PSYCHOLOGY 1355 THE ADOLESCENT BRAIN HARVARD UNIVERSITY

Spring 2020
Tuesdays & Thursdays 1:30-2:45 PM
B6 William James Hall

Instructor. Professor Leah Somerville
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Location. See Contact page of http://andl.wjh.harvard.edu for directions to Professor Somerville's office, as it is tricky to find.
Office hours. By appointment - please do not hesitate to email Prof. S to set something up!

Teaching Fellow. Emily Oot
Section date & time. TBD
Contact. eoot@mclean.harvard.edu

Course description. This course will introduce students to the dynamics of brain development primarily during the second decade of life. Together we will examine key changes in structural, functional, connectivity, and neurochemical changes that take place in the brain during adolescence. We will assess how these changes influence several aspects of the adolescent mind, including self-control, risky decision making, changes in daily emotions and reactions to stressors, the onset of psychiatric illnesses (such as mood and anxiety disorders), and sensitivity to social evaluation. In addition, this course will challenge students to apply what is known scientifically to guide discussions about controversial societal issues affecting youths today, including questions such as:

- *When should a person be considered an adult, with its associated rights and responsibilities?*
- *What environments should developing brains be entitled to (for example, within the penal system)?*
- *What kinds of challenges are optimal for developing brains, and do various parenting trends hit or miss the mark?*
- *Can we orient health-related interventions to developing brains to increase their impact?*

Course objectives. This course is designed to achieve the following three learning objectives:

1. Based on the course content, students will become experts on the principles of brain development and existing theories on how brain development affects adolescent behavior.
2. Students will gain experience synthesizing research and presenting arguments for or against dominant viewpoints in the field.
3. Students will practice being informed consumers of psychological & neuroscientific research.
4. Students will gain competency and confidence extending scientific discussions to inform societal issues.

Who can take this course. Prerequisites: Science of Living Systems 20 or the equivalent of introductory psychology (e.g. Psych AP=5 or IB =7 or Psyc S-1) and at least one foundational course from PSY 14, PSY 15, PSY 16, PSY 18, MCB 80 or MCB 8, or permission of instructor. If you lack the prerequisites, please contact Professor Somerville as exceptions can sometimes be made depending on the student's background. GSAS graduate students may enroll in the course if they obtain Prof. Somerville's permission.

Course format. The success of the course depends critically on students' preparation and engagement so it is expected that every student will actively prepare for and attend every class, and contribute to the course discussion. This course will also give students an opportunity to delve deeper into relevant topics that interest them through in-class presentations and a final paper. Students considering this course should plan to invest a high level of engagement to do well.

This course integrates material from wide-ranging disciplines including neurobiology, developmental psychology, cognitive psychology, cognitive neuroscience, clinical psychology, legal doctrine, epidemiology and public health/policy. Given the multidisciplinary content, we will all enter into the course with different backgrounds and approaches to the material. Our job, as a class, is to collectively draw linkages between these seemingly disparate areas to advance our understanding of adolescence. To do this, we will read original articles, chapters, commentaries, and popular media around a particular topic each week before class and discuss them during class.

During the first four weeks of class, we will work together to build foundational knowledge of adolescent brain development. This unit will take on a lecture-and-discussion style and will culminate in a brief quiz to ensure students have come up to speed on the foundations of the rest of the course.

The remainder of the course will run in a seminar style as we consider, as a class, the existing knowledge that links biological development with major psychological and real-world issues adolescents face. Each week, students will read and respond to the course readings for the next class through Critical Response assignments. At the next class, discussion will center around the questions and issues raised by the Critical Responses. Professor Somerville will lead the discussion and offer additional findings and viewpoints as they become relevant to the topic at hand.

The culminating assignment of the course is a final paper, which will be on a topic of the student's choosing (relevant to the course and approved by Professor Somerville). We will also have student presentations during section, at which students present a scholarly article that is relevant to their final paper and field questions about that article. This is meant to be a helpful exercise in guiding each student toward the critical issues relevant to final paper topics.

Course schedule.

