

COURSE SYLLABUS

Course Code and Title: KIN489X Psychobiology of Physical Activity

Class location: Woodward B79

Class Meeting time(s): Tuesday, Thursday 10:30am to 12:00pm

Instructor Name: Eli Puterman

Contact Information: eli.puterman@ubc.ca or 604.822.2854

Office Hours: by appointment, location 104-2176 Health Sciences Mall

Course Description

This course offers an in-depth exploration of the effects of exercise and physical activity on psychobiological structures and functions, including the brain and the neuroendocrine and autonomic nervous systems. This course also examines our current understanding of the role that physical activity and exercise play in modifying, and perhaps ameliorating, psychiatric disorders and daily psychological wellbeing that are underpinned by neurobiological systems. This course evaluates observational and intervention studies in animals and humans to provide a comprehensive examination of the concepts and methods used in stress biology.

Rationale

In 2014, 23% of Canadians reported their lives to be quite or extremely stressful (Statistics Canada). 11% are at risk for depression at some point in their lifetime. A wide literature has identified how depressed mood and stress gets ‘under our skin’, through poor engagement in healthy behaviours and by way of the biological ‘stress response.’ The question then is, what if those who are depressed or experiencing long-term stress become physically active? What psychobiological response processes are corrected? To better understand and appreciate the full extent to which physical activity and exercise improve health, it is necessary to have a fundamental understanding of the psychobiological processes that are modified by physical activity.

Aims

The aim of the course is for students to be confident in their understanding of the psychiatric and neurobiological effects of exercise and physical activity, and the varied conceptual and research methods utilized to scientifically frame and examine the psychobiological effects of physical activity and exercise.

Educational outcomes

- Understand the effects of physical activity on depression and mood
- Understand the effects of physical activity on psychobiological brain structures and functions
- Understand the stress response system, including psychological and neurobiological processes
- Appreciate the role the biological stress response system plays in disease development and progression
- Be familiar with the scientific methods used in both rodent and human research to discover the effects of physical activity and exercise on the varied psychobiological processes examined

- Develop skills in presenting research ideas and results in written assignments and in front of an audience

It is important for students in kinesiology to have knowledge of the psychobiological effects of physical activity and exercise. Many patients in hospital and clinic settings either come from backgrounds with high adversity or the experience of a disease diagnosis causes high levels of stress. In either circumstance, it is essential to understand how physical activity can directly improve their disease status and what pathways are corrected.

Specific Learning Objectives:

Upon completion of the course, students will be able to

- Describe different methods for designing research trials for behavioural interventions
- Describe features of an exercise program that are needed to consider when planning an intervention trial
- Describe the symptoms of depression, its prevalence, impact on health
- Describe impact of exercise on depression levels in healthy adults and adults with depression
- Gain proficiency in evaluating trials for bias
- Describe different ways to assess mood and affect
- Describe the role of both acute and chronic effects of physical activity and exercise on mood and affect
- Describe strengths and weaknesses of experimental laboratory studies and naturalistic studies
- Describe areas of the brain impacted by physical activity
- Describe some of the neurotransmitters affected by physical activity
- Describe effects on the structure and function of brain regions following intervention trials
- Describe the hypothalamic-pituitary-adrenal axis and sympathetic adrenal medullary pathway and their relationships to health
- List experimental procedures used in rodent research to investigate the role of exercise in neurobiological functioning
- Describe the different observational, laboratory, and daily process methods to assess the psychobiological impacts of stress and physical activity
- Conduct literature searches in Pubmed, Web of Science, and other online databases
- Consolidate and present concepts and results from the extant literature in written and oral forms
- Design a research study based on the existing literature and write up the design

Class Format and Procedures:

This course is held on Tuesdays and Thursdays at 10:30 – 12:00 pm in Woodward B79. The course is structured as a seminar. The course will include weekly readings of original experimental studies and review articles, professor-led discussions, and student

presentations. It is strongly encouraged that all students come to class prepared to discuss the weekly readings.

