**PSY 809**

*Developmental Psychobiology*

*Fall, 2021*

The objective of this graduate-level seminar course is to examine the biological factors influencing how the brain, behavior, and mental health are shaped by events occurring during early life and how they change over the course of an organism’s early development. These changes result from a complex interaction among an organism’s genetic profile, physical development (especially of the nervous system), sensory experience, exposure to internal and external chemical factors, and the social environment. The course readings often include “classics” in the field in addition to recent contributions, which will give you some historical perspective on these topics. By the end of this course, you should understand the transactional relationships among the biological and psychological factors underlying numerous aspects of typical and atypical development.

***Where and When:*** Psychology Building Room 153; Mondays, 1:50-4:40 pm.

***Professors:*** Joe Lonstein, 4017 ISTB, 353-8675, lonstein@msu.edu

 Alytia Levendosky, 107C Psychology Bldg, 353 -6396, levendo1@msu.edu

***Office Hours:*** By appointment

***Grading:***

1. There are 100 points to obtain toward your grade.
2. 10% of your grade will be based on your 1-2 page, double-spaced reaction papers that are due each week two days before class (i.e. Saturdays by 5 pm) and on your weekly in-class participation. Please email reaction papers as MS Word files to both Drs. Levendosky and Lonstein. No reaction papers are due for Week 1. The reaction papers are expected to be written based on the readings assigned for class. They can be an in-depth analysis of, and questions you may have about, at least three particular readings, or they can address similar issues or questions that arose more generally across those readings and others assigned for that class period. You are expected to do all of the reading in preparation for each class period and to actively participate in the class discussions.
3. 20% of your grade will be based on your class presentation. During our first class meeting, students will choose or be assigned a day near the end of the semester during which they will present material related to that week’s topic. You will assign the class one empirical article (i.e., no reviews) of your choice directly related to that topic and be prepared to lead a discussion on your presentation and the readings. Send your article to Drs. Levendosky and Lonstein at least two weeks in advance of your presentation, and we will let you know if we think it’s an appropriate choice. If not, we will ask you to choose and send us another one. After your chosen article is approved, we will send it to the rest of the class. You are expected to have enough material for a presentation and discussion lasting ~30 minutes.
4. 30% of your grade will be based on a midterm exam covering material from the beginning of the semester up until the material covered in class on 10/18. The exam will be sent by email to the class on 10/18 and is due on Friday, 10/29. The format of the exam will be take-home essays and you must generate your answers alone, not with other students in the course or the assistance from any other people. To hand in your exam, email your answers contained in a single MS Word file to both Drs. Levendosky and Lonstein by 5 pm on Friday, 10/29. After the exams are graded and returned to you, any specific questions or concerns about how your exams were graded have to be sent to both Drs. Levendosky and Lonstein in writing within one week after exams are returned, and then we will meet with you within one week after that to discuss it. We will not reconsider exam grades any later in the semester than this. A makeup exam will be granted only in the case of a documented medical, religious, or legal excuse and must be completed within 7 days of the original exam. There are no exceptions to this policy.
5. The last 40% of your grade will be for preparing and handing in a final term paper. Your paper will provide an overview of some topic related to the content of the course, so must focus on a scientific topic pertinent to the early life development of a specific behavior or specific mental or psychological process/state/outcome, and the central nervous system or another relevant biological systems involved in its development. This term paper will be at least 10 full, double-spaced typed pages, not including the title page or reference list. If your final term paper has fewer than 10 pages of meaningful and relevant text, each page short will involve a 10% loss of your term paper grade. You must use 12-point Times Roman font and 1-inch margins. Do not include a running header at the top, a footer at the bottom, or use subheadings within the text. Do not include any additional spaces between paragraphs. Please do include page numbers on the bottom of each page. A list of references used in the paper must be included at the end and presented in APA format (footnotes or any other style are not acceptable).

To obtain the necessary information for your paper you should exclusively use primary scientific articles, similar to the ones we read in class. Textbooks, articles from popular magazines, health-related websites, and class lecture notes are not appropriate sources for this paper and we will tell you to remove them. The two essential places to find abstracts of the articles you should use are https://pubmed.ncbi.nlm.nih.gov/ or the PsychInfo database accessible from the MSU library webpage. Google Scholar could also be useful. To receive full credit for the term paper, you must turn in on the assigned dates specified below: (1) A 1-page double-spaced description of the topic you will write about and a brief discussion of why you think it’s an important/interesting topic. You will send it to both Drs. Levendosky and Lonstein via email by the beginning of class on 11/15. By Friday, 11/19, we will then have arranged to meet with and/or have emailed with you to help you refine the topic. (2) The final paper. You will hand in the final paper by noon on Tuesday, 12/14 by emailing it as an MS Word file to both Drs. Levendosky and Lonstein.

