

Addiction Science (GMS MS710)
Course Syllabus Fall 2023
Thursdays 10AM-12PM
E201

Description: This introductory course will cover the broad field of addiction with a focus on drug dependence. In one segment of the course, students will learn about the spectrum of drug dependence disorders and modalities for diagnosis and treatment. Another segment will present a wide variety of approaches for studying addiction using the tools of epidemiology, genetics, pharmacology, neurobehavior, and animal models. Emphasis will be placed on transdisciplinary approaches which are essential for understanding and combating addiction disorders. In addition, students will be exposed to the impact of addiction on the family and society, and to public policy issues addressing the prevention of addiction.

Lecture Series Overview

1. Sep 7 *Introduction / History of Addiction Research* - **Lindsay Farrer**
2. Sep 14 *Current Approaches in Diagnosis & Treatment of Substance Use Disorders* -
Alexander Walley
3. Sep 21 *Target Trials for Addiction Medicine* - **Sara Lodi**
4. Sep 28 *Genetic Basis of Addiction* - **Lindsay Farrer**
5. Oct 5 *Clinical Trials for Substance Use Disorders* - **Zoe Weinstein**
6. Oct 12 *Neurochemistry & Neurobiology of Addiction I* - **Pietro Cottone /Valentina Sabino**
7. Oct 26 *Neurochemistry & Neurobiology of Addiction II* - **Pietro Cottone /Valentina Sabino**
8. Nov 2 *Opioid Analgesia and Addiction: Cellular and Molecular Mechanisms* - **Venetia Zachariou**
9. Nov 9 *Animal Models of Addiction* - **Kathleen Kantak**
10. Nov 16 *Neonatal Opioid Withdrawal Syndrome – Presentation, Treatment, and Emerging Research* - **Elisha Wachman**
11. Nov 30 *A Trauma-Informed Approach to Substance Use Prevention and Treatment with Latinos(as)/Latinx* – **Luz Lopez**
12. Dec 7 *The Politics of Addiction Prevention: From Tobacco to Alcohol to Cannabis* - **David Jernigan**
13. Dec 14 **student presentations**

Lecture Outlines

Lecture 1 (September 7): Introduction / History of Addiction Research

Lindsay A. Farrer, Ph.D.

BU Distinguished Professor of Genetics

Chief, Biomedical Genetics

Professor of Medicine, Neurology, Ophthalmology, Epidemiology, and Biostatistics

Boston University Chobanian & Avedisian School of Medicine & School of Public Health

Summary: This lecture will introduce the students to addiction as it pertains to diagnosis, treatment, research, and public policy. Insight into contemporary approaches in these domains will be provided by historical analysis.

Objectives: To give to the student some understanding of the history and attitudes and beliefs of drug abuse through the years by both the lay public and investigators.

Outline:

1. Introduction
 - a) Overview of course and learning objectives
 - b) Class organization
 - c) Evaluation and grading
2. Definition of Substance Use Disorders
3. History of substance use and societal views
4. Brain reward system
5. Animal models in the study of drug addiction

Required Readings:

- Wikler, A. A Psychodynamic Study of a Patient During Experimental Self-Regulated Re-addiction to Morphine *Psychiatric Quarterly*, 26:270-293, 1952
- Yale Reports. The Doctor and the Treatment of Narcotic Addiction –Daniel X. Freedman, Conan Kornetsky and Vincent Dole, 2/6/66.
- Robins LN, Helzer JE, Hesselbrock M, Wish E. Vietnam veterans three years after Vietnam: How our study changed our view of heroin. *Am J Addictions* 19:203-211, 2010.

Lecture 2 (September 14): Current Approaches in Diagnosis & Treatment of Substance Use Disorders

Alexander Walley, MD

Professor of Medicine

Boston University Chobanian & Avedisian School of Medicine

Summary: This lecture will review the natural history, diagnostic criteria and current treatment approaches for substance use disorders. Treatment approaches include existing evidence-based FDA-approved medications and behavioral therapy. Learning Objectives:

- Review the natural history of addiction and the basis for the disease model
- Review the current diagnostic criteria for substance use disorders
- Understand the existing clinical treatment approaches for substance use disorders, including opioids, stimulants, benzodiazepines, and alcohol

Outline:

