Psychobiology of Stress (NSBV BC3392)

Fall 2024 Dr. Russell Romeo; Thursday 2:10pm-4:00pm Rm. 113 Milstein

Office Hours: Wednesdays, 1:00pm-2:00pm (or appointment), Office: Milbank Rm. 226E

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Course Description: This seminar will explore factors that modulate stress reactivity and the impact of stressors on the structure and function of the nervous system and behavior. Specifically, topics will include how developmental stage, sex, time of day, and experience influence how organisms respond to stressors at endocrinological, neurobiological, and behavioral levels.

-*Prerequisites: Introduction to Neuroscience (NSBV BC1001). Permission of the instructor is required.*
-This course is worth 4 points and qualifies as a 3000-level seminar for the elective requirement for Barnard College's Neuroscience and Behavior major.
-Course Overlap*:* Psychobiology of Stress (NSBV BC3392) is considered an overlapping course with Neuroendocrinology of Stress (NSBV BC2003) and Stress and the Brain (PSYC GU4493).

Course Objectives and Learning Goals: Students who complete this seminar will learn to: 1) demonstrate experimental methods used in psychobiological stress research; 2) demonstrate the impact of stressors and stress-related hormones on the structure and function of the nervous system and behavior; 3) critically read and interpret the primary research literature and discuss the strengths and weaknesses of experimental results; 4) conduct literature searches and synthesize these searches into a grant proposal; and 5) write a scientific grant proposal.

Readings: No textbook is required. Assigned readings are available in pdf format through CourseWorks.

Grades:
15% Participation in Journal Article Discussions
15% Questions for Journal Article Discussions
20% Presentation of Journal Article
10% Mini-Grant Proposal: Title, Hypothesis, Prediction, and References: DUE 10/17
20% Mini-Grant Proposal: Significance, Objectives of Proposed Research, and References: DUE 11/7
20% Mini-Grant Proposal: Experimental Design, Methods, Anticipated Results, Future Directions, and References: DUE 12/13

LATE ASSIGNMENTS WILL RESULT IN POINT REDUCTIONS AND ASSIGNMENTS MORE THAN 4 WEEKS PAST THE DUE DATE WILL NOT BE ACCEPTED.

Participation in Journal Article Discussions (15%): All students are expected to attend class and participate in our weekly journal article discussions.

Questions for Journal Article Discussions (15%): All students are required to provide at least one *meaningful* question for **each** journal article discussed during that class meeting (except if it is the paper you are presenting). These questions are to be emailed to Professor Romeo the Wednesday before (**by 11:59pm**) the class meeting.

Presentation of Journal Article (20%): Each student will present one assigned journal article on the assigned class meeting date. Students are expected to present a thorough "walk through" of the article's Introduction, Methods, Results, and Discussion. During Week 3, students will be provided with examples of how these presentations should be conducted.

Mini-Grant Proposal: Title, Hypothesis, Prediction, and References (10%): All students are required to provide a title of their grant proposal and a specific hypothesis and prediction(s) that will be tested in the grant proposal, along with supporting literature citations. An example will be posted on CourseWorks. This will be **due October 17th** and submitted via email as editable file, such a Word file, (**by 11:59pm on 10/17**) to Professor Romeo (2-3 pages, double spaced, 12-point font, 1-inch margins).

Mini-Grant Proposal: Significance, Objectives of Proposed Research, and References (20%): All students are required to write an original and relatively succinct literature review putting their research question in context, highlighting its significance and the specific objectives of the proposed research, along with supporting literature citations. An example will be posted on CourseWorks. This will be **due November 7th** and submitted via email (**by 11:59pm on 11/7**) to Professor Romeo (8-10 pages, double spaced, 12-point font, 1-inch margins). ***This should include the corrected Title, Hypothesis, Prediction, and References section.***

Mini-Grant Proposal: Experimental Design, Methods, Anticipated Results, Future Directions, and References (20%): All students are required to write an original and relatively succinct outline of their experimental design, proposed methods to be used, what results are expected/predicted, and what future experiments may be conducted after collecting the results from their proposed project. An example will be posted on CourseWorks. This will be **due Friday Dec 13th** and submitted via email (**by 11:59pm on 12/13**) to Professor Romeo (12-15 pages, double spaced, 12-point font, 1-inch margins). ***This should include the corrected Title, Hypothesis, and Prediction and Significance and Objectives of Proposed Research sections, along with an updated and complete Reference section.*** **THIS IS THE COMPLETE GRANT PROPOSAL**

