NOTE: In Fall 2016 Dr. Spicer's section of G4440 will meet from 2:10 - 4 PM on Thursdays.

G4440 Topics in Neurobiology and Behavior: Health Neuroscience and Stress (Preliminary Syllabus)

Spring, 2016, Thursdays 12:10 PM – 2:00 PM
Schermerhorn, Room 405
Instructor: Julie Spicer, Ph.D.
Email: jas2161@columbia.edu
Office Hours: by Appointment

Course overview: This course explores the emerging field of health neuroscience with a focus on stress. Health psychology and neuroscience are concerned with the links between psychological processes and health outcomes by way of neural and physiological processes. We will consider (1) neural mechanisms of physiological processes important to health outcomes, such as cardiovascular and inflammatory processes (2) how stress is defined from social, psychological, physiological and neural levels (3) developmental origins of health and disease (DOHaD) (4) psychological processes. In some weeks, we will consider examples from the perspective of scholars from related disciplines such as public health and history of science.

Course requirements: Each week students will attend a two–hour seminar. No later than 5 PM of the proceeding evening, students will submit (via **Courseworks**) three questions about that week's readings (none based on the same paper). These questions will be used to launch discussion during each meeting. Weekly readings are readily available to download via the CU system, PubMed or Google Scholar. Students will be assigned a week for which they will lead the discussion. No later than 5 PM of the preceding evening, class leaders will submit (via **email**) slides and questions they have prepared. (Depending on class size and preference, students can do this individually or in pairs.) In addition to these readings, students will write a final paper (10 pages) on a topic of their choice. These papers will require 15 references (5 of which can be from the course syllabus). Students will give a brief presentation on their paper topic at the final class meeting.

A note about weekly questions: These are to be integrative and to reflect thoughtfulness about the class readings; they should not be one sentence 'why' questions, or 'has this ever been looked at' questions, as those can begin to be answered with a little investigative work on one's own.

Grading will be allocated as follows:
Attendance/Participation: 25%
Weekly questions: 25%
Class leader: 25%
Final paper and 10 minute presentation: 25%

Week 1: Introduction and Overview

****Week 2: What is health neuroscience?**

Miller, G., Chen, E., & Cole, S. W. (2009). Health psychology: Developing biologically plausible models linking the social world and physical health. *Annual Review of Psychology*. 60:501–24.
Approx 23 pages

Erickson, K. I., Creswell, J. D., Verstynen, T. D., & Gianaros, P. J. (2014). Health Neuroscience Defining a New Field. *Current Directions in Psychological Science*, *23*(6), 446-453.
Approx 7 pages

Eisenberger, N. I., & Cole, S. W. (2012). Social neuroscience and health: neurophysiological mechanisms linking social ties with physical health. *Nature Neuroscience*, *15*(5), 669–674.
Approx 5 pages

Week 3: Stress

Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: a theoretical integration and synthesis of laboratory research. *Psychological Bulletin*, *130*(3), 355–391.
[Read Introduction, skim Methods and Results, Read Discussion, Assess Figures]
Approx 11 pages

Epel, E. S., Blackburn, E. H., Lin, J., Dhabhar, F. S., Adler, N. E., Morrow, J. D., & Cawthon, R. M. (2004). Accelerated telomere shortening in response to life stress. *Proceedings of the National Academy of Sciences of the United States of America*, *101*(49), 17312–17315.
Approx 3 pages

Wang, J., Rao, H., Wetmore, G. S., Furlan, P. M., Korczykowski, M., Dinges, D. F., & Detre, J. A. (2005). Perfusion functional MRI reveals cerebral blood flow pattern under psychological stress. *Proceedings of the National Academy of Sciences of the United States of America*, *102*(49), 17804–17809.
Approx 5 pages

van Marle, H. J. F., Hermans, E. J., Qin, S., & Fernández, G. (2010). Enhanced resting-state connectivity of amygdala in the immediate aftermath of acute psychological stress. *NeuroImage*, *53*(1), 348–354.
Approx 6 pages

Lataster, J., Collip, D., Ceccarini, J., Haas, D., Booij, L., van Os, J., et al. (2011). Psychosocial stress is associated with in vivo dopamine release in human ventromedial prefrontal cortex: A positron emission tomography study using [18F]fallypride. *NeuroImage*, *58*(4), 1081–1089.
Approx 8 pages

****Week 4: Cardiovascular System**

Wager, T. D., Waugh, C. E., Lindquist, M., Noll, D. C., Fredrickson, B. L., & Taylor, S. F. (2009). Brain mediators of cardiovascular responses to social threat: part I: Reciprocal dorsal and ventral sub-regions of the medial prefrontal cortex and heart-rate reactivity. *NeuroImage*, *47*(3), 821–835.
Approx 14 pages