1. Natural history of substance use disorders
2. Diagnostic criteria for substance use disorders – DSM IV and V
3. Alcohol Disorders
 - a) Behavioral treatment
 - b) Pharmacological treatment
4. Opioid Disorders
 - a) Pharmacologic treatment
 - b) Overdose prevention
5. Stimulant Disorders
 - a) Cocaine
 - b) Methamphetamine
 - c) Contingency management
6. Benzodiazepine Disorders
 - a) Medically managed withdrawal treatment (detoxification)

Required Readings:

- Kranzler HR, Soyka M. Diagnosis and pharmacotherapy of alcohol use disorder: a review. *Jama*. 2018 Aug 28;320(8):815-24.
- National Academies of Sciences, Engineering, and Medicine. Medications for opioid use disorder save lives. National Academies Press; 2019 May 16. Access at: <https://nap.nationalacademies.org/catalog/25310/medications-for-opioid-use-disorder-save-lives>
- Chan B, Kondo K, Freeman M, Ayers C, Montgomery J, Kansagara D. Pharmacotherapy for Cocaine Use Disorder-a Systematic Review and Meta-analysis. *J Gen Intern Med*. 2019 Dec;34(12):2858-2873. doi: 10.1007/s11606-019-05074-8. Epub 2019 Jun 10. PMID: 31183685; PMCID: PMC6854210.

Suggested Readings:

- Helping Patients Who Drink Too much: A Clinician’s Guide. [https://s21151.pcdn.co/wp-content/uploads/2016/11/Helping-Patients-who-Drink-Too-Much A-Clinicians-Guide-2017.pdf](https://s21151.pcdn.co/wp-content/uploads/2016/11/Helping-Patients-who-Drink-Too-Much-A-Clinicians-Guide-2017.pdf)
- McLellan TA et al. Drug Dependence: A Chronic Medical Illness. JAMA 2000 284: 1689-95.
- Hasin DS, O’Brien CP, Auriacombe M, Borges G, Bucholz K, Budney A, Compton WM, Crowley T, Ling W, Petry NM, Schuckit M. DSM-5 criteria for substance use disorders: recommendations and rationale. American Journal of Psychiatry. 2013 Aug;170(8):834-51. <http://www.ncbi.nlm.nih.gov/pubmed/17034434>
- Prendergast M, Podus D, Finney J, Greenwell L, Roll J. Contingency management for treatment of substance use disorders: A meta-analysis. Addiction. 2006;101(11):1546-1560.
- Tardelli VS, Bisaga A, Arcadepani FB, Gerra G, Levin FR, Fidalgo TM. Prescription psychostimulants for the treatment of stimulant use disorder: a systematic review and meta-analysis. Psychopharmacology (Berl). 2020 Aug;237(8):2233-2255. doi: 10.1007/s00213-020-05563-3. Epub 2020 Jun 29. PMID: 32601988.
- Saitz R. Clinical practice. Unhealthy alcohol use. N Engl J Med. 2005 Feb 10;352(6):596-607. doi: 10.1056/NEJMc042262. PMID: 15703424.

Lecture 3 (September 21): Target Trials for Addiction Medicine

Sara Lodi, Ph.D.

Associate Professor of Biostatistics

Boston University School of Public Health

Summary: This lecture will focus on the target trial emulation approach to design observational studies. To illustrate the methodology, we will discuss the study design and statistical analysis of an observational study on opioid tapering (Larochelle et al.).

Objectives:

1. The student will learn the basics of the target trial approach to study design and analysis of observational studies.
2. The student will be able to explain why the target trial approach is useful for avoiding common biases in observational epidemiology.

Outline:

1. Target trial emulation approach
2. Illustrating the methodology
 - a. Designing an observational study on opioid tapering
 - b. Statistical analysis of this study

Required Readings (BEFORE CLASS):

- Larochelle MR, Lodi S, Yan S, Clothier BA, Goldsmith ES, Bohnert AS. Comparative Effectiveness of Opioid Tapering or Abrupt Discontinuation vs No Dosage Change for Opioid Overdose or Suicide for Patients Receiving Stable Long-term Opioid Therapy. *JAMA Netw Open*. 2022 Aug 1;5(8):e2226523. doi: 10.1001/jamanetworkopen.2022.26523.