Introduction			
Date	Topic	Reading	What's Due
Unit 1: Neuroscientific Foundations			
Week 1 28 Jan	Who is an adolescent? *Introduction and course overview*	Online brain anatomy tutorial (see course website for link & instructions) Noba article on adolescence	Nothing
Week 1 30 Jan	- How to study brain development - Guiding principles of neurodevelopment in adolescence (focus on brain structure)	Spear Chapter 1 (p. 1-12)	Nothing
Section	None	None	Nothing

Week 2 4 Feb	- Brain structure, function - Energy utilization	Spear Chapter 4 (most importantly p. 73-92)	Submit a question for Week 1/2 readings by Feb 3
Week 2 6 Feb	Brain development and adolescent behavior part 1	Steinberg & Morris, 2001	Nothing
Section	Semester goals	None	Nothing
Week 3 11 Feb	Brain development and adolescent behavior part 2	Foulkes & Blakemore, 2018	Submit a question for Week 3 readings by Feb 10
Week 3 13 Feb	Hormones and behavior in adolescence	DeLorme et al., 2013	Nothing
Section	- Puberty v adolescence - Quiz Review		Bring questions
Week 4 18 Feb	Developmental change in sleep	Peper & Dahl, 2013	Submit a question for Week 4 readings by Feb 17
Week 4 20 Feb	The balance between plasticity and stability	Knudsen, 2004	Nothing
Unit 2: Linking Brain, Behavior, & Policy			
Section	Quiz 1	None	None
Week 5 25 Feb	Ages and stages in research and policy	Sawyer et al., 2018 Somerville, 2016	Nothing
Week 5 27 Feb	Adolescence across history, evolution, and culture	Crockett, 1997	Critical Response on Week 6 readings due 2 Mar at 5PM
Section	Dopamine	None	Attend & participate
Week 6 3 Mar	Adolescent cognition and risky decision making	The Science of Adolescent Risk-Taking: Workshop Report	None
Week 6 5 Mar	Adolescent reward sensitivity	Galvan, 2013	Critical Response on Week 7 readings due 9 Mar at 5PM
Section	Drugs of abuse - overview		Attend & participate
Week 7 10 Mar	Adolescent risk taking and preventative programs	Duell et al., 2017 Rosenbaum et al., 2017	None
Week 7 12 Mar	Prof S. away - no class	None	Critical Response on Week 9 readings due 23 Mar at 5PM
Week 8 17/19 Mar	SPRING BREAK – NO CLASS		
Section	Why doesn't *DARE work*?	*Scientific American* article on DARE	Read & think before
Week 9 24 Mar	Peer influence on adolescent decisions	Albert et al., 2013	Presentation article selection due 27 Mar at 5PM
Week 9 26 Mar	The juvenile justice system	Summary of Roper v Simmons Scott et al., 2016	Critical Response due on Week 10 30 Mar at 5PM
Section	Case study of Edwin Dubrow	Article "The Prisoner"	Read & think before section
Week 10 31 Mar	Juvenile rights and responsibilities	Steinberg & Icenogle, 2019	Nothing
Week 10 2 Apr	Adolescent emotions	Somerville & McLaughlin, 2018 Rudolph et al., 2017	Critical Response due on Week 11 6 Apr at 5PM

Section	Student article presentations	None	Present article/engage with others' presentations
Week 11 7 Apr	Adolescent risk for mental illness	Spear Ch 9	Optional: Final paper outline due to Prof. Somerville 8 Apr at 5PM for ungraded feedback
Week 11 9 Apr	Social media part 1	Twenge (2017) article in *The Atlantic* + rebuttals Orben & Przybylski, 2019	Critical Response due on Week 12 13 Apr at 5PM
Section	Student article presentations	None	Present article/engage with others' presentations
Week 12 14 Apr	- Social media part 2 - Peer feedback on final paper ideas	Crone & Konijn, 2018	Bring ½ page outline of final paper idea to class for peer review
Week 12 16 Apr	Critical and sensitive periods	Fuhrmann et al., 2015	Critical Response due on Week 13 20 Apr at 5PM
Section	Student article presentations	None	Present article/engage with others' presentations
Week 13 21 Apr	Environmental impacts on brain development	Sheridan & McLaughlin, 2014 Belsky et al., 2007	Nothing
Week 13 23 Apr	Independence part 1	The Atlantic article, *The Overprotected Kid*	Critical Response due on Week 14 27 Apr at 5PM
Section	Student article presentations	None	Present article/engage with others' presentations
Week 14 28 Apr	- Independence part 2 - Course conclusion	None	Nothing
Finals date TBD			Final paper due @ 11:59PM

Course materials.

Book: The Behavioral Neuroscience of Adolescence (2010) by Linda Spear. We will read a few sections of this book throughout the semester. The book is available at Widener Library and at various online marketplaces in New and Used form.

Articles. All articles will be provided electronically, in PDF format on the course website. Students should read all assigned articles prior to the class date and time.

Grading overview. The course will not be graded on a curve. The grading breakdown is: 92-100%=A; 90-91%=A-; 88-89%=B+; 82-87%=B; 80-81%=B-; 78-79%=C+; 72- 77%=C; 70-71%=-C-; 68-69=D+; 67-60=D; Less than 60%=F.