Course Requirements

The course is structured as follows:

1. Each new concept will be introduced with a review or meta-analysis. On these days, students are expected to come to each class prepared to engage in discussion on the readings, however, the Instructor will lead the class with presentations on the materials presented. Following the Instructor-led lectures on the materials, students are expected to send in 2-3 comments on the readings for the section. On the final day for each section, students and Instructor will engage in a didactic exploration to develop a hypothetical new study. Please see the Evaluation section below to see how in-class participation and comments/questions sent to the professor will be graded.

Policies and Expectations

The following is a list of all policies and guidelines that should be included on the course outline. Instructors should not be limited to the three examples included below and may wish to include statements around participation, inclusivity, email and technology in the classroom, and scheduling meetings outside of class time.

Class Attendance

You should attend all lectures. You are responsible for all material covered in class and any information given whether in attendance or not. You are also responsible for getting your own notes from class, as well as information pertaining to changes in the course outline, readings, assignments, and information related to any quizzes or exams. If you miss a class or your presentation date without advanced notice and proper documentation, you cannot make up that assessment and will be given a mark of zero. For example, if you will not be in class due to travel for varsity sport or an acute illness you must email BEFORE the assessment takes place to notify your instructor of your absence, and then provide documentation to the instructor.

Academic Accommodation for Students with Disabilities

The University's goal is to ensure fair and consistent treatment of all students, including students with a disability, in accordance with their distinct needs and in a manner consistent with academic principles. Students with a disability who wish to have an academic accommodation should contact Access and Diversity without delay.

Email

Attempting to teach or explain material over e-mail can be difficult and ineffective. If you have questions about course material or concepts, those questions should be addressed in person. Please seek clarification on course material in class, during breaks, after class, or during office hours with the instructor. E-mail should be used for a limited number of reasons, including: scheduling a time to meet, in cases of emergency that may cause you to miss an exam, or situations otherwise detailed in class. It may take up to 24 hours to respond to your email during the week and I do not check my email on weekends, nor will your teaching assistants. Please keep this in mind around exam time. Please include "KIN 489X" in the subject line of emails.

Academic Integrity

All UBC students are expected to behave as honest and responsible members of an academic community. Breach of those expectations or failure to follow the appropriate policies, principles, rules, and guidelines of the University with respect to academic honesty may result in disciplinary action. It is your responsibility to become familiar with the University of British Columbia's Academic Honesty and Plagiarism Policies, as well as the Student Declaration and the consequences of violating these policies.

Statement on Diversity and Inclusivity

Education is a multidisciplinary field that brings together faculty, students and others from diverse academic and personal backgrounds. UBC's Faculty of Education is committed to creating a respectful workplace and learning environment that supports inclusion based on the principles of equity, diversity and social justice in order to create an environment that supports its community members' full participation. The Faculty of Education is committed to providing accessible, usable, and welcoming spaces for faculty, staff, students, and visitors who have disabilities, are members of racialized communities, Indigenous, transgender, two-spirit and gender-diverse people, regardless of their age, sexual orientation, social status, religion, ethno-linguistic, nationality and/or citizenship status.

Faculty of Education courses take place in learning environments that are inclusive of gender identity, gender expression, sex, race, ethnicity, class, sexual orientation, ability, age, etc. Learners and educators expect to be treated respectfully at all times and in all interactions. Non-sexist, non-racist, non-homophobic, non-transphobic and non-heterosexist language is expected in Faculty of Education classes, course content, discussions and assignments.

Please feel welcome to e-mail your instructor your name and pronoun and how you would like these to be used.

Readings and Resources

Required readings are presented in the Course Schedule. It is expected that the articles assigned be read prior to each class.

For classes with class notes, class notes will be made available in PPT file-format through the course website on CANVAS. Students are encouraged to bring these notes along with paper and pen to class. Notes will be posted within 24-hours prior to each class. Please keep in mind that these notes provide an overview of what will be covered and do not contain information related to discussions, in-class assignments, or detailed examples, which will be covered in class. The instructor will not make a full set of notes available online. This information can be accessed at the following address:

Evaluation

Course evaluation will include:

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| Submitted questions and comments per reading | 16% |
| In-class participation..... | 9% |
| Term Paper presentation to class..... | 25% |
| <u>Final written research study.....</u> | <u>50%</u> |
| TOTAL..... | 100% |

Assessment 1. Familiarity of the readings

Format Submitted questions and comments

Details At the end of each section, students are required to submit 2 or 3 well-thought through comments on the materials presented in the previous lectures. Questions are to be submitted **1 day before class, by noon.**

Learning Objective Demonstrate comprehension, familiarity and integration of the assigned readings.

