

School of Kinesiology
Faculty of Health Sciences
Western University

**KIN 4420B - Impact of Exercise During Pregnancy on Chronic Disease Risk
Winter 2020**

<p>Instructor: Dr. Michelle Mottola, Director R Samuel McLaughlin Foundation Exercise & Pregnancy Lab Office: 3M Centre Rm 2214 Email: mmottola@uwo.ca Phone: 519/661-2111 x85480 Office Hrs: by appointment</p> <p>GTA: Silar Gardy sgardy@uwo.ca</p>	<p>Lectures: Monday 2:30pm – 4:30pm</p> <p>Room: SSC-3024 **Please note that if UWO restrictions are put in place due to COVID we will move to live online activities.</p>
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NOTE: All course information including grades, assignment outlines, deadlines, etc. are available via OWL. Check the website regularly for course announcements.

Calendar Description (including prerequisites/anti-requisites):

Discussion of human pregnancy and the impact of exercise to prevent or treat cardiovascular disease, obesity and metabolic syndrome/type 2 diabetes will occur. The theory of the 'Thrifty phenotype' will be discussed and the mother/fetal link to chronic disease risk. Active living during pregnancy and exercise prescription will be emphasized.

Antirequisite(s): Kinesiology 4471B (if taken to 2009-10).

Prerequisite(s): [Kinesiology 2222A/B](#) or [Health Sciences 2300A/B](#) or [Health Sciences 2330A/B](#) or [Anatomy and Cell Biology 2221](#) or the former Anatomy and Cell Biology 3319; and [Kinesiology 3337A/B](#).

Extra Information: 1 lecture hour, 1 seminar hour.

Course Format: One lecture hour, followed by one hour seminar discussion

You are responsible for ensuring that you have successfully completed all course pre-requisites, and that you have not taken an anti-requisite course.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

My Course Description:

This course provides an overview of human pregnancy and the impact of exercise to prevent or treat cardiovascular disease, obesity and metabolic syndrome/type 2 diabetes. The theory of the "Thrifty phenotype" will be discussed and the mother/fetal link to chronic disease risk, including discussion of "Developmental Origins of Health and Disease". Active living during pregnancy will be emphasized using the 2019 Canadian guideline for physical activity throughout pregnancy and the Get Active Questionnaire for Pregnancy for low-risk pregnant individuals. In addition, exercise prescription for special populations of pregnant individuals across the exercise continuum including those with gestational diabetes or obesity will also be discussed.

Learning Objectives: Upon completion of this course students will:

- 1) Gain knowledge and understanding of different theories of fetal origins of adult diseases.
- 2) Gain knowledge and understanding of current research in the area of exercise during pregnancy for a low-risk pregnant population.
- 3) Gain knowledge and understanding of current research in the area of how exercise during pregnancy can prevent or be used to treat different disease states.
- 4) Engage in seminar discussions, present orally on a research paper to the class and to evaluate the research literature critically.
- 5) Create and implement an exercise and lifestyle intervention for active low risk pregnant individuals and pregnant individuals with disease risk.

Topics for Discussion:

- 1) The “Downside of Upright”
- 2) “Thrifty genotype” and “Thrifty phenotype” – developmental influences of adult diseases. DOHaD – Developmental Origins of Health and Disease.
- 3) DOHaD and adult diseases that may have origin from fetal life.
 - a. Cardiovascular disease
 - b. Obesity
 - c. Type 2 diabetes/Metabolic syndrome
- 4) Impact of exercise during pregnancy on chronic disease risk.
- 5) Importance of active living during pregnancy
 - a. *2019 Canadian Guideline for Physical Activity throughout Pregnancy* and the *Get Active Questionnaire for Pregnancy* – medical screening, exercise guidelines, and safety considerations for low-risk pregnant individuals
 - b. Promoting active living during pregnancy in low-risk individuals
- 6) Designing an exercise program for pregnant individuals across the exercise continuum – from activity restricted to recreational to elite athlete.
- 7) Using an exercise and lifestyle intervention to prevent excessive weight gain and gestational diabetes in pregnant individuals with risk factors.