Gianaros, P. J., Sheu, L. K., Matthews, K. A., Jennings, J. R., Manuck, S. B., & Hariri, A. R. (2008). Individual differences in stressor-evoked blood pressure reactivity vary with activation, volume, and functional connectivity of the amygdala. *The Journal of Neuroscience*, *28*(4), 990-999.
Approx 9 pages

Thayer, J., Åhs, F., Fredrikson, M., & Sollers, J., III. Wager, T. D. (2012). A meta-analysis of heart rate variability and neuroimaging studies: Implications for heart rate variability as a marker of stress and health. *Neuroscience & Biobehavioral Reviews*, 36, 747-756.
Approx 9 pages

Hermans, E. J., van Marle, H. J. F., Ossewaarde, L., Henckens, M. J. A. G., Qin, S., van Kesteren, M. T. R., et al. (2011). Stress-related noradrenergic activity prompts large-scale neural network reconfiguration. *Science*, *334*(6059), 1151–1153.
Approx 2 pages

Week 5: **Inflammation**

Cohen, S., Tyrrell, D. A., & Smith, A. P. (1993). Negative life events, perceived stress, negative affect, and susceptibility to the common cold. *Journal of Personality and Social Psychology*, *64*(1), 131–140.
Approx 9 pages

Dickerson, S., Gable, S., & Irwin, M. (2009). Social-Evaluative Threat and Proinflammatory Cytokine Regulation An Experimental Laboratory Investigation. *Psychological Science, 20*, 1237-1244.
Approx 7 pages

Muscatell, K. A., Dedovic, K., Slavich, G. M., Jarcho, M. R., Breen, E. C., Bower, J. E., et al. (2014). Greater amygdala activity and dorsomedial prefrontal-amygdala coupling are associated with enhanced inflammatory responses to stress. *Brain, Behavior, and Immunity*. doi.:10.1016/j.bbi.2014.06.201
Approx 8 pages

Slavich, G. M., Way, B. M., Eisenberger, N. I., & Taylor, S. E. (2010). Neural sensitivity to social rejection is associated with inflammatory responses to social stress. *Proceedings of the National Academy of Sciences of the United States of America*, *107*(33), 14817–14822.
Approx 5 pages

Week 6: Depression

Wager, T. D., & Gianaros, P. J. (2014). The social brain, stress, and psychopathology. *JAMA Psychiatry*, *71*(6), 622–624.
Approx 2 pages

Ryan, J. P., Sheu, L. K., Critchley, H. D., & Gianaros, P. J. (2012). A Neural Circuitry Linking Insulin Resistance to Depressed Mood. *Psychosomatic Medicine*. doi:10.1097/PSY.0b013e31824d0865
Approx 7 pages

Eisenberger, N. I., Inagaki, T. K., Rameson, L. T., Mashal, N. M., & Irwin, M. R. (2009). An fMRI study of cytokine-induced depressed mood and social pain: The role of sex differences. *NeuroImage*, *47*(3), 881–890.
Approx 9 pages

Cyranowski, J. M., Hofkens, T. L., Swartz, H. A., & Gianaros, P. J. (2011). Thinking about a close relationship differentially impacts cardiovascular stress responses among depressed and nondepressed women. *Health Psychology*, *30*(3), 276-284.
Approx 8 pages

Week 7: Socioeconomic Status I

Adler, N. E., Boyce, T., Chesney, M. A., Cohen, S., Folkman, S., Kahn, R. L., & Syme, S. L. (1994). Socioeconomic status and health: the challenge of the gradient. *American psychologist*, *49*(1), 15-24.
Approx 9 pages

Gianaros, P.J., Matthews, K., & Cohen, S. (2008). Potential neural embedding of parental social standing. *Social Cognitive Affective Neuroscience*, 3, 91-96.
Approx 5 pages

Gianaros, P. J., Horenstein, J. A., Cohen, S., Matthews, K. A., Brown, S. M., Flory, J. D., et al. (2007). Perigenual anterior cingulate morphology covaries with perceived social standing. *Social Cognitive and Affective Neuroscience*, *2*(3), 161–173.
Approx 12 pages

****Week 8: Socioeconomic Status II**

Seeman, T. E., McEwen, B.S., Rowe, J.W., & Singer, B.H. Allostatic load as a marker of cumulative biological risk: MacArthur studies of successful aging. *Proceedings of the National Academy of Sciences of the United States of America*, *98*(8), 4770–4775.
Approx 5 pages

Gruenewald, T. L., Karlamangla, A. S., Hu, P., Stein-Merkin, S., Crandall, C., Koretz, B., & Seeman, T. E. (2012). History of socioeconomic disadvantage and allostatic load in later life. *Social Science & Medicine, 74*(1), 75–83.
Approx 8 pages