Assessment 2. In-class participation

Format Students are expected to participate in discussions throughout the course, **including, but not limited to**, responding to questions posed by the instructor, asking questions, engaging with other students in a discussion of the materials and presentations in a respectful manner. Students are expected to participate during the in-class assignments and demonstrate their knowledge of research methodologies and materials.

Assessment 3. Develop and present research study, including hypotheses

Format In-class presentation of selected study

Details Students will be required to prepare a 10-minute presentation on a research study they develop throughout the term. Presentations will be required to have the following sections: Background, Current Study, Purpose, Hypothesis/es.

Due Date Presentations occur in the second to last week of the course. Decisions for order of presentations will be completed prior to Reading Week.

Learning Objective Demonstrate ability to understand and present an empirical study related to a topic in the field of Psychobiology of Physical Activity, demonstrate an understanding of ways hypotheses are formulated and studies designed.

Assessment 4. Ability to present a research study in written format

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| Format | Final written research study Students will be required to write-up the study presented in the In-class research study. |
| Due Date | Before Reading Week, all students are required to meet the Instructor either before or after class or in the office to review the idea of the study you are proposing to design. Upon return from Reading Week, students are required to send a list of at least 10 peer-reviewed publications that will be used in the paper. Students are also strongly encouraged to meet with the professor to discuss the outline of the Written Research Study to guarantee that they are on the right track. Final written study submitted before or on April 20, 2019. |
| Learning Objective | To consolidate the Required Readings, demonstrate proficiency in a specific area related to the Psychobiology of Physical Activity, demonstrate ability to apply readings and lecture materials and discussions to develop hypotheses and develop a new study, and present the information logically in written format. All papers will include a minimum of 10 references, and the following sections: Introduction, Background, Current Study, Purpose and Hypotheses. More information will be provided throughout the course on these sections and methods for writing strong academic manuscripts. |

Grading

All assignments and assessments will be given a score on 100, and then scaled appropriately to their weight of the assessment. Presentations will not be rescheduled for any reason other than a medical issue or family emergency. Written documentation must be presented in order for the presentation to be rescheduled. If you do not contact your instructor, you will be given a score of zero on the assessment.

The final written assignment is due no later than April 20, 2019, unless a medical note is provided. Late assignments will be penalized by a loss of 5 points per day of the grade (based on a 100) of the assignment.

Policy on Text-Matching Software:

UBC subscribes to Turnitin, an online system that compares written material with the Web and with other material submitted to its database. The instructor will can submissions and check for duplication of material in other sources and possible plagiarism.

Course Schedule

The topics and assigned readings for each class are listed below, although this may be subject to change.

| <i>Date</i> | <i>Topic</i> | <i>Readings</i> | <i>Student Responsibilities</i> |
|--------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Week 1 01.07.20 | Review of Syllabus | Syllabus | Familiarize with syllabus and evaluation criteria |
| Week 1 01.09.20 | Exercise and Brain Health | Mello Portugal et al, (2013). Neuroscience of exercise: From neurobiology mechanisms to mental health. <i>Neuropsychobiology</i> , 68, 1-14. (In class video: Wendy Suzuki Ted Talk) | Mello Portugal Pages 1 – 5 (until end of Parkinson’s section). (Watch together in class) |
| Week 2 01.14.20 | Exercise and Brain Health | (In class video: BBC “The truth about depression”) | (Watch together in class) |
| Week 2 01.16.20 | Exercise and Mood Disorders | Belvederi Murri et al (2018). Physical exercise in major depression: Reducing the mortality gap while improving clinical outcomes. <i>Frontiers in Psychiatry</i> , 9, 762. | Read in full. |
| Week 3 01.21.20 | Exercise and Mood Disorders | Schuch et al. (2016). Exercise as a treatment for depression: A meta-analysis adjusting for publication bias. <i>Journal of Psychiatry Research</i> , 77, 42-51. | Read in full. |
| Week 3 01.23.20 | Exercise and Mood Disorders | Class Discussion | Each student required to send in 2-3 questions or comments on the readings from the previous two lectures. |
| Week 4 01.28.20 | Exercise and Mood Disorders | In-Class Activity | Evaluate individual studies for publication bias |