Grading components.

1. Attendance & active participation (20% of final grade). Attendance for this course is mandatory. This is a mixed lecture-and-discussion based class, and the quality of our experience will depend on your contributions. If you make constructive contributions during each class throughout the term, you will receive full credit for this portion of your grade.

   Attendance: Each student is excused to miss two classes (lecture or section), no questions asked.

Grade deductions will occur if additional classes are missed and not excused. See the policy on attendance below for more information about excused and unexcused absences.

Attention & participation: During this course, we will sometimes discuss issues as a whole class, and sometimes in small groups. Students will be expected to arrive ready to contribute. Professor Somerville is committed to fostering a relaxed and supportive environment where students will feel comfortable sharing their opinions, confusions, and any other substantive discussion points that come to mind. Please contribute when you have something to say. Ideally, that will happen frequently, but you do not need to force it. Please speak with Professor Somerville during the first two weeks of the semester if you have difficulty or discomfort speaking in class. Being aware of such discomforts is helpful for instructors so that they have some context behind participants' in-class behavior.

This portion of your grade will also depend on paying attention. That means staying awake and not doing something else on your laptop during class. [You are welcome to use your laptops during class, but Professor Somerville has a sixth sense around whether you are using them to supplement your learning or whether you are using them for other purposes. If Professor Somerville has concerns about your attention in class, she will discuss her concerns with you in private. If it happens repeatedly, this portion of your grade will be affected.]

Post-a-question: In Unit 1, we will be building foundations on the neuroscience of brain development. For weeks 2-4, students should post a question to the course discussion board when completing the readings. Students will receive full credit for posting a pertinent question before the due date specified on the course website (usually the Sunday before class).

2. NeuroQuiz (10% of final grade).

3. Critical Reaction submissions (5 graded, 6% each, totaling 30% of final grade): Each week, students are expected to read the assigned text and articles before class. From February 25 onwards, students will submit critical reactions of the readings from class. The timing is as follows. By the end of Tuesday of each week, Professor Somerville will post questions on the Discussion board of the course website for the next week's materials. By 5PM on Monday, students will post a ~2 paragraph reaction to the questions posted or a related issue or a question of your own about that week's materials, to the Discussion board on the course site. These are called Critical Reactions and the goal is to offer a novel insight or question about the readings. The goal is not to summarize the readings. It is to think hard about the readings and illuminate a novel way to think about or challenge what was in the readings. Length is less important than novel insights. Please see the course website for two example CRs.

   There will be 8 weeks with the opportunity to write a Critical Reaction and 5 of them will count toward your grade. You may write just 5 or you may write more, and the top 5 grades will count. Professor Somerville and Emily will offer feedback on CR responses including suggestions for improvement. CRs will be graded on a 1 to 10 scale based on the depth and thought that went into your response.

   Please note: These will not be graded lightly. It will be difficult to achieve a perfect 10/10 on these assignments. Please put time and effort into them. Professor Somerville will offer extensive

feedback, especially early in the semester, to help guide you toward quality Critical Responses.

3. Article presentation (10% of final grade). Students will prepare a short presentation of one scholarly article that is relevant to their final paper topic (presentations will be timed and limited to ~10 minutes!). Each student will present to the class a summary of a paper, the kind of scientific advance it represents, and a critical analysis of its claims in Section weeks 11-143. Presentation order will be determined randomly.

   Articles must be new to the class (e.g., not already assigned reading). The goal of student presentations will be to provide a very concise and digestible presentation of a paper they read so that students are teaching their classmates the main ideas and contributions of the paper they chose. This means stripping away the unnecessary detail and jargon and focusing on the theory, hypothesis, and/or finding (as the case may be). After each presentation, the student will field questions for 2 minutes. Presentations may use visual aids but should consider whether they are necessary for presentation of the information. Powerpoint presentations filled with text will be frowned upon (they are unnecessary and distracting from what you are saying).

   Students should select candidate papers based on literature search for their final paper, and should submit the selected paper on the course website for approval (due March 27 at 5PM). We might ask students to find a back-up article in case more than one student chooses the same article or in case the article is not sufficiently relevant to class.

4. Final paper (30% of final grade). Students will complete a final paper for the course, which will be due during finals week. The final paper can take on one of three formats: (1) a research style paper summarizing the current state of knowledge about the topic and the student's critical analysis of the evidence; or (2) a research proposal detailing 1-2 novel experiments that will add to the current state of knowledge on the student's topic; or (3) a novel analysis of what neuroscience has (and has not) told us about a societal issue relevant to adolescents. Papers are expected to be at least 12 pages in length (12 point font, double spaced, one inch margins) with original references. [Topics must incorporate neuroscientific findings or questions, and they must be centered on an adolescent-relevant issue. Beyond that, the student has much freedom in selecting something of particular interest!]

