Becker Library).

2. In-person class: Classes will be held on **Fridays, 9 am -10:30 am** in the Taylor Avenue Building (600 S. Taylor).

3. Workshop Classes: There are 3 weeks in which you should reserve **Fridays, 9 am - 12 pm** for project workshop classes: **Feb 2, April 19, and April 26**. Closer to those dates you will be assigned a specific smaller time window within those 3 hours that you are expected to attend, but for now please reserve the 3 hour block on your schedule.

4. Group assignments and projects: Throughout the semester you will apply the concepts to design and perform a systematic review and/or meta-analysis on a research question of your choosing. There will be a series of weekly assignments that build to your final project. We highly encourage you to work in a group (2-4 students), although you are allowed to work individually.

5. Weekly assignments: In addition to the larger group assignments, there will be a series of smaller assignments in which you will apply class material to your project topic. In addition to submitting these assignments, you will sometimes be expected to critique/comment on assignments from your classmates. These assignments are typically due prior to class so that we can use them during class.

6. Office hours Carrie will hold office hours by appointment, on Zoom or in person. You can use this time to ask questions about content, assignments, projects, etc. You are also welcome to email other instructors directly to request a meeting.

PREREQUISITES

Introductory epidemiology and biostatistics 1 (or permission of the course master)

TARGET AUDIENCE

Clinicians and doctoral students interested in conducting research synthesis or meta-analysis to inform practice or policy, medical students and clinical training program participants, students in MPH addressing application of epidemiologic data to prevention. Prior clinical or community research experience is helpful but not required.

COURSE DESCRIPTION & OBJECTIVES

Introduction to the use of meta-analysis and related methods used to synthesize and evaluate epidemiological and clinical research in public health and clinical medicine. Concepts introduced and illustrated through case studies of public health and medical issues.

Objectives are to learn how to use a variety of formal and informal methods for synthesizing clinical trial and epidemiological information on public health risks, to understand how to use these methods to assess the strength of the evidence in policy development and clinical contexts, and to appreciate how research synthesis can contribute to rational policy making in controversial areas.

COMPETENCIES

Ability to design research synthesis and meta-analysis

- Define research question
- Define literature search strategy
- Conduct literature search and document the process
- Apply eligibility criteria, data extraction, and data quality scoring
- Develop data analysis plan
- Understand and interpret fixed-effects, random-effects, and meta-regression methods and results
- Recognize heterogeneity and approaches to quantification and reporting of among-study variation

Skills and experience to conduct analysis

- Master data analysis and model fitting in context of meta-analysis
- Quantitatively evaluate publication bias
- Be able to estimate combined results from reports of randomized trials, observational studies, and diagnostic test

Master the core reporting strategies

- Master reporting standards for RCTs and observational data in context of meta-analysis
- Master forest plot, summary tables, and publication bias presentations

Draw inferences from data to inform clinical and public health practices

- Correctly use reasoning for design and methodologies employed
- Present oral and written reports from analyses
- Place inference in context of clinical and public health implications for action and future research

GRADING

Your grade will be based on:

- Class participation (5%)
- Introduction post (1%)
- Topic Workshop: Preliminary topic presentation (10%)

- Library Search Request Assignment (5%)
- Mid-semester course pulse survey (1%)
- Analysis HW 1 (5%)
- Analysis HW 2 (5%)
- Final workshop (15%)
- Final paper (30%)
- Weekly assignments (small quizzes, discussion posts, brief assignments, etc) (23% total spread across small assignments worth 2-5% each)

Grading Scale

A+: 97-100; A: 93-96; A-: 90-92; B+: 87-89; B: 83-86; B-: 80-82; C+: 77-79; C: 73-76; C-: 70-72

ATTENDANCE AND PARTICIPATION

Attendance to the in-person sessions is expected, and the class is designed with this in mind. However, virtual attendance to individual classes may be allowed on a case-by-case basis. In order to attend a session virtually you must request the zoom link from before class.

Up to 2 classes (NOT workshops) may be missed without affecting your grade, however you must notify us either before the class or within 24 hours after class. Attending virtually (with prior permission) counts as attending class.

Exceptions to these policies will be considered on a case-by-case basis. Please contact Carrie with any requests.

POLICY ON LATE ASSIGNMENTS

Late assignments will result in a deduction of one grade point (A down to A-) for each day late (including weekends) unless prior approval is obtained from the instructor or a compelling situation prevents prior approval. Extensions will be given on a case-by-case basis. Please reach out to Carrie (Carolyn.stoll@wustl.edu) if you need an extension.

