

HA716
Quantitative Research Methods in Health and
Aging
Course Outline

Instructor: Michel Grignon
Department of Health, Aging and Society
Department of Economics
KTH 232, ext 23493
grignon@mcmaster.ca

Fall 2022

Thursday 11:30 am to 2:20 pm, LRW3001

We discuss (seminar format). I usually don't lecture (except week 1, for obvious reasons, since flipping the class room requires homework in advance of sessions):

1. Most lectures are posted on Avenue (videos) and to be watched asynchronously before class
2. I also assign readings (not too many and not too long, as I am aware that you already have to watch lectures)
3. In class (synchronous sessions), we will:
 - (a) Discuss lectures: I will come with questions for you to answer and I hope you will also have questions or comments/objections to lectures
 - (b) Practice the material presented in lectures, using spreadsheets (mostly) posted on Avenue

- (c) Discuss assigned readings: one student will be assigned to facilitate that discussion (sign up sheet distributed at our first session)
- (d) Discuss applications of quantitative methods in social sciences: these can be your final papers, an article that intrigued you or your MRP/thesis. It will also be chapters from a book we will read together, *Suicide* by Emile Durkheim.

Contents

1	Course Description	4
2	Course Objectives	4
3	Required Materials and Text	6
4	Class Format	6
5	Course Evaluation: Overview	7
6	Course Evaluation: Details	7
6.1	Seminar Preparation	7
6.2	Seminar Participation	8
6.3	Seminar Papers	9
7	Weekly Course Schedule and Required Readings	10
8	Course Policies	11
8.1	Submission of Assignments	11
8.2	Grades	11
8.3	Late Assignments	11
8.4	Absences, Missed Work, Illness	11
8.5	Avenue to Learn	11
9	University Policies	12
9.1	Academic Integrity Statement	12
9.2	Academic Accommodation of Students with Disabilities	12
9.3	Academic Accommodation for Religious, Indigenous or Spiritual Observances (RISO)	13
9.4	Faculty of Social Sciences e-mail communication policy	13
9.5	Course Modification Notice	13
9.6	Extreme Circumstances	14
9.7	Conduct Expectations	14
9.8	Copyright and Recording	14

1 Course Description

This course provides an introduction to and overview of the use of numbers (“quantitative”) and formal inference (“hypothetico-deductive”) in research on the social aspects of health and aging.

What this course is not: I will not teach you a series of recipes (“how to”) on a bunch of statistical methods that are commonly used in quantitative research.

What this course wants to do: We will look for reasons why social scientists use (or should use) such or such method. The “why” has to do with the following:

1. The type of question one wants to answer (or explore further)
2. The type of data that are available
3. The underlying theoretical model one has in mind

2 Course Objectives

The course is intended to allow you to do the following (I italicized the names of specific technical approaches that we will discuss during the course):

1. To understand the difference between qualitative/inductive and quantitative/deductive approaches to social science questions.
2. To explain the role of theoretical frameworks in hypothesis generation and the use of empirical restrictions in hypothesis testing (*Qualitative Comparative Analysis*.)
3. To explain what *correlation* and *latent factor analysis* are and how quantitative methods can interpret and organize information.
4. To understand that quantitative methods are not only about causality testing but also about understanding and enriching theoretical models through induction.
5. To explain the role of *ceteris paribus* in *regression analysis* and the importance of model specification (omitted variables and error term).

6. To explain the concept of linearity and transformations in *regression analysis*, in particular the use of ratios.
7. To explain the problem of over-specification in *age-period-cohort analysis* (an issue of particular relevance to studies of aging)
8. To explain what causality and inference are and the role of identification in the determination of causality (concepts of self-selection and discussion of *experiments* and *quasi-experiments* or *natural experiments*, aka *difference in difference*).
9. To explain what *experiments* can and cannot do.
10. To explain why social scientists use a stochastic approach called statistical inference (*sampling, hypothesis testing, decision rules.*)
11. To understand the difference between statistical inference and theoretical inference.
12. To explain how *nonlinear regression* analysis and related basic econometric tools work (*Maximum Likelihood Estimator.*)
13. To understand what remains of interpretative approaches in quantitative methods: the rhetoric of social sciences and evidence-based policy.