***Grading Scale:***

Reaction papers/Class participation = 10 points

 Class presentation = 20 points

 Midterm Exam = 30 points

 Final Term Paper = 40 points

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 **TOTAL = 100 points**

> 90 points = 4.0

85-89 points = 3.5

80-84 points = 3.0

75-79 points = 2.5

70-74 points = 2.0

65-69 points = 1.5

60-64 points = 1.0

< 60 points = 0.0

***Academic Honesty and Integrity***:

MSU has strict guidelines regarding academic honesty and integrity. These rules will be followed in this class, and no student is exempt for any reason. Refer to your Student Handbook to see details of these guidelines. Academic Honesty Article 2.3.3 of the Academic Freedom Report states, “The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards. In addition, the Psychology Department adheres to the policies on academic honesty specified in General Student Regulation 1.0 - Protection of Scholarship and Grades, the all University Policy on Integrity of Scholarship and Grades, and Ordinance 17.00 - Examinations (www.msu.edu/unit/ombud/RegsOrdsPolicies.html). Therefore, unless authorized by me, you are expected to complete all course assignments without assistance from each other or any other source. You are not authorized to use the www.allmsu.com web site to complete any work in this course. Students who violate MSU rules may receive a penalty grade, including but not limited to a failing grade on the assignment or in the course. If you have any questions or concerns about whether any particular activity is permitted in carrying out the work for this course are urged to see the very useful web site prepared by the University Ombudsman at www.msu.edu/unit/ombud, especially the section on Academic Honesty. The Ombudsman has some very specific information about the kinds of activities that are or are not appropriate. Also, please do not hesitate to discuss concerns or questions about these issues with me*.* Furthermore, consistent with MSU’s efforts to enhance student learning, foster honesty, and maintain integrity in our academic processes, instructors may use a tool called Turnitin to compare a student’s work with multiple sources. The tool compares each student’s work with an extensive database of prior publications and papers, providing links to possible matches and a ‘similarity score’. The tool does not determine whether plagiarism has occurred or not. Instead, the instructor must make a complete assessment and judge the originality of the student’s work. All submissions to this course may be checked using this tool. Students should submit papers to Turnitin Dropboxes without identifying information included in the paper (e.g. name or student number), the system will automatically show this info to faculty in your course when viewing the submission, but the information will not be retained by Turnitin.Student submissions will be retained in the global Turnitin repository.

***Limits to Confidentiality:***

Please be aware that class materials are generally considered confidential pursuant to the University’s student record policies. However, all University employees, including instructors, cannot maintain confidentiality when it conflicts with their responsibility to report certain issues based on external legal obligations or health and safety considerations of MSU community members and others. As the instructor, Professor Lonstein must report the following information to other University offices if you share it with him:

• Suspected child abuse/neglect, even if this maltreatment happened when you were a child

•Allegations of sexual assault or sexual harassment when they involve MSU students, faculty, or staff

•Credible threats of harm to oneself or to others

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In almost all cases, it will be your decision whether you wish to speak with that individual or not. If you would like to talk about these events in a more confidential setting, you are encouraged to make an appointment with the MSU Counseling Center (http://www.counseling.msu.edu/students).

***Accommodations for Students with Disabilities*:**

Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at [rcpd.msu.edu](http://rcpd.msu.edu). Once your eligibility for an accommodation has been determined, you will be issued a Verified Individual Services Accommodation ("VISA") form. Please present this form to Professors Levendosky and Lonstein at the start of the term and/or **two weeks prior to the accommodation date** (midterm exam, final paper, other assignments). Requests received after this date may not be honored.