READINGS

The primary text for the course is Systematic Reviews in Health Care: Meta-analysis in Context, 2nd Edition, Mattias Egger, George Davey Smith, and Douglas Altman, eds., BMJ Books, 2001. *This book is available in full online from Becker Medical Library.*

Supplemental readings from Introduction to Meta-Analysis, Michael Borenstein, Larry V Hedges, Julian PT Higgins, and Hannah R Rothstein, Wiley, 2009, are also given. Additional readings will be available through Canvas.

Additional Resources

BMJ methods <http://www.bmj.com/search?submit=yes&tocsectionid=Research%20Methods> *

Cochrane library <http://www.thecochranelibrary.com/view/0/index.html>

Cochrane methods group and handbook <http://handbook.cochrane.org/>

UK NICE (National Institute for Health and Clinical Excellence) <http://www.nice.org.uk/>

Australia Handbook. How to use the evidence. NHMRC.

http://www.nhmrc.gov.au/files_nhmrc/file/publications/synopses/cp69.pdf

PLOS template for systematic review – meta-analysis article preparation

www.plosone.org/static/tpl_plos_meta.doc

CLASS SCHEDULE

Week	Date	Topics covered	Assignment Due
1	Jan 19	Introduction	Student introductions
2	Jan 26	Defining the research question and searching the literature (Becker)	
3	Feb 2	TOPIC WORKSHOP	Workshop slides

4	Feb 9	Statistical methods: effect sizes, basic meta-analysis calculations	Library search request assignment
5	Feb 16	Statistical methods, continued: regression, cumulative meta-analysis	Weekly assignment
6	Feb 23	Heterogeneity: I ² , subgroup analysis	Weekly assignment
7	Mar 1	Study selection/managing search results Data extraction/assessing risk of bias	Weekly assignment
8	Mar 8	Meta-analysis in STATA Computer Lab	Weekly assignment Analysis HW 1
9	Mar 15	NO CLASS	Weekly assignment
10	Mar 22	Writing a protocol PRISMA/reporting	Weekly assignment
11	Mar 29	Meta-analysis in STATA Computer Lab 2	Weekly assignment Analysis HW 2
12	Apr 5	Analysis combining individual patient data Combining diagnostic test results	
13	Apr 12	Drug safety and adverse events Network analysis	
14	Apr 19	FINAL WORKSHOP	Workshop slides
15	Apr 26	FINAL WORKSHOP	Workshop slides
16	May 3	Steps to get ready to publish; Applying results to policy and practice	Final paper

CLASS PUBLICATIONS

Many students go on to publish based on the work they performed in this class. Below is a selection of publications produced by participants in this class since 2011:

- Raghuraman N, Temming LA, Doering MM, Stoll CR, Palanisamy A, Stout MJ, Colditz GA, Cahill AG, Tuuli MG. Maternal Oxygen Supplementation Compared With Room Air for Intrauterine Resuscitation: A Systematic Review and Meta-analysis. *JAMA pediatrics*. 2021. Epub 2021/01/05. doi: 10.1001/jamapediatrics.2020.5351. PubMed PMID: 33394020.
- Wamkpa NS, Peterson AM, Lee JJ, Jia L, Hardi A, Stoll C, Huston M. Curbing the Cough: Multimodal Treatments for Neurogenic Cough: A Systematic Review and Meta-Analysis. *The Laryngoscope*. 2020. Epub 2020/10/22. doi: 10.1002/lary.29146. PubMed PMID: 33085095./
- Lapidus JB, Lu JC, Santosa KB, Yaeger LH, Stoll C, Colditz GA, Snyder-Warwick A. Too much or too little? A systematic review of postparetic synkinesis treatment. *Journal of plastic, reconstructive & aesthetic surgery : JPRAS*. 2020;73(3):443-52. Epub 2019/12/02. doi: 10.1016/j.bjps.2019.10.006. PubMed PMID: 31786138; PMCID: PMC7067638.
- Cheng AL, Schwabe M, Doering MM, Colditz GA, Prather H. The Effect of Psychological Impairment on Outcomes in Patients With Prearthritic Hip Disorders: A Systematic Review and Meta-analysis [published online ahead of print, 2019 Dec 12]. *Am J Sports Med*. 2019;363546519883246. doi:10.1177/0363546519883246. PMID 31829034.
- Salazar AS, Recinos LM, Mian HS, Stoll C, Simon LE, Sekhon S, Colditz GA, Wildes TM. Geriatric Assessment and Frailty Scores Predict Mortality in Myeloma: Systematic Review and Meta-analysis. *Clinical Lymphoma Myeloma and Leukemia*. 2019;19(8):488-96.e6.
- Cheng S-Y, Davis M, Jonson-Reid M, Yaeger L. Compared to what? A meta-analysis of batterer intervention studies using nontreated controls or comparisons. *Trauma, Violence, & Abuse*. 2019
- Eskew AM, Bedrick BS, Hardi A, Stoll CR, Colditz GA, Tuuli MG, Jungheim ES. Letrozole Compared With Clomiphene Citrate for Unexplained Infertility: A Systematic Review and Meta-analysis. *Obstetrics & Gynecology*. 2019 Feb 4.
- Lewkowitz AK, Gupta A, Simon L, Sabol BA, Stoll C, Cooke E, Rampersad RA, Tuuli MG. Intravenous compared with oral iron for the treatment of iron-deficiency anemia in pregnancy: a systematic review and meta-analysis. *Journal of Perinatology*. 2019 Jan 28:1.