Suggested Readings:

- Miguel A. Hernán, James M. Robins, Using Big Data to Emulate a Target Trial When a Randomized Trial Is Not Available, *American Journal of Epidemiology*, Volume 183, Issue 8, 15 April 2016, Pages 758–764, <https://doi.org/10.1093/aje/kwv254>
- Sara Lodi, Andrew Phillips, Jens Lundgren, et al. Effect Estimates in Randomized Trials and Observational Studies: Comparing Apples With Apples, *American Journal of Epidemiology*, Volume 188, Issue 8, August 2019, Pages 1569–1577, <https://doi.org/10.1093/aje/kwz100>

Lecture 4 (September 28): Genetic Basis of Addiction

Lindsay A. Farrer, Ph.D.

BU Distinguished Professor of Genetics

Chief, Biomedical Genetics

Professor of Medicine, Neurology, Ophthalmology, Epidemiology, and Biostatistics

Boston University Chobanian & Avedisian School of Medicine & School of Public Health

Summary: This lecture will explore the genetic basis for addiction in humans. The session will begin with a discussion of the evidence from family and twin studies for the genetic component to dependence on various substances including nicotine, alcohol, cocaine, opioids and cannabis. There will be some didactic on methodologies for genetic linkage and association studies including genome-wide association studies. This will be followed by a demonstration of how these approaches have been applied in substance dependence with a focus on phenotype definition and discussion of qualitative versus quantitative trait outcomes. Finally, the lecture will introduce contemporary genetics research approaches in addictions including next generation sequencing and bioinformatics.

Objectives: At the end of the session, students will be able to:

1. Describe methodologies for determining the strength of the genetic component for addictions;
2. Differentiate the strengths and limitations for genetic linkage, candidate gene association, GWAS and next generation sequencing approaches to identify genes for addiction;
3. Articulate principles for family-based and case-control designs for genetic discovery in

the addictions;

4. Read and understand scientific papers focused on these topics.

Outline:

1. Review of basic principles of genetics
 - a) Mendelian Inheritance
 - b) Complex Inheritance
 - c) Quantitative traits
 - d) Linkage and association
2. Twin studies of addiction
3. Candidate gene studies of addiction
4. Genome-wide association studies of addiction

Required Readings:

- Smith AH, Jensen KP, Li J, Nunez Y, Farrer LA, Hakonarson H, Cook-Sather SD, Kranzler HR, Gelernter J. Genome-wide association study of therapeutic opioid dosing identifies a novel locus upstream of OPRM1. *Mol Psychiatry* 2017; 22:346-352.
- Johnson EC, Chang Y, Agrawal A. An update on the role of common genetic variation underlying substance use disorders. *Curr Genet Med Rep.* 2020; 8:35-46.

Suggested Readings:

- Xie P, Kranzler HR, Krystal JH, Farrer LA, Zhao H, Gelernter J. Deep resequencing of 17 glutamate system genes identifies rare variants in *DISC1* and *GRIN2B* affecting risk of opioid dependence. *Addiction Biology* 2014; 19:955-964.
- Gelernter J, Sherva R, Koesterer R, Zhao H, Kranzler HR, Farrer LA. Genomewide association study of cocaine dependence and related traits: FAM53B identified as a risk gene. *Molecular Psychiatry* 2014; 19:717-723.
- Gelernter J, Kranzler HR, Sherva R, Koesterer R, Sun J, Bi J, Almasy L, Zhao H, **Farrer LA**. Genomewide association study of opioid dependence and related traits: multiple associations mapped to calcium and potassium pathways. *Biological Psychiatry* 2014; 76:66-74.
- Sherva R, Wang Q, Kranzler HR, Zhao H, Koesterer R, Herman A, Farrer LA, Gelernter J. Genome wide association study of cannabis dependence severity reveals novel risk variants, genes previously implicated in schizophrenia risk, and shared risk with major depressive disorder. *JAMA Psychiatry* 2016; 73:472-480.
- Cox JW, Sherva RM, Lunetta KL, Johnson EC, Martin NG, Degenhardt L, Agrawal A, Nelson EC, Kranzler H, Gelernter J, Farrer LA. Genome-wide association study of opioid cessation. *J Clin Med* 2020; 9:180.
- Cozzoli D, Daponte A, De Fazio S, Ariano V, Quaranta MR, Leone V, Ostuni A, Casanova M, Catacchio CR, Ventura M, Montinaro F. Genomic and personalized medicine approaches for substance use disorders (SUDs) looking at genome-wide association studies. *Biomedicines.* 2021; 9(12):1799.