**Date** **Topic**

Week 1 – 9/1 Introduction to Developmental Psychobiology: Perspectives on neuro-behavioral development, nature, and nurture

Week 2 – 9/6 **LABOR DAY** – no class

Week 3 - 9/13 Fundamentals of genetics, gene by environment interactions

 Guest speaker: Dr. Kelly Klump

Week 4 - 9/20 Epigenetics and parent-of-origin effects

Week 5 - 9/27 Central nervous system development and cellular substrates for plasticity

Week 6 – 10/4 Development of the sensory world and the emergence of behavior

Week 7 - 10/11 Development of sex differences in behavior and the brain

Week 8 - 10/18 Development of stress systems and effects of prenatal stress

Week 9 - 10/25 **FALL BREAK** – no class

 **Midterm exam due by 5 pm on Friday, 10/29**

Week 10 – 11/1 Prenatal drugs and neurobehavioral development

Week 11 - 11/8 Parental influences on offspring neurobehavioral development I: Healthy Parenting

Week 12 - 11/15 Parental influences on offspring neurobehavioral development II: Abuse, Neglect, Separation

 **Term paper topics due by beginning of class this day**

Week 13 - 11/22 Parental influences on offspring neurobehavioral development III: Parental Psychopathology

Week 14 - 11/29 Child psychopathology I - Internalizing disorders: depression, anxiety

Week 15 - 12/6 Child psychopathology II - Externalizing disorders

 Guest speaker: Dr. Alexandra Burt

Week 16 - 12/14 (Tu) **Term papers due by noon**

**Readings**

**Week 1 - Introduction to Developmental Psychobiology: Perspectives on neurobehavioral development, nature, and nurture**

* Lewontin R (1985). The organism as object and subject of evolution. In: R. Levins and R. Lewontin (Eds). *The Dialectical Biologist*, pp. 85-106. Cambridge, MA, Harvard University Press.
* Gould SJ (1991). Exaptation: A crucial tool for an evolutionary psychology. J Social Issues 47:43-65.
* Tinbergen N (1963). On aims and methods of Ethology. Zeitschrift fur Tierpsychologie 20:412-33.
* McCall RB (1981). Nature-nurture and the two realms of development: A proposed integration with respect to mental development. Child Dev 52:1-12.
* Pinker SA (2004). Why nature and nurture won’t go away. Daedalus, 133: 5-17.
* Ellis BJ, Boyce WT, Belsky J, Bakersman-Kranenberg MJ, & van Ijzendoorn MH (2011). Differential susceptibility to the environment: An evolutionary neuro-developmental hypothesis. Dev Psychopathol 23:7-28.

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**Week 2 – LABOR DAY – no class**

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**Week 3 - Fundamentals of genetics, and gene by environment interactions**

* Korf, BR (2004). Basic genetics. Primary Care 31:461-78 (optional basic review)
* Cooper RM, Zubek JF (1958). Effects of enriched and restricted early environments on the learning ability of bright and dull rats. Can J Psychol 12:159-64.
* Caspi A, McClay J, Moffitt TE, Mill J, Martin J et al. (2002). Role of genotype in the cycle of violence in maltreated children. Science 297:851-4.
* Karg K, Burmeister M, Shedden K, Sen S (2011). The serotonin transporter promoter variant (5-HTTLPR), stress, and depression meta-analysis revisited: evidence of genetic moderation. Arch Gen Psychiatry 68:444–54.
* Rutter M (2007). Gene-environment interdependence. Dev Science 10:12-18.
* Scarr S, McCartney K (1983). How people make their own environments: a theory of genotype → environment effects. Child Dev 54:424-435.
* Gottlieb G (2007). Probabilistic epigenesis. Developmental Sci 10:1-11.

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**Week 4 - Epigenetics and Parent of Origin Effects**

Epigenetics:

* Weaver IC, Cervoni N, Champagne FA, D'Alessio AC, Sharma S, Seckl JR, Dymov S, Szyf M, Meaney MJ (2004). Epigenetic programming by maternal behavior. Nature Neurosci 7:847-54.
* McGowan PO, Sasaki A, D'Alessio AC, Dymov S, Labonté B, Szyf M, Turecki G, Meaney MJ (2009). Epigenetic regulation of the glucocorticoid receptor in human brain associates with childhood abuse. Nat Neurosci 12:342-8.
* Szyf, M., & Bick, J. (2013). DNA Methylation: A mechanism for embedding early life experiences in the genome. Child Dev 84(1), 49–57.
* Broad KD, Rocha-Ferreira E, Hristova M (2016). Placental, matrilineal, and epigenetic mechanisms promoting environmentally adaptive development of the mammalian brain. Neural Plast 2016:6827135.
* Miller G (2010). Epigenetics. The seductive allure of behavioral epigenetics. Science 329(5987):24-7.