McEwen, B. S., & Gianaros, P. J. (2010). Central role of the brain in stress and adaptation: links to socioeconomic status, health, and disease. *Annals of the New York Academy of Sciences*, *1186*(1), 190-222.
Approx 32 pages

Week 9: No class meeting – Spring Break

Week 10: Developmental Origins of Health and Disease I

Wadhwa, P. D., Buss, C., Entringer, S., & Swanson, J. M. (2009, September). Developmental origins of health and disease: brief history of the approach and current focus on epigenetic mechanisms. In *Seminars in reproductive medicine* (Vol. 27, No. 5, p. 358). NIH Public Access.
Approx 10 pages

Danese, A., Pariante, C. M., Caspi, A., Taylor, A., & Poulton, R. (2007). Childhood maltreatment predicts adult inflammation in a life-course study. *Proceedings of the National Academy of Sciences of the United States of America*, *104*(4), 1319–1324.
Approx 5 pages

Sheridan, M. A., How, J., Araujo, M., Schamberg, M. A., & Nelson, C. A. (2013). What are the links between maternal social status, hippocampal function, and HPA axis function in children? *Developmental Science*, *16*(5), 665–675.
Approx 10 pages

Hackman, D. A., & Farah, M. J. (2009). Socioeconomic status and the developing brain. *Trends in Cognitive Sciences*, *13*(2), 65–73.
Approx 8 pages

Week 11: Developmental Origins of Health and Disease II

Shonkoff, J. P., Garner, A. S. Siegel, B. S., Dobbins, M. I., Earls, M. F., et al. (2011). The Lifelong Effects of Early Childhood Adversity and Toxic Stress. *Pediatrics*, *129*(1), e232–e246.
Approx 14 pages

Chen, E., Miller, G. E., Kobor, M. S., & Cole, S. W. (2011). Maternal warmth buffers the effects of low early-life socioeconomic status on pro-inflammatory signaling in adulthood. *Mol Psychiatry*, *16*(7), 729–737.
Approx 8 pages

Taylor, S. E. (2010). Mechanisms linking early life stress to adult health outcomes. *Proceedings of the National Academy of Sciences of the United States of America, 107*(19), 8507–8512.
Approx 5 pages

Kim, P., Evans, G. W., Angstadt, M., Ho, S. S., Sripada, C. S., Swain, J. E., et al. (2013). Effects of childhood poverty and chronic stress on emotion regulatory brain function in adulthood. *Proceedings of the National Academy of Sciences of the United States of America*, *110*(46), 18442–18447.
Approx 5 pages

Richardson, S. S., Daniels, C. R., Gillman, M. W., Golden, J., Kukla, R., Kuzawa, C., & Rich-Edwards, J. (2014). Society: Don't blame the mothers. *Nature*, *512*(7513), 131–132.
Approx 1 page

****Week 12: Psychological Processes I**

Gianaros, P. J., & Wager, T. D. (2015). Brain-Body Pathways Linking Psychological Stress and Physical Health. *Current Directions in Psychological Science*, *24*(4), 313–321.
Approx 8 pages

Dickerson, S. S., Gruenewald, T. L., & Kemeny, M. E. (2004). When the Social Self Is Threatened: Shame, Physiology, and Health. *Journal of Personality*, *72*(6), 1191–1216.
Approx 25 pages

Childs, E., White, T. L., & de Wit, H. (2014). Personality traits modulate emotional and physiological responses to stress. *Behavioural Pharmacology*, *25*(5-6), 493–502.
Approx 9 pages

Week 13: Psychological Processes II

Adler, N. E., & Snibbe, A. C. (2003). The Role of Psychosocial Processes in Explaining the Gradient Between Socioeconomic Status and Health. *Current Directions in Psychological Science*, *12*(4), 119–123.
Approx 4 pages

Gallagher, S., Meaney, S., & Muldoon, O. T. (2014). Social identity influences stress appraisals and cardiovascular reactions to acute stress exposure. *British Journal of Health Psychology*, *19*(3), 566–579.
Approx 13 pages

Gianaros, P. J., Marsland, A. L., Kuan, D. C. H., Schirda, B. L., Jennings, J. R., Sheu, L. K., ... & Manuck, S. B. (2014). An inflammatory pathway links atherosclerotic cardiovascular disease risk to neural activity evoked by the cognitive regulation of emotion. *Biological Psychiatry*, *75*(9), 738-745.
Approx 7 pages

Lane, R., McRae, K., Reiman, E., & Chen, K. (2009). Neural correlates of heart rate variability during emotion. *NeuroImage*. 44, 213-222.
Approx 9 pages

Week 14: Student presentations of final papers

Week 15: No class meeting – Final papers due at 5 PM (via email)

Recommended Extra Reading

Folkman, S., Lazarus, R. S., Dunkel-Schetter, C., DeLongis, A., & Gruen, R. J. (1986). Dynamics of a stressful encounter: cognitive appraisal, coping, and encounter outcomes. *Journal of Personality and Social Psychology*, *50*(5), 992–1003.1.