Course Evaluation Summary:

- 1) Class participation & on-line discussion forum using OWL – 23%
- 2) Paper Critique – Journal Article Review - 15% **(Due Monday Feb. 14th)**
- 3) Group presentation – 31% **(March 21st, March 28th)**
- 4) Final exam - 31%

Discussion Forums on OWL:

Students will be divided into groups of 6 to form a discussion group forum on OWL relating to specific questions regarding special topics relating to the course.

Paper Critique - Journal Article Review: (Due Monday Feb. 14th, 2022)

Each student will choose a paper from the literature (upon approval of Instructor) related to class and critically evaluate it in one page of assessment.

Group Presentations to the Class:

Each student will work with their group of 3 to choose one research paper from the literature (on approval of Professor) and present it to the class for 10 minutes, followed by 5 minutes of questions. The professor and GTA will evaluate the presentation. Each group of 3 students will pick a time to present on one of the following 2 days:

March 21st and March 28th, will be designated as Student presentation days.

Course Evaluation:

Assignments are due as stated in the course syllabus and will not be accepted late, except under medical or other compassionate circumstances. Submitting a late assignment without appropriate documentation will result in a zero (0) grade. Acceptable reasons might include hospital stays, serious illness, family emergencies (like serious accidents, illness or death) or similar circumstances.

Mandatory Readings (*Preliminary List*): All required readings will be posted on OWL**Jan. 10, 2022 Topic – Introduction and “Downside of Upright”****Reading(s):**

- 1) Ackerman J. 2006. The downside of upright. *National Geographic*. 210(1):126-145.
- 2) Mitteroecker P, et al. 2016. Cliff-edge model of obstetric selection in humans. *Proc Natl Acad Sci* 113(51):14680–14685.
- 3) Grossman, R. 2017. Are human heads getting larger? *Proc Natl Acad Sci* 114(8):E1304. (Comment to Mitteroecker et al. 2016)
- 4) Mitteroecker P, et al. 2017 The role of natural selection for the increase of Caesarean section rates. *Proc Natl Acad Sci* . 114(8):E1305. (Comment to Grossman 2017)

Jan. 17, 2022 Topic – “Developmental Origins of Health and Disease (DOHaD); thrifty genotype and thrifty phenotypes”**Readings:**

- 5) Prentice AM. 2005. Early influences on human energy regulation: Thrifty genotypes and thrifty phenotypes. *Physiol. Behav.* 640-645.
- 6) Hales CN and Barker DJP. 2001. The thrifty phenotype hypothesis. *Br. Med. Bull.* 60:5-20.
- 7) Prentice AM, Rayco-Solon P, and Moore S.E. 2005. Insights from the developing world: thrifty genotypes and thrifty phenotypes.
- 8) Barker DJP 2004. The developmental origins of adult disease. *J. Am. Coll. Nutr.* 23:588S-595S.

Jan. 24, 2022 Topic – “DOHaD and adult diseases that may have origin from fetal life” – Cardiovascular disease”**Readings:**

- 9) Hanson MA, Gluckman PD. 2011 Developmental origins of health and disease: moving from biological concepts to interventions and policy. *Int J Gynaecol Obstet.* Nov;115 Suppl 1:S3-5.
- 10) Martin-Gronert MS, Ozanne SE. 2012 Mechanisms underlying the developmental origins of disease. *Rev Endocr Metab Disord.* Jun;13(2):85-92.
- 11) Wiener SL, Wolfe DS. 2021 Links between maternal cardiovascular disease and the health of offspring. *Can J Cardiol* 2021:1-10 (in press)
- 12) Henry SL et al. 2012 Developmental origins of obesity-related hypertension. *Clin. Exper. Pharm. Physiol.* 39 (9), 799-806.

Jan. 31, 2022 Topic – “DOHaD and adult diseases that may have origin from fetal life” – Obesity”**Readings:**

- 13) Oken E, Gillman MW. 2003. Fetal origins of obesity. *Obes. Res.* 11:496-506.
- 14) Schoonejans J, Ozanne S. 2021. Developmental programming by maternal obesity: Lessons from animal models. *Diab Med* 38:e146694.
- 15) Davenport MH, et al. 2013. Timing of excessive pregnancy-related weight gain and offspring adiposity at birth. *Obstet Gynecol.* 122(2, PART 1):255-261.
- 16) Penkler et al. 2018. DOHaD in science and society: emergent opportunities and novel responsibilities. *J Dev Orig Health Dis* doi:10.1017/S2040174418000892.