Specificity of Aging and Health Studies within Social sciences

Health and aging can be studied from a variety of perspectives (clinical, biological, molecular, or social). Social scientists study health and aging as they relate to “society” (more detail below) and ask questions such as:

- What are the perceptions of age, aging, old, age groups, health, healthy, illness, sickness, disease, disability, treatment, rehabilitation in societies and groups within societies?
- What are the effects of changes in the age distribution of the population on the economy, society, and perceptions of age and aging?
- What are the effects of health and medicine on the economy, society, and perceptions of and expectations toward age, health and treatment?

These questions have in common an interest in health and aging from the perspective of human beings living in society (groups of human beings linked by norms, institutions, rules, or resource allocations). The methods and research designs used by social scientists to address such questions are generic methods and designs used by social scientists in general. There is no specific method or design used in health studies or studies of aging that is not used elsewhere in the social sciences. However, some specific issues, designs or concepts distinguish social scientists studying health and aging: among others, the use of chronological data, the distinction between population level and individual level phenomena, and proximity to health sciences and their methods (systematic reviews, knowledge transfers, randomized controlled trials).

3 Required Materials and Text

Beside articles assigned on a weekly basis, I will rely on one textbook (Bartholomew), chapters from a book on quantitative methods (Maxim) and one book as illustration (Durkheim):

- Required:
 - David Bartholomew, *Statistics Without Mathematics*, Sage, 2015 (\$55.00)
 - Paul S. Maxim, *Quantitative Research Methods in the Social Sciences*, Oxford University Press. (not easy to find, and quite costly; I have a few second hand copies that I am happy to share with you).
 - Émile Durkheim, *Suicide: A Study in Sociology*. (available at the library, second hand editions for low prices).
- Recommended:
- Booth, Wayne C., Gregory G. Colomb and Joseph M. Williams (2008 - 3rd edition) *The Craft of Research* Chicago: University of Chicago Press.

4 Class Format

We meet once a week for 150 minutes. Each session will be used as follows:

1. Discussion of lectures: I will come with questions for you to answer and I hope you will also have questions or comments/objections to lectures
2. Practice the material presented in lectures, using spreadsheets (mostly) posted on Avenue
3. Discuss assigned readings: one student will be assigned to facilitate that discussion (sign up sheet distributed at our first session) (about 50-60 minutes seminar discussion).
4. Discuss applications of quantitative methods in social sciences: these can be your final papers, an article that intrigued you or your MRP/thesis. It will also be chapters from a book we will read together, *Suicide* by Emile Durkheim.

5 Course Evaluation: Overview

To achieve its objectives, this course requires a good understanding of the readings, active participation in seminar discussions, and interest in research and writing. The evaluation of your understanding, participation, and research will be based on the following components:

1. Seminar Preparation (20%), Week 2 to Week 12
2. Seminar Leadership and Participation (20%)
3. Research: Three short Seminar Papers (20% each) due on weeks 4 (first paper), 8 (second paper) and 12 (third paper).

Late submissions of the seminar preparation documents will not be accepted.

5.1 Seminar Preparation

You must arrive in class having watched the videos (lectures) and carefully done the readings and well-prepared to engage in the seminar discussion. In

order to contribute to a better understanding of the readings, you will be required to submit documents on the course shell on Avenue (one document for each of the required readings), which have the following three components:

1. List of core concepts and terms
2. Brief summary statement of the central arguments (written in your own words)
3. List of important questions and issues

5.2 Seminar Participation

You will take turns leading that portion of the session. As a discussion facilitator, you should:

1. ask participants to define and clarify the core concepts and terms
2. ask participants to summarize and discuss the central arguments
3. ask participants to raise important issues and questions related to the readings
4. ask participants to discuss the strengths and weaknesses of the readings

I do not expect you to have all the answers (I don't), but to do your best to understand the question raised in the reading and be ready to discuss what you understand and compare it with what others understand.