Gianaros, P. J., Derbtshire, S. W., May, J. C., Siegle, G. J., Gamalo, M. A., & Jennings, J. R. (2005). Anterior cingulate activity correlates with blood pressure during stress. *Psychophysiology*, *42*(6), 627-635.

Taylor, S. E., Burklund, L. J., Eisenberger, N. I., Lehman, B. J., Hilmert, C. J., & Lieberman, M. D. (2008). Neural bases of moderation of cortisol stress responses by psychosocial resources. *Journal of Personality and Social Psychology*, *95*(1), 197–211.

Chen, E., & Miller, G. E. (2012). "Shift-and-Persist" Strategies: Why Being Low in Socioeconomic Status isn't Always Bad for Health. *Perspectives on Psychological Science*, *7*(2), 135–158.

Braveman, P. A., Cubbin, C., Egerter, S., Williams, D. R., & Pamuk, E. (2010). Socioeconomic Disparities in Health in the United States: What the Patterns Tell Us. *American Journal of Public Health*, *100*(S1), S186–S196.

Hackman, D. A., Farah, M. J., & Meaney, M. J. (2010). Socioeconomic status and the brain: mechanistic insights from human and animal research. *Nature Reviews Neuroscience*, *11*(9), 651–659.

Gianaros, P. J., Marsland, A. L., Sheu, L. K., Erickson, K. I., & Verstynen, T. D. (2012). Inflammatory pathways link socioeconomic inequalities to white matter architecture. *Cerebral Cortex*, *23*(9), bhs191–2071.

Ramsay, D. S., & Woods, S. C. (2014). Clarifying the roles of homeostasis and allostasis in physiological regulation. *Psychological Review*, *121*(2), 225–247.

Bogdan, R., & Hariri, A. R. (2012). Neural embedding of stress reactivity. *Nature Neuroscience*, *15*(12), 1605–1607.

Branchi, I., & Cirulli, F. (2014). Early experiences: Building up the tools to face the challenges of adult life. *Developmental Psychobiology*, n/a–n/a. doi:10.1002/dev.21235

Fox, A. S., Oler, J. A., Tromp, D. P. M., Fudge, J. L., & Kalin, N. H. (2015). Extending the amygdala in theories of threat processing. *Trends in Neurosciences*. http://doi.org/10.1016/j.tins.2015.03.002

Roy, M., Shohamy, D., & Wager, T. D. (2012). Ventromedial prefrontal-subcortical systems and the generation of affective meaning. *Trends in Cognitive Sciences*, *16*(3), 147–156.

Slavich, G. M., O'Donovan, A., Epel, E. S., & Kemeny, M. E. (2010). Black sheep get the blues: a psychobiological model of social rejection and depression. *Neuroscience & Biobehavioral Reviews*, *35*(1), 39–45.

Muscatell, K. A., Morelli, S. A., Falk, E. B., Way, B. M., Pfeifer, J. H., Galinsky, A. D., et al. (2012). Social status modulates neural activity in the mentalizing network. *NeuroImage*, *60*(3), 1771–1777.

Zink, C. F., Tong, Y., Chen, Q., Bassett, D. S., Stein, J. L., & Meyer-Lindenberg, A. (2008). Know your place: neural processing of social hierarchy in humans. *Neuron*, *58*(2), 273–283.

** Indicates a class amenable to paired class leaders

Faculty Statement on Academic Integrity

The intellectual venture in which we are all engaged requires of faculty and students alike the highest level of personal and academic integrity. As members of an academic community, each one of us bears the responsibility to participate in scholarly discourse and research in a manner characterized by intellectual honesty and scholarly integrity.

Scholarship, by its very nature, is an iterative process, with ideas and insights building one upon the other. Collaborative scholarship requires the study of other scholars' work, the free discussion of such work, and the explicit acknowledgement of those ideas in any work that inform our own. This exchange of ideas relies upon a mutual trust that sources, opinions, facts, and insights will be properly noted and carefully credited.

In practical terms, this means that, as students, you must be responsible for the full citations of others' ideas in all of your research papers and projects; you must be scrupulously honest when taking your examinations; you must always submit your own work and not that of another student, scholar, or internet agent.

Any breach of this intellectual responsibility is a breach of faith with the rest of our academic community. It undermines our shared intellectual culture, and it cannot be tolerated. Students failing to meet these responsibilities should anticipate being asked to leave Columbia.

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http://www.college.columbia.edu/academics/academicintegrity