- Deak JD, Zhou H, Galimberti M, Levey DF, Wendt FR, Sanchez-Roige S, Hatoum AS, Johnson EC, Nunez YZ, Demontis D, Børglum AD, Rajagopal VM, Jennings MV, Kember RL, Justice AC, Edenberg HJ, Agrawal A, Polimanti R, Kranzler HR, Gelernter. J Genome-wide association study in individuals of European and African ancestry and multi-trait analysis of opioid use disorder identifies 19 independent genome-wide significant risk loci. *Mol Psychiatry*. 2022 Jul 25. doi: 10.1038/s41380-022-01709-1. Online ahead of print.

Lecture 5 (October 5): Clinical Trials for Substance Use Disorders

Zoe Weinstein, MD

Assistant Professor of Medicine

Boston University Chobanian & Avedisian School of Medicine

Addiction Medicine Physician, Boston Medical Center

Summary: During this session we will describe and critically appraise clinical trials of treatments for people with addictions. We will review key examples and design issues and outline the design for a new trial.

Objectives:

1. Learners will become familiar with an example of an addiction clinical trial
2. Learners will gain skills in critical appraisal of addiction clinical trials
3. Learners will be able to list the key design issues relevant to addiction clinical trials

Outline:

1. Review of an addiction clinical trial
2. Principles of critical appraisal
 - a) Validity
 - b) Results
 - c) Generalizability
3. Critical appraisal of an addiction clinical trial
4. Special challenges in studying addiction treatments
 - a) Surrogate outcomes
 - b) Anonymity/confidentiality
 - c) Motivation to change
5. Key design issues
 - a) Experimental design
 - b) Participant selection
 - c) Intervention fidelity
 - d) Control groups
 - e) Blinding
 - f) Follow-up
 - g) Outcomes
 - h) Effectiveness versus efficacy

6. Exercise: design a trial

Required Readings:

- Therapy (randomized trials). Chapter 7, in Gordon Guyatt, Drummond Rennie, Maureen O. Meade, Deborah J. Cook. *Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice*, 3rd ed. McGraw Hill, USA. To Access, Search BU Libraries for JAMAevidence. JAMAevidence using evidence to improve care 2009. Click on online access.Focus on Box 7-1, this is critical appraisal. <https://jamaevidence.mhmedical.com/book.aspx?bookid=847#69031499>
- Lee JD, Nunes EV Jr, Novo P et al. Comparative effectiveness of extended-release naltrexone versus buprenorphine-naloxone for opioid relapse prevention (X:BOT): a multicentre, open-label, randomised controlled trial. *Lancet*. 2018 Jan 27;391(10118):309-318. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5806119/>
- Joudrey PJ, Bart G, Brooner RK, Brown L, Dickson-Gomez J, Gordon A, Kawasaki SS, Liebschutz JM, Nunes E, McCarty D, Schwartz RP, Szapocnik J, Trivedi M, Tsui JI, Williams A, Wu LT, Fiellin DA. Research priorities for expanding access to methadone treatment for opioid use disorder in the United States: A National Institute on Drug Abuse Center for Clinical Trials Network Task Force report. *Subst Abus*. 2021;42(3):245-254. Erratum in: *Subst Abus*. 2022;43(1):691. PMID: 34606426; DOI: [10.1080/08897077.2021.1975344](https://doi.org/10.1080/08897077.2021.1975344)

Lecture 6 (October 12): Neurochemistry and Neurobiology of Addiction I

Pietro Cottone, Ph.D.

*Associate Professor of Pharmacology & Experimental Therapeutics and Psychiatry
Laboratory of Addictive Disorders*

Valentina Sabino, Ph.D.

Professor of Pharmacology & Experimental Therapeutics and Psychiatry

Summary: This lecture will provide information about the molecular mechanisms of action of the most common drugs of abuse. Neurocircuitries involved in the recreational stage of drug use will be described. First stage of the addiction cycle.