Schedule:	**Topic:**	**Reading:**
Wk 1 (9/5)	**Course Organization, Syllabus, Topics and Expectations**	
Wk 2 (9/12)	**The Hormonal Stress Response**	Ulrich-Lai and Herman (2009) Nat Rev Neurosci
Wk 3 (9/19)	**Journal Articles and Discussion (Examples by Instructor)**	Droste *et al*. (2008) Endo Bergman *et al*. (2007) J Am Acad Child Adolesc Psychiatry
Wk 4 (9/26)	**Grant Proposal Workshop**	
Wk 5 (10/3)	**Journal Articles and Discussion (Development)**	Dent *et al*. (2000) Endocrinology Sapolsky and Altmann (1991) Biol Psychiatry
Wk 6 (10/10)	**Journal Articles and Discussion (Sex)**	Kudielka *et al*. (1998) J Clin Endo Metabol Goel and Bale (2010) Endocrinology
Wk 7 (10/17)	**Journal Articles and Discussion (Experience)** DUE: Title, Hypothesis, Prediction, and References	Bhatnagar *et al*. (2002) J Neuroendocrinol Romeo *et al*. (2006) Endocrinology
Wk 8 (10/24)	**Journal Articles and Discussion (Rhythmicity and Metabolism)**	Windle *et al*. (1998) Endocrinology Karatsoreos *et al*. (2010) Endocrinology
Wk 9 (10/31)	**Journal Articles and Discussion (Brain)**	Bloss *et al*. (2010) J Neurosci Eiland *et al*. (2012) Psychoneuroendocrinology
Wk 10 (11/7)	**Journal Articles and Discussion (Transgenerational/Epigenetic)** DUE: Significance, Objectives of Purposed Research, and References	Francis *et al*. (1999) Science Weaver *et al*. (2004) Nat Neurosci

Wk 11 (11/14)	**Journal Articles and Discussion (Neuroimmune and Health)**	Dhabhar and McEwen (1999) PNAS Cavigelli and McClintock (2003) PNAS
Wk 12 (11/21)	**(De)Programming of HPA Axis**	Vallee et al. (1997) J Neurosci Morely-Fletcher et al. (2003) Eur J Neurosci
	THANKSGIVING BREAK	
Wk 14 (12/5)	**Stress Interventions**	Lupien et al. (2013) Neuroscience Yeager et al. (2022) Nature

Finals Week (12/13) DUE: Experimental Design, Methods, Anticipated Results, Future Directions, and References

Reading List (pdfs are available via CourseWorks):

Bergman, K., *et al.* (2007). Maternal stress during pregnancy predicts cognitive ability and fearfulness in infancy. *Journal of the American Academy of Child and Adolescent Psychiatry,* **46**: 1454-1463.

Bhatnagar, S., *et al.* (2002). Lesions of the posterior paraventricular thalamus block habituation of hypothalamic-pituitary-adrenal responses to repeated restraint. *Journal of Neuroendocrinology,* **14**: 403-410.

Bloss, E. B., *et al.* (2010). Interactive effects of stress and aging on structural plasticity in the prefrontal cortex. *Journal of Neuroscience,* **30**: 6726-6731.

Cavigelli, S. A., and McClintock, M. K. (2003). Fear of novelty in infant rats predicts adult corticosterone dynamics and an early death. *Proceedings of the National Academy of Sciences,* **100**: 16131-16136.

Dent, G. W., *et al.* (2000). Rapid induction of corticotropin-releasing hormone gene transcription in the paraventricular nucleus of the developing rat. *Endocrinology,* **141**: 1593-1598.

Dhabhar, F. S. and McEwen, B. S. (1999). Enhancing versus suppressive effects of stress hormones on skin immune function. *Proceedings of the National Academy of Sciences,* **96**: 1059-1064.

Droste, S. K., *et al.* (2008). Corticosterone levels in the brain show a distinct ultradian rhythm but a delayed response to forced swim stress. *Endocrinology,* **149**: 3244-3253.

Eiland, L., et al. (2012). Chronic juvenile stress produces corticolimbic dendritic architectural remodeling and modulates emotional behavior in male and female rats. *Psychoneuroendocrinology*, **37**: 39-47.

Francis, D., *et al.* (1999). Nongenomic transmission across generations of maternal behavior and stress response in the rat. *Science,* **286**: 1155-1158.

Goel, N. and Bale, T. L. (2010). Sex differences in the serotonergic influences on the hypothalamic-pituitary-adrenal stress axis. *Endocrinology*, **151**: 1784-1794.

Karatsoreos, I. N., *et al.* (2010). Endocrine and physiological changes in response to chronic corticosterone: a potential model of the metabolic syndrome in mouse. *Endocrinology,* **151**: 2117-2127.

Kudielka, B. M., et al. (1998). Sex differences in endocrine and psychological responses to psychosocial stress in healthy elderly subjects and the impact of a 2-week dehydroepiandrosterone treatment. *Journal of Clinical Endocrinology and Metabolism.* **83**: 1756-1761.