Feb. 7, 2022 Topic – “DOHaD and adult diseases that may have origin from fetal life” – Type 2 diabetes/metabolic syndrome”

Readings:

- 17) Hales CN, Barker DJP 1992. Type 2 diabetes mellitus: the thrifty phenotype hypothesis. *Diabetologia* 35:595-601.
- 18) Stein A, Obrutu O, Behere R, Yajnik C. 2019 Developmental undernutrition, offspring obesity and type 2 diabetes. *Diabetol* 62:1773-1778.
- 19) Boney CM et al. 2005. Metabolic syndrome in childhood: association with birth weight, maternal obesity and gestational diabetes mellitus. *Pediatrics* 115:e290-296.
- 20) Hattersley AT, Tooke JE. 1999. The fetal insulin hypothesis: an alternative explanation of the association of low birthweight with diabetes and vascular disease. *Lancet*. 353:1789-1792.

Feb. 14, 2022 Topic – “Impact of exercise during pregnancy on chronic disease risk”

Readings:

- 21) Wojtyła A, et al. 2012 Epidemiological studies in Poland on effect of physical activity of pregnant women on the health of offspring and future generations – adaptation of the hypothesis DOHaD. *Ann Agric Environ Med*. 19(2): 315-326.
- 22) Nagpal TS, Mottola MF 2020 Physical activity throughout pregnancy is key to preventing chronic disease. *Reproduction* 160:R111-118.
- 23) Weissgerber T, Wolfe L, Davies G, Mottola MF. 2006. Exercise in the prevention and treatment of maternal-fetal disease: a review of the literature. *Appl Physiol Nutr Metab* 31:661-674.
- 24) Brislane A, Steinback C, Davenport MH. 2021 The 9-month stress test: pregnancy and exercise – similarities and interactions. *Can J Cardiol In Press*.

Feb. 28, 2022 Topic – “Importance of active living during pregnancy and evidence-based exercise guidelines”

Readings:

- 25) Bo K, et al. 2016. Exercise and pregnancy in recreational and elite athletes: 2016 evidence summary from the IOC expert group meeting, Lausanne. Part 1 - Exercise in women planning pregnancy and those who are pregnant. *Br J Sports Med* 50:571–89
- 26) Mottola MF, Davenport MH, Ruchat SM et al. 2019 *Canadian guideline for physical activity throughout pregnancy*. *Br J Sports Med* 2018;52:1339–1346.
- 27) *Get Active Questionnaire for Pregnancy* and companion document *Health Care Provider Consultation Form for Prenatal Physical Activity*
<https://csep.ca/2021/05/27/get-active-questionnaire-for-pregnancy/>
- 28) Rudin L, Dunn L, Lyons K, et al. Professional exercise recommendations for healthy women who are pregnant: A systematic review. *Wom Health Rep* 2021;2.1:400-412.

Mar. 7, 2022 Topic “Designing an exercise program across the continuum – from activity restricted to recreational to the elite athlete and using exercise and lifestyle interventions to prevent excessive weight gain and gestational diabetes in pregnant women with risk factors”

Readings:

- 29) Brun C, et al. 2011. Bed-rest-exercise, activity restriction and high-risk pregnancies: A feasibility study. *Applied Physiol Nutrit Metabolism*. 36(4):577-82.
- 30) Anderson J, Pudwell J, McAuslan C, et al. 2021 Acute fetal response to high-intensity interval training in the second and third trimesters of pregnancy. *Appl Physiol Nutr Metab* 46:1552-1558.
- 31) Mottola, MF 2015. Pregnancy, physical activity and weight control to prevent obesity and future chronic disease risk in both mother and child. *Curr Wom Health Rev* 11:31-40.
- 32) Bø K, Artal R, Barakat R et al. 2018. Exercise and pregnancy in recreational and elite athletes: 2016/2017 evidence summary from the IOC expert group meeting, Lausanne. Part 5. Recommendations for health professionals and active women. *Br J Sports Med* 52(17):1080-1085.