- Yu L, Kronen RJ, Simon LE, Stoll CRT, Colditz GA, Tuuli MG. Prophylactic negative-pressure wound therapy after cesarean is associated with reduced risk of surgical site infection: a systematic review and meta-analysis. *American journal of obstetrics and gynecology*. 2018;218(2):200-10.e1.
- Karlow N, Schlaepfer CH, Stoll CRT, Doering M, Carpenter CR, Colditz GA, et al. A Systematic Review and Meta-analysis of Ketamine as an Alternative to Opioids for Acute Pain in the Emergency Department. *Academic emergency medicine : official journal of the Society for Academic Emergency Medicine*. 2018.
- George IA, Thomas B, Sadhu JS. Systematic review and meta-analysis of adjunctive corticosteroids in the treatment of tuberculous pericarditis. *The international journal of tuberculosis and lung disease : the official journal of the International Union against Tuberculosis and Lung Disease*. 2018;22(5):551-6.
- Vouri SM, Kebodeaux CD, Stranges PM, Teshome BF. Adverse events and treatment discontinuations of antimuscarinics for the treatment of overactive bladder in older adults: A systematic review and meta-analysis. *Archives of gerontology and geriatrics*. 2017;69:77-96.
- Johnson KJ, Lee JM, Ahsan K, Padda H, Feng Q, Partap S, et al. Pediatric cancer risk in association with birth defects: A systematic review. *PloS one*. 2017;12(7):e0181246.
- Drewry AM, Ablordeppey EA, Murray ET, Stoll CRT, Izadi SR, Dalton CM, et al. Antipyretic Therapy in Critically Ill Septic Patients: A Systematic Review and Meta-Analysis. *Critical care medicine*. 2017;45(5):806-13.
- Carter EB, Temming LA, Fowler S, Eppes C, Gross G, Srinivas SK, et al. Evidence-Based Bundles and Cesarean Delivery Surgical Site Infections: A Systematic Review and Meta-analysis. *Obstetrics and gynecology*. 2017;130(4):735-46.
- Walling EB, Benzoni N, Dornfeld J, Bhandari R, Sisk BA, Garbutt J, et al. Interventions to Improve HPV Vaccine Uptake: A Systematic Review. *Pediatrics*. 2016;138(1).
- Roland L, Fischer C, Tran K, Rachakonda T, Kallogjeri D, Lieu JE. Quality of Life in Children with Hearing Impairment: Systematic Review and Meta-analysis. *Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery*. 2016;155(2):208-19.
- Conner SN, Bedell V, Lipsey K, Macones GA, Cahill AG, Tuuli MG. Maternal Marijuana Use and Adverse Neonatal Outcomes: A Systematic Review and Meta-analysis. *Obstetrics and gynecology*. 2016;128(4):713-23.
- Carter EB, Temming LA, Akin J, Fowler S, Macones GA, Colditz GA, et al. Group Prenatal Care Compared With Traditional Prenatal Care: A Systematic Review and Meta-analysis. *Obstetrics and gynecology*. 2016;128(3):551-61.
- Boots CE, Meister M, Cooper AR, Hardi A, Jungheim ES. Ovarian stimulation in the luteal phase: systematic review and meta-analysis. *Journal of Assisted Reproduction and Genetics*. 2016;33(8):971-80.
- Yarbrough CK, Ong CJ, Beyer AB, Lipsey K, Derdeyn CP. Endovascular Thrombectomy for Anterior Circulation Stroke: Systematic Review and Meta-Analysis. *Stroke; a journal of cerebral circulation*. 2015.
- Stout MJ, Conner SN, Colditz GA, Macones GA, Tuuli MG. The Utility of 12-Hour Urine Collection for the Diagnosis of Preeclampsia: A Systematic Review and Meta-analysis. *Obstetrics and gynecology*. 2015;126(4):731-6.
- Rowland KJ, Jin LX, Moley JF. Biochemical cure after reoperations for medullary thyroid carcinoma: a meta-analysis. *Annals of surgical oncology*. 2015;22(1):96-102.
- Rashidi A, Ebadi M, Colditz GA, DiPersio JF. Outcomes of Allogeneic Stem Cell Transplantation in Elderly Patients with Acute Myeloid Leukemia: A Systematic Review and Meta-analysis. *Biology of blood and marrow transplantation : journal of the American Society for Blood and Marrow Transplantation*. 2015.
- Levy PT, Machefsky A, Sanchez AA, Patel MD, Rogal S, Fowler S, et al. Reference Ranges of Left Ventricular Strain Measures by Two-Dimensional Speckle-Tracking Echocardiography in Children: A Systematic Review and Meta-Analysis. *Journal of the American Society of Echocardiography*. 2015.
- Kumar G, Uhrig D, Fowler S, DeLaney MC, Alexandrov AV. Intravenous Recombinant Tissue Plasminogen Activator Does Not Impact Mortality in Acute Ischemic Stroke at Any Time Point up to 6 Months: A Systematic Review and Meta-Analysis of Randomized Controlled Clinical Trials. *CNS drugs*. 2015;29(8):659-67.
- Davis J, Sanford D, Schilling J, Hardi A, Colditz G. Systematic Review of Outcomes after Non-Cardiac Surgery in Patients with Implanted Left Ventricular Assist Devices. *ASAIO journal (American Society for Artificial Internal Organs : 1992)*. 2015.