Parent of Origin Effects:

* Guilmatre A, Sharp AJ (2012). Parent of origin effects. Clin Genet 81:201-9.
* Davies W, Humby T, Isles AR, Burgoyne PS, Wilkinson LS (2007). X-monosomy effects on visuospatial attention in mice: a candidate gene and implications for Turner syndrome and attention deficit hyperactivity disorder. Biol Psychiatry 61:1351-60.
* Lepage JF, Hong DS, Mazaika PK, Raman M, Sheau K, et al. (2013). Genomic imprinting effects of the X chromosome on brain morphology. J Neurosci 33:8567-74.

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**Week 5 - Central nervous system development and cellular substrates for plasticity**

* Early vertebrate development: Neurulation and ectoderm. In: Scott F. Gilbert’s *Developmental Biology*, second edition. Pp. 152-173. (optional basic review)
* Falconer DS (1951). Two new mutants,‘trembler’and ‘reeler’, with neurological actions in the house mouse (*Mus musculus L*.). J Genetics 50:192-205.
* Grossman AW, Aldridge GM, Lee KJ, Zeman MK, Jun CS, Azam HS, Arii T, Imoto K, Greenough WT, Rhyu IJ (2010). Developmental characteristics of dendritic spines in the dentate gyrus of Fmr1 knockout mice. Brain Res 1355:221-7.
* Hoeft F, Carter JC, Lightbody AA, Cody Hazlett H, Piven J, Reiss AL (2010). Region-specific alterations in brain development in one- to three-year-old boys with fragile X syndrome. Proc Natl Acad Sci USA 107:9335-9.
* Fox SE, Levitt P, & Nelson CA (2010). How the timing and quality of early experiences influence the development of brain architecture. Child Dev 81:28-40.

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**Week 6 - Development of the sensory world and the emergence of behavior**

Sensory development:

Sound:

* DeCasper AJ, Fifer W (1980). Of human bonding: Newborns prefer their mother’s voices. Science 208:1174-6.
* Rivera‐Gaxiola M, Silva‐Pereyra J, & Kuhl PK (2005). Brain potentials to native and non‐native speech contrasts in 7‐and 11‐month‐old American infants. Dev Science 8:162-72.
* Gottlieb G. (1980). Development of species identification in ducklings: VI. Specific embryonic experience required to maintain species-typical perception in Peking ducks. J Comparative Physiol Psychol 94:579-87.

Taste:

* Galef BG, Sherry DF (1973). Mother’s milk: A medium for transmission of cues reflecting the flavor of mother’s diet. J Comparative Physiol Psychol 83:374
* Mennella JA, Pepino MY, Reed DR (2005). Genetic and environmental determinants of bitter perception and sweet preferences. Pediatrics 115:e216-22.

Vision:

* Blakemore C, Cooper GF (1970). Development of the brain depends on the visual environment. Nature 228:477-8.
* Annis RC, Frost B (1973). Human visual ecology and orientation anisotropies in acuity. Science 182(4113):729-31.
* Pascalis O (2002). Is face processing species-specific during the first year of life? Science 296 (5571):1321-23.

Prenatal emergence of behavior:

* Smotherman WP, Robinson SR (1987). Prenatal expression of species-typical action patterns in the rat fetus (*Rattus norvegicus*). J Comp Psychol 101:190-6.
* Smotherman WP, Robinson SR. (1988). Behavior of rat fetuses following chemical or tactile stimulation. Behav Neurosci 102:24-34.
* Grant-Beuttler M, Glynn LM, Salisbury AL, Davis EP, Holliday C & Sandman CA, (2011). Development of fetal movement between 26 and 36-weeks’ gestation in response to vibro-acoustic stimulation. Front Psychol, 2:350-357.

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**Week 7 - Development of sex differences in behavior and the brain**

Behavior:

* Phoenix CH, Goy RW et al. (1959). Organizing action of prenatally administered testosterone propionate on the tissues mediating mating behavior in the female guinea pig. Endocrinology 65:369-82.
* Mueller, S.C., Verwilst, T., Van Branteghem, A., T'Sjoen, G. and Cools, M., 2016. The contribution of the androgen receptor (AR) in human spatial learning and memory: a study in women with complete androgen insensitivity syndrome (CAIS). Horm Behav, 78:121-126.
* Pasterski V, Zucker KJ, Hindmarsh PC, Hughes IA, Acerini C, Spencer D, Neufeld S, Hines M (2015). Increased cross-gender identification independent of gender role behavior in girls with congenital adrenal hyperplasia: results from a standardized assessment of 4- to 11-year-old children. Arch Sex Behav 44:1363-75.
* Bakker J, Honda S, Harada N, Balthazart J (2002). The aromatase knock-out mouse provides new evidence that estradiol is required during development in the female for the expression of sociosexual behaviors in adulthood. J Neurosci 22:9104-12.