Mar. 14, 2022 Topics: What influence does paternity have on chronic disease risk in the offspring?

Readings:

- 33) Easey KE, Sharp GC. 2021 The impact of paternal alcohol, tobacco, caffeine use and physical activity on offspring mental health: a systematic review and meta-analysis.

Course/University Policies

1. Statement on Use of Personal Response Systems (“Clickers”)

If Personal Response Systems (“Clickers”) are used in the course, a reference to the Guidelines for their use (Guidelines are shown below). Instructors are to communicate clearly to students information on how clickers are used including: how the student’s privacy will be protected, how clickers may be used by the instructor for data gathering and for evaluating the students, and why they cannot be used by anyone but the student (since the students involved in misuse of a clicker may be charged with a scholastic offence).

2. Academic offences: They are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

A) Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar). All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between Western University and Turnitin.com <http://www.turnitin.com>

B) Computer marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

3. Electronic Device Usage:

During Exams - Unless you have medical accommodations that require you to do so, or explicit permission from the instructor of the course, you may not use any of the following electronic devices during ANY of the tests, quizzes, midterms, examinations, or other in-class evaluations: cellphones, smart phones, smart watches, smart glasses, audio players or recorders of any sort, video cameras, video games, DVD players, televisions, laptop/notebook/netbook computers, flashlights or laser pointers.

During Lectures and Tutorials: Although you are welcome to use a computer during lecture and tutorial periods, you are expected to use the computer for scholastic purposes only, and refrain from engaging in any activities that may distract other students from learning. Please be respectful to your fellow students and turn the sound off. If the professor receives complaints from other students regarding noise or other disruptive behavior (e.g. watching videos on YouTube.com, updating your Facebook status, playing Solitaire), your classroom privileges will be revoked. From time to time, your professor may ask the class to turn off all computers, to facilitate learning or discussion of the material presented in a particular class. **Unless explicitly noted otherwise, you may not make audio or video recordings of lectures – nor may you edit, re-use, distribute, or re-broadcast any of the material posted to the course website.**

4. Health and Wellness:

Information regarding health and wellness-related services available to students may be found at <http://www.health.uwo.ca/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<http://www.health.uwo.ca/>) for a complete list of options about how to obtain help.

5. Support Services

There are various support services around campus and these include, but are not limited to:

1. Student Development Centre -- <http://www.sdc.uwo.ca/ssd/>
2. Student Health & Wellness -- <http://www.health.uwo.ca/>
3. Registrar's Office -- <http://www.registrar.uwo.ca/>
4. Ombudsperson Office -- <http://www.uwo.ca/ombuds/>

6. Accommodation, Illness Reporting and Academic Considerations:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_12

Accommodation Policies

Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The accommodation policy can be found here: [Academic Accommodation for Students with Disabilities](#).

Academic Consideration for Student Absence

<https://www.uwo.ca/fhs/kin/undergrad/academic/consideration/index.html>

Students will have up to two (2) opportunities during the regular academic year to use an on-line portal to self-report an absence during the term, provided the following conditions are met: the absence is no more than 48 hours in duration, and the assessment for which consideration is being sought is worth 30% or less of the student's final grade. Students are expected to contact their instructors within 24 hours of the end of the period of the self-reported absence, unless noted on the syllabus. Students are not able to use the self-reporting option in the following circumstances:

- for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student's final grade,
- if a student has already used the self-reporting portal twice during the academic year

If the conditions for a Self-Reported Absence are *not* met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For Western University policy on Consideration for Student Absence, see [Policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs](#)

and for the Student Medical Certificate (SMC), see:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

Religious Accommodation

Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the [Western Multicultural Calendar](#).

7. Examination Conflicts: A student with examinations having flexible submission times (e.g., where one or more examination is a take-home examination) cannot request alternative arrangements unless a conflict cannot be avoided by rescheduling writing the exam to a different time within the window specified by the instructor. This applies to direct conflicts as well as “heavy load” conflicts (e.g., three exams within a 23-hour period). The student should discuss any concerns about a potential conflict and/or request accommodation with their academic counselling unit prior to the deadline to drop a course without academic penalty

In the case of online examinations, an “Examination Conflict Room,” which may be assigned when a student is scheduled to write two proctored exams concurrently, will be interpreted as arrangements for continuous proctoring.