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| Week 4 01.30.20 | Exercise and Affect | <p>Ekkekakis (2017). People have feelings! Exercise psychology in paradigmatic transition. <i>Current Opinion in Psychology</i>, 16, 84-88.</p> <p>Ekkekakis et al (2011). The pleasure and displeasure people feel when they exercise at different intensities. <i>Sports Medicine</i>, 41, 641-671.</p> | <p>Ekkekakis in full.</p> <p>Ekkekakis in full.</p> |
| Week 5 02.04.20 | Exercise and Affect | <p>“Eat, drink and be sedentary: A review of health behaviors’ effects on emotions and affective states, and implications for interventions,” Epel et al., <i>Handbook of Emotions (chapter 40)</i>, 2016.</p> <p>Liao, Shonkoff, Dunton (23 December 2015). The acute relationships between affect, physical feeling states, and physical activity in daily life: A review of current evidence. <i>Frontiers in Psychology</i>.</p> | <p>Read pages 685-691. Stop at section titled, Sleep.</p> <p>Read in full.</p> |
| Week 5 02.06.20 | Exercise and Affect | Class Discussion | Each student required to send in 2-3 questions or comments on the readings from the previous two lectures. |
| Week 6 02.11.20 | Exercise and Affect | In-Class Activity | Design a research study in groups |
| Week 6 02.13.20 | Exercise and the Brain | <p>Basso and Suzuki (2017). The effects of acute exercise on mood, cognition, neurophysiology, and neurochemical pathways: A review. <i>Brain Plasticity</i>, 2, 127-152.</p> <p>Raichlen and Alexander (2017). Adaptive capacity: An evolutionary neuroscience model linking exercise, cognition, and brain</p> | <p>Read sections up to and including: “The effects of acute exercise on the brain: insight from functional imaging and electrophysiological studies.”</p> <p>Read in full.</p> |

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READING WEEK

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| Week 7 02.25.20 | Exercise and the Brain | Firth et al. (2018). Effect of aerobic exercise on hippocampal volume in humans: A systematic review and meta-analysis. | Read in full. |
| Week 7 02.27.20 | Exercise and the Brain | Szuhany et al (2015). A meta-analytic review of the effects of exercise on brain-derived neurotrophic factor. <i>Journal of Psychiatric Research</i> , 60, 56-64. | Szuhany in full. |
| Week 8 03.03.20 | | Class Discussion | Each student required to send in 2-3 questions or comments on the readings from the previous two lectures. |
| Week 8 03.05.20 | | In-Class Activity | TBD |
| Week 9 03.10.20 | Exercise and HPA activity | Duclos & Tabarin (2016). Exercise and the hypothalamo-pituitary-adrenal axis. <i>Frontiers in Hormone Research</i> , 47, 12-46. | Duclos & Tabarin in full. |
| Week 9 03.12.20 | Exercise and HPA activity | Chen et al (2017). The exercise-glucocorticoid paradox: How exercise is beneficial to cognition, mood, and the brain while increasing glucocorticoid levels. <i>Frontiers in Neuroendocrinology</i> , 44, 83-102. | Chen in full. |
| Week 10 03.17.20 | Exercise and cardiovascular reactivity | Hamer, M. (2012). Psychosocial stress and cardiovascular disease risk: The role of Physical activity. <i>Psychosomatic Medicine</i> , 74, 896-903. | Read in full. |

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| Week 10 03.19.20 | Exercise and cardiovascular reactivity | Brindle et al. (2014). A tale of two mechanisms: a meta-analytic approach toward understanding the autonomic basis of cardiovascular reactivity to acute psychological stress. <i>Psychophysiology</i> , 51, 964-976. | Read in full. |
| Week 11 03.24.20 | Exercise and stress Reactivity | Class Discussion | Each student required to send in 2-3 questions or comments on the readings from the previous two lectures. |
| Week 11 03.26.20 | Exercise and stress reactivity | In-Class Activity | Design a research study |
| Week 12 03.31.20 | Students present | | |
| Week 12 04.02.20 | Students present | | |
| Week 13 04.07.20 | Students present | | |