Brain and other:

* Gorski RA, Gordon JH, Shryne JE, Southam AM (1978). Evidence for a morphological sex difference within the medial preoptic area of the rat brain. Brain Res 148:333-46.
* LeVay S (1991). A difference in hypothalamic structure between heterosexual and homosexual men. Science 253(5023):1034-7.
* Byne W, Tobet S, Mattiace LA, Lasco MS, Kemether E, Edgar MA, Morgello S, Buchsbaum MS, Jones LB (2001). The interstitial nuclei of the human anterior hypothalamus: an investigation of variation with sex, sexual orientation, and HIV status. Horm Behav 40:86-92.
	+ Knickmeyer RC, Wang J, Zhu H, Geng X, Woolson S, et al. (2014). Impact of sex and gonadal steroids on neonatal brain structure. Cereb Cortex 24:2721-31.

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**Week 8 - Prenatal stress and development of stress systems**

* Koss KJ, Gunnar MR (2018). Annual research review: Early adversity, the hypothalamic–pituitary–adrenocortical axis, and child psychopathology. J Child Psychol Psychiatry 59:327-346.
* Weinstock M. (2011). Sex-dependent changes induced by prenatal stress in cortical and hippocampal morphology and behaviour in rats: an update. Stress;14:604-13
* Glover V, O'Donnell KJ, O'Connor TG, Fisher J (2018). Prenatal maternal stress, fetal programming, and mechanisms underlying later psychopathology—A global perspective. Dev Psychopathol 30:843-854.
* Van Dijk AE, Van Eijsden M, Stronks K, Gemke RJ, Vrijkotte TG (2012). Prenatal stress and balance of the child's cardiac autonomic nervous system at age 5-6 years. PloS One, 7:e30413.
* Walker CD, Perrin M, Vale W, Rivier C. (1986). Ontogeny of the stress response in the rat: role of the pituitary and the hypothalamus. Endocrinology 118:1445-51.
* Levine S (2001). Primary social relationships influence the development of the hypothalamic–pituitary–adrenal axis in the rat. Physiol Behav 73:255-260.
* Hane AA, Fox NA. (2016). Early caregiving and human biobehavioral development: A comparative physiology approach. Current Opin Behav Sci 7:82-90.

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**Week 9 – FALL BREAK – no class**

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**Week 10 – Prenatal drugs and neurobehavioral development**

* Cronise K, Marino MD, Tran TD, Kelly SJ. (2001).Critical periods for the effects of alcohol exposure on learning in rats. Behav Neurosci 115:138-45.
* Ikonomidou C, Bittigau P, Ishimaru MJ, Wozniak DF, et al. (2000). Ethanol-induced apoptotic neurodegeneration and fetal alcohol syndrome. Science 287(5455):1056-60.
* Spano MS, Ellgren M, Wang X, Hurd YL. (2007). Prenatal cannabis exposure increases heroin seeking with allostatic changes in limbic enkephalin systems in adulthood. Biol Psychiatry 61:554-63.
* Mulder EJ, Morssink LP, Van Der Schee T, Visser GH. (1998). Acute maternal alcohol consumption disrupts behavioral state organization in the near-term fetus. Pediatric Res 44:774-9.
* Chang L, Oishi K, Skranes J, Buchthal S, Cunningham E, et al. (2016). Sex-specific alterations of white matter developmental trajectories in infants with prenatal exposure to methamphetamine and tobacco. JAMA Psychiatry 73:1217-27.
* Kaltenbach K, O’Grady KE, Heil SH, Salisbury AL, Coyle MG, et al. (2018). Prenatal exposure to methadone or buprenorphine: early childhood developmental outcomes. Drug Alcohol Depend 185:40-9.
* Long X, Little G, Treit S, Beaulieu C, Gong G, Lebel, C (2020). Altered brain white matter connectome in children and adolescents with prenatal alcohol exposure. Brain Struct Funct 225:1123-1133.