- Levy PT, Sanchez A, Machevsky A, Fowler S, Holland MR, Singh GK. Normal Ranges of Right Ventricular Systolic and Diastolic Strain Measures in Children: A Systematic Review and Meta-Analysis. *Journal of the American Society of Echocardiography : official publication of the American Society of Echocardiography*. 2014;27(5):549-60.e3.
- Kumar G, Shahripour RB, Alexandrov AV. Recanalization of acute basilar artery occlusion improves outcomes: a meta-analysis. *Journal of neurointerventional surgery*. 2014.
- Fayanju OM, Stoll CR, Fowler S, Colditz GA, Margenthaler JA. Contralateral prophylactic mastectomy after unilateral breast cancer: a systematic review and meta-analysis. *Annals of surgery*. 2014;260(6):1000-10.
- Conner SN, Frey HA, Cahill AG, Macones GA, Colditz GA, Tuuli MG. Loop electrosurgical excision procedure and risk of preterm birth: a systematic review and meta-analysis. *Obstetrics and gynecology*. 2014;123(4):752-61.
- Leinicke JA, Elmore L, Freeman BD, Colditz GA. Operative management of rib fractures in the setting of flail chest: a systematic review and meta-analysis. *Annals of surgery*. 2013;258(6):914-21.
- Kumar G, Goyal MK. Warfarin versus aspirin for prevention of stroke in heart failure: a meta-analysis of randomized controlled clinical trials. *Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association*. 2013;22(8):1279-87.
- Jungheim ES, Schon SB, Schulte MB, DeUgarte DA, Fowler SA, Tuuli MG. IVF outcomes in obese donor oocyte recipients: a systematic review and meta-analysis. *Human reproduction (Oxford, England)*. 2013;28(10):2720-7.
- Jim J, Caputo FJ, Sanchez LA. Intentional coverage of the celiac artery during thoracic endovascular aortic repair. *Journal of vascular surgery*. 2013;58(1):270-5.
- Fayanju OM, Stoll CR, Fowler S, Colditz GA, Jeffe DB, Margenthaler JA. Geographic and temporal trends in the management of occult primary breast cancer: a systematic review and meta-analysis. *Annals of surgical oncology*. 2013;20(10):3308-16.
- Tuuli MG, Frey HA, Odibo AO, Macones GA, Cahill AG. Immediate compared with delayed pushing in the second stage of labor: a systematic review and meta-analysis. *Obstetrics and gynecology*. 2012;120(3):660-8.
- Rachakonda T, Lieu JEC, Thorne MC. Quality of Life in Childhood Hearing Loss: Systematic Review. *Otolaryngology -- Head and Neck Surgery*. 2012;147(2 suppl):P235.
- Goetzing KR, Harper LM, Tuuli MG, Macones GA, Colditz GA. Effect of regional anesthesia on the success rate of external cephalic version: a systematic review and meta-analysis. *Obstetrics and gynecology*. 2011;118(5):1137-44.