   Students may prepare a final paper proposal that can be submitted to Professor Somerville anytime in the semester prior to April 10 at 5PM. This is an informal, ungraded exercise that is meant to help hone in on the relevant literature and topics. Professor Somerville will offer extensive feedback on this proposal including assessing whether the topic idea is suitable for the assignment. Submitting a paper proposal is technically optional, but highly recommended.

Course policies.

1. Policy on collaboration for written assignments. Discussion and the exchange of ideas are essential to academic work. For assignments in this course, you are encouraged to consult with your classmates in and out of class. You may find it useful to discuss the course material with your peers. However, you should ensure that any written work you submit for evaluation is the result of your own research and writing and that it reflects your own approach to the topic. You must also adhere to standard citation practices in this discipline and properly cite any books, articles, websites, lectures, etc. that have helped

you with your work. If you received any help with your writing (feedback on drafts, etc), you must also acknowledge this assistance on a separate page at the end of your document or assignment.

2. Policy on citing sources. It is expected that all of the assignments you turn in for this course will be your own, original work. In your own papers, you will be required to draw upon existing research to inform and lend credibility to your arguments. To avoid committing plagiarism, you must follow two main rules:

a) Always cite the source of a finding, idea, or argument that isn't your own, no matter how much rewording you have done.

b) Always put the findings, ideas, and arguments you cite into your own words. If a direct quote is absolutely necessary, put the text in quotation marks and include a page number in your citation.

Plagiarized or improperly cited work will be referred to the Ad Board for review, and may result in severe penalties and disciplinary action. Please be very, very careful. And remember, poor citation does not have to be intentional to be considered plagiarism. When in doubt, cite!

If the rules of citation are not clear to you, it is highly recommend that you speak with Professor Somerville or Emily Oot, who will help connect you with resources you need.

For more information on how to cite others' work, please consult the Harvard Guide to Using Sources: http://usingsources.fas.harvard.edu/icb/icb.do

For more information on academic integrity, please consult the FAS Handbook for Students: http://handbook.fas.harvard.edu/icb/icb.do?keyword=k88702&pageid=icb.page516359

3. Policy on attendance.

Excused absences. If you miss class for a valid reason (you are sick or experience a family emergency that conflicts with a class meeting or deadline), please inform both Emily Oot and Professor Somerville by email as soon as possible. In these cases, it is expected that the student can provide a detailed note from their Resident Dean or from UHS documenting the affected dates. Alternative arrangements will be made on a case-by-case basis at the discretion of Professor Somerville.

Lateness. We will start promptly and students are expected to be ready to begin. If students are consistently late for class, Professor Somerville will warn students if this is becoming an issue.

Unexcused absences. Out of fairness to those students who do not miss class activities and deadlines, each unexcused absence will reduce the 'Attendance & Active Participation' portion of your grade by ten percentage points. One unexcused absence will drop your attendance grade from 100% to 90%; two unexcused absences to 80% and so on.

> TWO FREEBIES. Students may miss two classes (lecture or section), unexcused, with no penalty to your grade and no questions asked. However, out of respect to your fellow students, you should not exercise this option on Student Presentation meetings. Missing class on Student Presentation days will result in a grading penalty (see above) unless otherwise excused by a Resident Dean or UHS.
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> Religious holidays. Please look at the calendar now. If a course meeting, activity or deadline falls

on a religious holiday, notify Professor Somerville and Emily Oot via email by the end of the second week of class. If you follow this procedure, Professor Somerville will determine the best way to ensure that you are not penalized for your absence.

4. Policy on late assignments.
Critical Responses. Critical Response submissions will not be accepted after the deadline. If a paper is not received by the deadline, the student will receive 0 points out of 10 possible. Broken computers, faulty wi-fi, or other technological fails will *not* be accepted as excuses for lateness, so please plan ahead, back up your work, and do not cut it close. Remember, there are 8 CR opportunities and you are only required to do 5. Those 5 need to be on time.

Final paper. Out of fairness to all students, unexcused late final papers will be penalized one letter grade per hour they are late. Papers submitted more than 5 hours late will not be accepted.

5. Accessibility. Any student needing academic adjustments or accommodations is requested to present their letter from the Accessible Education Office (AEO) and speak with the professor by the third class meeting. Failure to do so may result in the Course Head's inability to respond in a timely manner. All discussions will remain confidential, although AEO may be consulted to discuss appropriate implementation.