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**Week 11 - Parental influences on offspring neurobehavioral development I - Healthy Parenting**

* Levine S, Haltmeyer GC, Karas GG, Denenberg VH (1967). Physiological and behavioral effects of infantile stimulation. Physiol Behav 2:55-59.
* Francis D, Diorio J, Liu D, Meaney MJ (1999). Nongenomic transmission across generations of maternal behavior and stress responses in the rat. Science 286:1155-8.
* Maestripieri D, McCormack K, Lindell SG, Higley JD, Sanchez MM (2006). Influence of parenting style on the offspring's behaviour and CSF monoamine metabolite levels in cross-fostered and non-crossfostered female rhesus macaques. Behav Brain Res 175:90-95.
* Calkins SD, Smith CL, Gill KL, Johnson MC (1998). Maternal interactive style across contexts: Relations to emotional, behavioral and physiological regulation during toddlerhood. Social Dev 7: 350-369.
* Doan SN, Tardif T, Miller A, Olson S, Kessler D, Felt B. Wang L (2017). Consequences of ‘tiger’ parenting: a cross‐cultural study of maternal psychological control and children's cortisol stress response. Dev Sci 20:e12404-13.
* Mills-Koonce WR, Garrett-Peters P, Barnett D, Granger D (2011). Father contributions to cortisol responses in infancy and toddlerhood. Dev Psychology 47:388-95.
* Langlois JH, Ritter JM, Casey RJ, Sawin DB (1995). Infant attractiveness predicts maternal behaviors and attitudes. Dev Psychol 31:464-72.
* Kopala‐Sibley DC, Dougherty LR, Dyson MW, Laptook RS, Olino TM, Bufferd SJ, Klein DN (2017). Early childhood cortisol reactivity moderates the effects of parent–child relationship quality on the development of children's temperament in early childhood. Developmental Sci 20:e12378-12392.

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**Week 12 - Parental influences on offspring neurobehavioral development II – Abuse, Neglect, Separation**

* Hall WG (1975). Weaning and growth of artificially reared rats. Science, 190:1313-5.
* Afonso VM, King SJ, Novakov M, Burton CL, Fleming AS (2011). Accumbal dopamine function in postpartum rats that were raised without their mothers. Horm Behav 60:632-43.
* Raineki C, Cortés MR, Belnoue L, Sullivan RM. (2012). Effects of early-life abuse differ across development: infant social behavior deficits are followed by adolescent depressive-like behaviors mediated by the amygdala. J Neurosci 32:7758-65.
* Harlow HF, Harlow MK (1962). Social deprivation in monkeys. Scientific American, Nov. 1962: 136-46.
* McCormack K, Newman TK, Higley JD, Maestripieri D, Sanchez MM (2009). Serotonin transporter gene variation, infant abuse, and responsiveness to stress in rhesus macaque mothers and infants. Horm Behav 55:538-47.
* Drury SS, Sanchez MM, Gonzalez A (2016). When mothering goes awry: Challenges and opportunities for utilizing evidence across rodent, nonhuman primate and human studies to better define the biological consequences of negative early caregiving. Horm Behav 77:182-92.
* Kumsta R, Stevens S, Brookes K, Schlotz W, Castle J, Beckett C, Kreppner J, Rutter M, Sonuga-Barke E (2010). 5HTT genotype moderates the influence of early institutional deprivation on emotional problems in adolescence: evidence from the English and Romanian Adoptee (ERA) study. J Child Psychol Psychiatry 51:755-62.
* Teicher MH, Anderson CM, Ohashi K, Khan A, McGreenery CE, et al. (2018). Differential effects of childhood neglect and abuse during sensitive exposure periods on male and female hippocampus. Neuroimage 169:443-52.

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**Week 13 – Parental influences on offspring neurobehavioral development III- Parental Psychopathology**

Maternal Psychopathology:

* Brummelte S, Pawluski JL, Galea LA (2006). High postpartum levels of corticosterone given to dams influence postnatal hippocampal cell proliferation and behavior of offspring: a model of post-partum stress and possible depression. Horm Behav 50:370-82.
* Kaplan LA, Evans L, Monk C (2008). Effects of mothers' prenatal psychiatric status and postnatal caregiving on infant biobehavioral regulation: can prenatal programming be modified? Early Human Dev 84:249-256.
* Conradt E, Hawes K, Guerin D, Armstrong DA, Marsit CJ, Tronick E, Lester BM (2016). The contributions of maternal sensitivity and maternal depressive symptoms to epigenetic processes and neuroendocrine functioning. Child Dev 87:73-85.
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Students will choose some additional articles on this topic.

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