Slides are **NOT** recommended - I do not ban slides but I do not encourage their use to lead a seminar discussion. Firstly, producing slides while preparing for a seminar is a waste of your time (especially if you use Powerpoint) and will distract you from the main task, which is to read, understand, and discuss. Also, human beings are so built that they cannot think deeply and fine tune presentation details at the same time. In this course, you should privilege substance over packaging. Secondly, presenting slides kills discussion: your listeners will focus on what is written on a screen and will not listen to what you have to say. If you simply say out loud what is already written on your slides, what is the point? If you feel more comfortable with an outline of the discussion (the main points you want to cover during the discussion) projected on a screen behind you, and used as a reference, that

is fine with me. Also, if you prefer to think and discuss based on graphs and diagrams, that is fine as well. But stay away from the never ending slide deck that simply paraphrases what is in the reading.

As a seminar participant, you are expected to answer the questions raised by discussion facilitators and other participants, respond to their contributions to our seminar discussions, provide information and examples, and raise your own questions and issues. The seminar is not only about making sure we understand the readings but also about using them as a springboard for our discussion of the day.

All: feel free to use the whiteboard to write down ideas or suggest charts that we might then discuss. All suggestions are welcome and no idea is a silly one. I strongly encourage active participation to the seminar, even though that might seem a bit chaotic at times.

5.3 Seminar Papers

Each short paper will discuss issues of research design and methods in the study of health and aging. I do not have any recommendation for the length of these papers. I am only interested in the logic of your argument and how you support it with theory and evidence, not packaging. Having said so, keep in mind that it takes time to write short pieces but it pays off (a well-organized short piece presenting all the argument but nothing but the argument will be better received than a long and winding one that I will have to read 10 times to understand). Please use class time (fourth sub-session) to discuss your papers and get feedback and suggestions from your peers (and me). Here are the topics of the three papers (you can start right away and hand them in any time before the end of the term):

1. First paper (due at the end of week 4): Select an interesting topic or problem in health and aging (possibly your MRP or thesis topic) and define a research question, based on a theoretical framework. Detail how you came upon your research question and how it will add to knowledge.
2. Second paper (causal inference, due at the end of week 8): explain what empirical restrictions you will use to reject competing hypotheses (empirical tests) to answer your research question (has to build on paper 1).

3. Third paper (measurement of variable and statistical strategy, due at the end of week 12): explain how you would statistically test your empirical restrictions and how you would address measurement issues (has to build on papers 1 and 2).

6 Weekly Course Schedule and Required Readings

This course is divided into three parts:

1. Scientific method in social sciences and the organization of quantified information.
 - (a) The scientific method and social sciences. I will lecture live (synchronously) on week 1: outline of the course and its organization, and lecture on the scientific method and social sciences, with an emphasis on differences between quantitative and qualitative approaches. I will also introduce the book we will read through the term, *Suicide* by Emile Durkheim.
 - (b) Hypothetico-deductive approaches, theory formalization, qualitative comparative analysis and intersectionality. On week 2, we begin flipped classroom (watch 3 recorded lectures and read readings ahead of class and we discuss both in class). Readings:
 - i. Ragin, “Using comparative methods to study diversity”. On theory formation, possibly McCloskey, the rhetoric of economics.
 - ii. Maxim, chapter 2 (some pages only, TBA)
 - (c) Theory of information: watch 3 recorded lectures on correlation, latent factor analysis (spurious correlation) and multivariate regression analysis (OLS). I will give a short lecture (in class) on the pitfalls of ratios in regressions. Readings:
Bartholomew (textbook), chapters 6, “Covariation” and 13, “Unobserved variables”.
2. Inference and identification.