DROP DATES

You may drop for any reason during the course of the semester. However, you may only receive a partial or no tuition reimbursement depending upon how far into the semester you drop the course. See the [MPHS Student Handbook](#). Late withdrawals will appear on your transcript as a withdrawal.

MPHS Academic Policy Guidelines:

Guidelines regarding MPHS course registration and enrollment, grades, tuition obligation, and academic leave are consolidated in the [MPHS Student Handbook](#). Please review this document.

MPHS Guidelines for Academic and Non-Academic Transgressions:

By registering for this course you have agreed to the terms of the **MPHS Academic Integrity Policy**, outlined below and in more detail in the [MPHS Student Handbook](#). Please review this policy before submitting your first graded assignment.

Academic Integrity/Plagiarism Policy:

- Academic dishonesty is a serious offense that may lead to probation, suspension, or dismissal from the University. Academic dishonesty includes plagiarism (the use of someone else's ideas, statements, or approaches without proper citation). Academic dishonesty also includes copying information from another student, submitting work from a previous class for a new grade without prior approval from your instructor,

cheating on exams, etc. You are responsible for reviewing [WashU's academic integrity resources](#) to become aware of all the actions that constitute academic dishonesty.

- All instances of academic dishonesty will be reported to the Office of the Registrar for investigation and potential disciplinary action. In addition, the instructor will make an independent decision about the student's grade on any assignment in question. The MPHS process regarding academic dishonesty is described in the [MPHS Student Handbook](#)

DISABILITY RESOURCES

It is the goal of Washington University to assist students with disabilities in removing the barriers their disabilities may pose and provide support in facing the challenge of pursuing an education at Washington University.

Washington University recognizes and accepts its professional, legal and moral responsibility to avoid discrimination in the acceptance and education of qualified students with disabilities and to provide reasonable accommodations to such students consistent with the principles embodied in the law. These guidelines apply to students seeking admittance as well as to those who become disabled while they are enrolled.

Washington University makes every effort to insure that all qualified applicants and students can participate in and take full advantage of all programs and opportunities offered within the university. Washington University encourages and gives full consideration to all applicants for admission. Washington University does not discriminate in access to its programs and activities on the basis of age, sex, sexual orientation, race, disability, religion, color or national origin.

To learn more about services provided to students with disabilities, initiate the process of formal documentation and/or to arrange for accommodations, please review the [Disability Resources](#) for the Med School at the start of the course.

SEXUAL ASSAULT RESOURCES

You can also speak confidentially and learn about available resources by contacting [Dr. Gladys Smith, PhD](#), Sexual Violence Prevention Therapist and Licensed Psychologist at the Medical Campus, (314) 362-2404. Additionally, you can report incidents to the Office of Student Affairs or by contacting WUSM Protective Services 314-362-4357 or your local law enforcement agency.

BIAS RESOURCES

The University has a process through which students and staff who have experienced or witnessed bias, prejudice or discrimination against a student can report their experiences to the University's Bias Report and Support System (BRSS) team. For details see: diversityinclusion.wustl.edu/brss/.

Office of the Associate Vice Chancellor for Diversity, Equity and Inclusion (DEI)

The DEI Training Team designs, facilitates and leads diversity education programming for faculty, staff and students on a wide range of topics including: creating a climate of respect, the value of diversity and the role of biases in our day-to-day lives.

diversity.med.wustl.edu/training/

The Office of Diversity Programs promotes diversity among and prepares medical students to lead in a global society. A priority for the Office of Diversity Programs is to cultivate and foster a supportive campus climate for students of all backgrounds, cultures and identities.

mddiversity.wustl.edu/

The Diversity and Inclusion Student Council promotes an inclusive campus environment for all School of Medicine students.

sites.wustl.edu/disc/

The Office for International Students and Scholars embraces the university's mission of welcoming promising students from around the world.

wumma.wustl.edu/

MENTAL HEALTH

Mental Health Services are available for full-time students enrolled on the Medical School campus. Students can make an appointment with **Dr. Karen Winter** (kwinters@wustl.edu) or through **Student Health Services**.

There are also contractual mental health service providers who are available off-campus. More information regarding this coverage and a list of participating providers are accessible via <https://wusmhealth.wustl.edu/> and then clicking on **Students** and scrolling down to **Mental Health Information** <https://wusmhealth.wustl.edu/students/mental-health-information/>.

Please do not hesitate to reach out to Dr. Winters, 314-362-3523, or to any of our off-campus providers <https://wusmhealth.wustl.edu/>