Objectives:

At the end of the session, students will be able to:

1. Describe the neuroanatomy and neurochemistry involved in the recreational stage of drug use
2. Describe the mechanism of action of psychostimulants, opiates, alcohol, and cannabinoids
3. Describe the first stage of the addiction cycle

Outline:

1. Addiction Definitions: Drug Use, Abuse, Dependence, Addiction
2. Classification of drugs of abuse
3. Mesolimbic system and reward neurotransmission

4. Mechanism of action of most common drugs of abuse (psychomotor stimulants, opiates, alcohol, cannabinoids)
5. The first stage of the addiction cycle: Binge/Intoxication Stage

Required Readings:

- Neurocircuitry of addiction. Koob GF, Volkow ND. *Neuropsychopharm* 2010; 35:217-238
- Experimental psychiatric illness and drug abuse models: from human to animal, an overview. Edwards S, Koob GF. *Methods Mol Biol.* (2012); 829: 31-48.

Suggested Readings:

- *Neurobiology of Addiction*, George Koob and Michel Le Moal, 2006, Elsevier, Inc., London

Midterm Exam – October 19

Lecture 7 (October 26): Neurochemistry and Neurobiology of Addiction II

Pietro Cottone, Ph.D.

*Associate Professor of Pharmacology & Experimental Therapeutics and Psychiatry
Laboratory of Addictive Disorders*

Valentina Sabino, Ph.D.

Professor of Pharmacology & Experimental Therapeutics and Psychiatry

Summary: This lecture will provide information about the neurocircuitries involved in the second and third stages of drug addiction. The lecture will focus on the neurochemical and molecular changes taking place in the transition to dependence.

Objectives:

At the end of the session, students will be able to:

1. Describe the mechanisms of the second and third stages of the addiction cycle
2. Describe the neuroanatomy and neurochemistry of the three stages of the addiction cycle
3. Describe the most common animal models of the three stages of the addiction cycle

Outline:

1. Second stage of the addiction cycle: Withdrawal/Negative Affect Stage
2. Within-system neuroadaptations
3. Between-system neuroadaptations
4. Third stage of the addiction cycle: Preoccupation/Anticipation (Craving) Stage
5. Animal models of the three stages of the addiction cycle

Required Readings:

- Neurocircuitry of addiction. Koob GF, Volkow ND. *Neuropsychopharmacology* (2010); 35(1): 217-38.
- Drug Addiction: Hyperkatifeia/Negative Reinforcement as a Framework for Medications Development. Koob GF. *Pharmacol Rev.* (2021); 73(1): 163-201
- Experimental psychiatric illness and drug abuse models: from human to animal, an overview. Edwards S, Koob GF. *Methods Mol Biol.* (2012); 829: 31-48.

Suggested Readings:

- *Neurobiology of Addiction*, by George F. Koob and Michel Le Moal, 2006, Elsevier, Inc., London.

Lecture 8 (November 2): Opioid Analgesia and Addiction: Cellular and Molecular Mechanisms

Venetia Zachariou, Ph.D.

Professor and Chair of Pharmacology, Physiology & Biophysics

Summary: The lecture will provide information on the structure and functional roles of opioid receptors. We will also discuss the signal transduction, transcriptional and epigenetic mechanisms mediating analgesia and addiction.

Objectives:

The objective of this lecture is to highlight the cellular mechanisms underlying the therapeutic and adverse effects of opioid analgesics, and to discuss novel approaches for the optimization of opioid analgesia and treatment of drug use disorders.

Outline:**I. Categorization of Opioid Receptors**

- A. Structure of MOR, DOR, KOR and G protein signaling mechanisms
- B. Distribution of opioid receptors in the CNS and peripheral tissues
- C. Physiological function of opioid receptors

II. Opioid analgesia and tolerance

- Functional responses to endogenous and synthetic opioids
- Biased Signaling of opioid analgesics
- Mechanisms of analgesic tolerance
- Research tools for the study of analgesia and tolerance

III. Opioid Reward and Reinforcement

- A. Neurocircuitry of Addiction
- B. Factors affecting Addiction Vulnerability
- C. Addiction Therapeutics

IV. Physical Dependence to Opioids

Opioid Dependence, Precipitated and Spontaneous withdrawal

Physical Dependence to synthetic opioids under chronic pain: Clinical studies and preclinical models.