8. Grades: Where possible assignment objectives and rubrics will be posted on OWL. Should you have a concern regarding the grade you received for an assignment or feel that it is unfair in any way, you must wait 24 hours from the receipt of the assignment to approach the instructor or TA. In doing so, please make an appointment and prepare in writing, with evidence, why you feel your grade is inappropriate. Please be aware that in requesting a grade reassessment, your grade could go up/down/or stay the same. Note that calculations errors (which do occur!) should be brought to my attention immediately.

At least three days prior to the deadline for withdrawal from a 1000- or 2000-level course without academic penalty, students will receive assessment of work accounting for at least 15% of the final grade.

- March 7th, 2022 (for second term half-or full year courses)

A+	90-100	<i>One could scarcely expect better from a student at this level</i>
A	80-89	<i>Superior work that is clearly above average</i>
B	70-79	<i>Good work, meeting all requirements and eminently satisfactory</i>
C	60-69	<i>Competent work, meeting requirements</i>
D	50-59	<i>Fair work, minimally acceptable.</i>
F	below 50	<i>Fail</i>

Rounding of Grades (for example, bumping a 79 to 80%):

This is a practice some students request. **This practice will not occur here.** The edges of this course are clear and sharp. The mark attained is the mark you achieved and the mark assigned; there is no rounding to the next grade level, or ‘giving away’ of marks. Please don’t ask me to do this for you; the response will be “please review the course outline where this is presented”.

9. Contingency Plan for an In-Person Class Pivoting to 100% Online Learning: In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor

10. **Online Etiquette:** Some components of this course will involve online interactions. To ensure the best experience for both you and your classmates, please honour the following rules of etiquette:

- please “arrive” to class on time
- please use your computer and/or laptop if possible (as opposed to a cell phone or tablet)
- ensure that you are in a private location to protect the confidentiality of discussions in the event that a class discussion deals with sensitive or personal material
- to minimize background noise, kindly mute your microphone for the entire class until you are invited to speak, unless directed otherwise
- [suggested for classes larger than 30 students] In order to give us optimum bandwidth and web quality, please turn off your video camera for the entire class unless you are invited to speak
- [suggested for cases where video is used] please be prepared to turn your video camera off at the instructor’s request if the internet connection becomes unstable
- unless invited by your instructor, do **not** share your screen in the meeting

The course instructor will act as moderator for the class and will deal with any questions from participants. To participate please consider the following:

- if you wish to speak, use the “raise hand” function and wait for the instructor to acknowledge you before beginning your comment or question
- remember to unmute your microphone and turn on your video camera before speaking
- self-identify when speaking.
- remember to mute your mic and turn off your video camera after speaking (unless directed otherwise)

General considerations of “netiquette”:

- Keep in mind the different cultural and linguistic backgrounds of the students in the course.
- Be courteous toward the instructor, your colleagues, and authors whose work you are discussing.
- Be respectful of the diversity of viewpoints that you will encounter in the class and in your readings. The exchange of diverse ideas and opinions is part of the scholarly environment. “Flaming” is never appropriate.
- Be professional and scholarly in all online postings. Cite the ideas of others appropriately.

Note that disruptive behaviour of any type during online classes, including inappropriate use of the chat function, is unacceptable. Students found guilty of Zoom-bombing a class or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct.

11. **Classroom Behaviour:** Class will begin promptly at the time specified at the top of page one of this syllabus. In the event that you must arrive late, please enter the classroom with a minimal disturbance to the class. Please keep all electronic devices on silent and avoid distracting classmates.

12. **Student Code of Conduct**

The purpose of the Code of Student Conduct is to define the general standard of conduct expected of students registered at Western University, provide examples of behaviour that constitutes a breach of this standard of conduct, provide examples of sanctions that may be imposed and set out the disciplinary procedures that the University will follow. For more information, visit

<https://www.uwo.ca/univsec/pdf/board/code.pdf>