Lupien, S. J., *et al*. (2013). The *Destress for Success Program*: Effects of a stress education program on cortisol levels and depressive symptomatology in adolescents making the transition to high school. *Neuroscience*, **249**:74-87.

Morley-Fletcher, S., *et al.* (2003). Environmental enrichment during adolescence reverses the effects of prenatal stress on play behaviour and HPA axis reactivity in rats. *European Journal of Neuroscience*. **18**: 3367-3374.

Romeo, R. D., *et al.* (2006). Stress history and pubertal development interact to shape hypothalamic-pituitary-adrenal axis plasticity. *Endocrinology*, **147**: 1664-1674.

Sapolsky, R. M. and Altmann, J. (1991). Incidence of hypercortisolism and dexamethasone resistance increases with age among wild baboons. *Biological Psychiatry*, **30**: 1008-1016.

Ulrich-Lai, Y. M. and Herman, J. P. (2009). Neural regulation of endocrine and autonomic stress responses. *Nature Reviews Neuroscience*, **10**: 397-409.

Vallee, M., *et al*. (1997). Prenatal stress induces high anxiety and postnatal handling induces low anxiety in adult offspring: correlations with stress-induced corticosterone secretion. *Journal of Neuroscience*, **17**: 2626-2636.

Weaver, I. C. G., *et al.* (2004). Epigenetic programming by maternal behavior. *Nature Neuroscience*, **7**: 847-854.

Windle, R. J., *et al.* (1998). Ultradian rhythm of basal corticosterone release in the female rat: dynamic interaction with the response to acute stress. *Endocrinology*, **139**: 443-450.

Yeager, D. S., *et al*. (2022). A synergistic mindsets intervention protects adolescents from stress. *Nature*, **607**: 512-520.

Class Policies:

Attendance: As participation in seminar courses is of paramount importance, it is assumed that you will make every effort to attend every seminar meeting. If medical or other significant extenuating circumstances keep you from attending class, email (rromeo@barnard.edu) or call (4-5903) me before class so that I know that you will be absent from our class meeting. A sign-in sheet will be circulated at the being of each seminar meeting.

Grading and Grade Scale: ***There is no extra credit***. The grading scale is as follows: A+ = 100-98; A = 97.9-92; A- = 91.9-90; B+ = 89.9-88; B = 87.9-82; B- = 81.9-80; C+ = 79.9-78; C = 77.9-72; C- = 71.9-70; D = 69.9-60; F = 59.9-0.

Honor Code:

Approved by the student body in 1912 and updated in 2016, the Code states:
We, the students of Barnard College, resolve to uphold the honor of the College by engaging with integrity in all of our academic pursuits. We affirm that academic integrity is the honorable creation and presentation of our own work. We acknowledge that it is our responsibility to seek clarification of proper forms of collaboration and use of academic resources in all assignments or exams. We consider academic integrity to include the proper use and care for all print, electronic, or other academic resources. We will respect the rights of others to engage in pursuit of learning in order to uphold our commitment to honor. We pledge to do all that is in our power to create a spirit of honesty and honor for its own sake.

Additional information about the Barnard College Honor Code can be found at: https://barnard.edu/honor-code

Wellness Statement:

It is important for undergraduates to recognize and identify the different pressures, burdens, and stressors you may be facing, whether personal, emotional, physical, financial, mental, or academic. We as a community urge you to make yourself--your own health, sanity, and wellness--your priority throughout this term and your career here. Sleep, exercise, and eating well can all be a part of a healthy regimen to cope with stress. Resources exist to support you in several sectors of your life, and we encourage you to make use of them. Should you have any questions about navigating these resources, please visit: https://barnard.edu/wellwoman/about

Center for Accessibility Resources and Disability Services Statement:
If you believe you may encounter barriers to the academic environment due to a documented disability or emerging health challenges, please feel free to contact me and/or the Center for Accessibility Resources & Disability Services (CARDS). Any student with approved academic accommodations is encouraged to contact me during office hours or via email. If you have questions regarding registering a disability or receiving accommodations for the semester, please contact CARDS at (212) 854-4634, cards@barnard.edu, or learn more at: https://barnard.edu/disabilityservices/faculty-staff/faculty-info

Plagiarism:
Presenting someone else's ideas as you won, either verbatim or recast in your own words, is a serious academic offense with serious consequences. Please see this discussion of plagiarism in our campus policies: https://barnard.edu/frequently-asked-questions-4

ChatGPT and generative AI:
Submitting work that is generated by AI is not acceptable. There are no shortcuts when it comes to learning how to write about and present your own research. Instead, you are expected to put in the time and effort required to create your own work, which will not only demonstrate your understanding of your research topic, but also your ability to think critically and creatively. Students are expected to take responsibility for their work to ensure that it is original and well-researched.