Recommended Readings:

[Opioid Pharmacology under the Microscope.](#)

Jullié D, Gondin AB, von Zastrow M, Canals M. *Mol Pharmacol*. 2020 Oct;98(4):425-432. doi: 10.1124/mol.119.119321. Epub 2020 Mar 20.

[Delta opioid receptors in brain function and diseases.](#)

Chu Sin Chung P, Kieffer BL. *Pharmacol Ther*. 2013 Oct;140(1):112-20. doi: 10.1016/j.pharmthera.2013.06.003. Epub 2013 Jun 10. PMID: 23764370 **Free PMC article**. Review.

[Fentanyl and Other Opioid Use Disorders: Treatment and Research Needs.](#)

Volkow ND, Blanco C. *Am J Psychiatry*. 2023 Jun 1;180(6):410-417.

[Endogenous and Exogenous Opioids in Pain.](#)

Corder G, Castro DC, Bruchas MR, Scherrer G. *Annu Rev Neurosci*. 2018 Jul 8;41:453-473. doi: 10.1146/annurev-neuro-080317-061522. Epub 2018 May 31. PMID: 29852083 **Free PMC article**. Review.

[The Mesolimbic Dopamine System in Chronic Pain and Associated Affective Comorbidities.](#)

Serafini RA, Pryce KD, Zachariou V. *Biol Psychiatry*. 2020 Jan 1;87(1):64-73. doi: 10.1016/j.biopsych.2019.10.018.

Additional Reading:

[Epigenetic Mechanisms of Opioid Addiction.](#)

Browne CJ, Godino A, Salery M, Nestler EJ. *Biol Psychiatry*. 2020 Jan 1;87(1):22-33. doi: 10.1016/j.biopsych.2019.06.027. Epub 2019 Jul 8. PMID: 31477236 **Free PMC article**. Review.

[Addiction and physical dependence are not the same thing.](#)

Horowitz MA, Taylor D. *Lancet Psychiatry*. 2023 Aug;10(8):e23. doi: 10.1016/S2215-0366(23)00230-4. PMID: 37479345 No abstract available.

[Nestler, Hyman & Malenka's Molecular Neuropharmacology: A Foundation for Clinical Neuroscience, 4th International Edition, Chapter 11 and Chapter 16.](#)

Lecture 9 (November 9): Animal Models of Addiction

Kathleen Kantak, Ph.D.

Director Laboratory of Behavioral Neuroscience

Department of Psychological and Brain Sciences

Summary: This lecture will explore the methods commonly used to study drug addiction in preclinical animal models ranging from fruit flies to non-human primates. Particular attention is paid to how different phases of the addiction cycle are modeled in animals.

Objectives:

1. To acquire basic knowledge of a variety of behavioral approaches to study drug addiction in animals. This lecture will prepare students for upcoming lectures in which the various behavioral models of addiction are used to study the neurochemistry, neurobiology and pharmacology of addiction.
2. To gain perspectives on the advantages and limitations of each species used in the preclinical assessment of drug addiction.
3. To instill an appreciation for the translational relevance of the addiction cycle, as studied in animals, to the human condition.

Outline:

1. Common behavioral approaches
 - a. Self-Administration
 - b. Conditioned Place Preference
 - c. Voluntary Intake
2. Model organisms for addiction research
 - a. Drosophila
 - b. Zebrafish
 - c. Mice
 - d. Rats
 - e. Monkeys
3. Modeling the addiction cycle in animals
 - a. Acquisition
 - b. Maintenance
 - c. Escalation
 - d. Extinction
 - e. Relapse/Craving
 - f. Drug Use Despite Aversive Consequences

Required Readings:

Venniro M, Banks ML, Heilig M, Epstein DH, Shaham Y. Improving translation of animal models of addiction and relapse by reverse translation. *Nat Rev Neurosci.* 2020 Nov;21(11):625-643. doi: 10.1038/s41583-020-0378-z. Epub 2020 Oct 6. PMID: 33024318.