- (a) Measurement issues: conceptual, not technical. Watch 2 recorded lectures on measurement in practice and types of variables. Readings:
Alain Desrosières, 2001 “How Real Are Statistics? Four Possible Attitudes”, *Social Research* 68(2): 339-355
- (b) Causality and self-selection biases. Watch one recorded lecture on causality, attenuation bias, mostly to help you read and discuss the readings. Readings:
 - i. Maxim, chapter 3 (some pages only, TBA)
 - ii. Surgeon General 2004, Causal inference
- (c) Experiments in social sciences: how they work. Watch one video on ANOVA, quasi-experiments, and the RAND Health Insurance Experiment. Readings:
 - i. Maxim, chapter 8 (some pages only, TBA)
 - ii. Newhouse, *Free for All*, chapters 1 and 2.
- (d) Experiments in social sciences: what they can and cannot do. Watch one video on randomization. Readings:
 - i. Levitt and List, 2007, “What Do Laboratory Experiments Measuring Social Preferences Reveal About the Real World?” *Journal of Economic Perspectives*, 21(2): 153-174
 - ii. Deaton and Cartwright, 2018, “Understanding and misunderstanding randomized controlled trials” *Social Science & Medicine*, 210: 2-21

3. Statistical (stochastic) inference.

- (a) Sampling, law of large numbers and inference. Watch 5 recorded videos on sampling procedures, generation of random numbers, the law of large numbers, a practice on LLN and the estimation of variance.
- (b) Hypothesis testing and decision making. Watch 3 recorded videos on statistical tests. Readings (for both this and the previous session):
 - i. Maxim, chapters 4 to 6 (some pages only, TBA)
 - ii. Bartholomew, chapters 7 to 10

- iii. Martikainen et al., 2007, “Does survey non-response bias the association between occupational social class and health?”
Scandinavian Journal of Public Health, 35: 212-215
- (c) Non linear inference: Maximum Likelihood Estimator, and serial correlation (autocorrelation in time series, fixed and random effects in panel data, spatial correlation))

I will post on the course shell on Avenue a series of weekly documents (class preparation) providing information on required readings, expectations for seminar/discussion, optional readings as well as resources you may find helpful.

7 Course Policies

7.1 Submission of Assignments

Each week, on dropbox on Avenue to Learn

7.2 Grades

Grades will be based on the McMaster University grading scale.

7.3 Late Assignments

See Course Evaluation section

7.4 Absences, Missed Work, Illness

Contact me in case of absence.

7.5 Avenue to Learn

In this course we will be using Avenue to Learn. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the

technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

8 University Policies

8.1 Academic Integrity Statement

Academic Integrity: You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at <http://www.mcmaster.ca/academicintegrity>

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

8.2 Academic Accommodation of Students with Disabilities

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext.

28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University's Policy for Academic Accommodation of Students with Disabilities: <http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf>

8.3 Academic Accommodation for Religious, Indigenous or Spiritual Observances (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students requiring a RISO accommodation should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

Please review the (clickable link) RISO information for students in the Faculty of Social Sciences about how to request accommodation.

8.4 Faculty of Social Sciences e-mail communication policy

In order to encourage participation outside of class, we will use the discussion tools of Avenue To Learn. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure.

Effective September 1, 2010, it is the policy of the Faculty of Social Sciences that all e-mail communication sent from students to instructors (including TAs), and from students to staff, must originate from the student's own McMaster University e-mail account. This policy protects confidentiality and confirms the identity of the student. It is the student's responsibility to ensure that communication is sent to the university from a McMaster account. If an instructor becomes aware that a communication has come from an alternate address, the instructor may not reply at his or her discretion.

8.5 Course Modification Notice

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check his/her McMaster email and course websites weekly during the term and to note any changes.

8.6 Extreme Circumstances

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.

8.7 Conduct Expectations

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the “Code”): <https://secretariat.mcmaster.ca/app/uploads/Code-of-Student-Rights-and-Responsibilities.pdf>. All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, whether in person or online.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g., use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students’ access to these platforms.

8.8 Copyright and Recording

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, including lectures by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.