Suggested Readings:

- Kaun KR, Devineni AV, Heberlein U. *Drosophila melanogaster* as a model to study drug addiction. *Hum Genet.*131:959-75, 2012.
- Klee EW, Schneider H, Clark KJ, Cousin MA, Ebbert JO, Hooten WM, et al. Zebrafish: a model for the study of addiction genetics. *Hum Genet.*131:977-1008, 2012.
- Fowler CD, Kenny PJ. Utility of genetically modified mice for understanding the neurobiology of substance use disorders. *Hum Genet.*131:941-57, 2012.
- O'Connor EC, Chapman K, Butler P, Mead AN. The predictive validity of the rat self-administration model for abuse liability. *Neurosci Biobehav Rev.*35:912-38, 2011.
- Weerts EM, Fantegrossi WE, Goodwin AK. The value of nonhuman primates in drug abuse research. *Exp Clin Psychopharmacol.* 15:309-27, 2007.
- Koob GF, Ahmed SH, Boutrel B, Chen SA, Kenny PJ, Markou A, et al. Neurobiological mechanisms in the transition from drug use to drug dependence. *Neurosci Biobehav Rev.* 27:739-49, 2004.
- Nic Dhonnchadha BA, Kantak KM. Cognitive enhancers for facilitating drug cue extinction: insights from animal models. *Pharmacol Biochem Behav.* 99:229-44 2011.
- Epstein DH, Preston KL, Stewart J, Shaham Y. Toward a model of drug relapse: an assessment of the validity of the reinstatement procedure. *Psychopharmacology (Berl).* 189:1-16, 2006.
- Mathieson E, Irving C, Koberna S, Nicholson M, Otto MW, Kantak KM. Role of preexisting inhibitory control deficits vs. drug use history in mediating insensitivity to aversive consequences in a rat model of polysubstance use. *Psychopharmacology (Berl).* 2022 Apr 7:1–18. doi: 10.1007/s00213-022-06134-4. Epub ahead of print.

Lecture 10 (November 16): Neonatal Opioid Withdrawal Syndrome – Presentation, Treatment, and Emerging Research

Elisha Wachman, MD

Associate Professor of Pediatrics

Director of Pediatric Academic Research

Division of Neonatology, Boston Medical Center

Boston University Chobanian & Avedisian School of Medicine

Summary: This lecture will review the diagnosis, assessment, and current treatment approaches for Neonatal Opioid Withdrawal Syndrome (NOWS) / neonatal abstinence syndrome (NAS) secondary to in-utero opioid exposure. This will include a review of both non-pharmacologic and pharmacologic treatment strategies, and new research contributing to NOWS outcomes.

Objectives:

1. Learners will be able to identify signs and symptoms of NOWS, and ways to assess NOWS.

2. Learners will understand the existing treatment approaches, both non-pharmacologic and pharmacologic, to Nows.
3. Learners will be able to identify some contributors to Nows outcomes.

Outline:

1. Definition and epidemiology of Nows
2. Nows symptoms and assessment tools
3. Clinical variables affecting Nows presentation and outcomes
4. Non-Pharmacologic Management of Nows
5. Pharmacologic Treatment of Nows
6. Emerging research – predictors of Nows outcomes
7. Long-term outcomes

Required Readings:

1. Wachman EM, Schiff DM, Silverstein M. Neonatal Abstinence Syndrome: Advances in Diagnosis and Treatment.(review) *JAMA*, 319(13):1362-1374.
2. Patrick SW, Barfield WD, Poindexter BB, Committee on Fetus and Newborn, Committee on Substance Use and Prevention. Neonatal Opioid Withdrawal Syndrome. *Pediatrics*, 2020; 146(5):e2020029074. PMID: 33106341. DOI: 10.1542/peds.2020-029074

Suggested Readings:

1. Davis JM, Shenberger J, Terrin N, Breeze J, Hudak M, Silverstein M, Wachman EM, et al. Methadone versus Morphine in the Treatment of Neonatal Abstinence Syndrome: A Randomized Comparison Trial. *JAMA Pediatrics*, 2018, Jun 18. doi: 10.1001/jamapediatrics.2018.1307.
2. [Eat, Sleep, Console Approach or Usual Care for Neonatal Opioid Withdrawal.](#)
3. Young LW, Ounpraseuth ST, Merhar SL, et al.. *N Engl J Med*. 2023 Apr 30. doi: 10.1056/NEJMoa2214470. Online ahead of print.PMID: 37125831

NO CLASS (November 23) – Thanksgiving vacation

Lecture 11 (November 30): A Trauma-Informed Approach to Substance Use Prevention and Treatment with Latinos(as)/Latinx

Luz M López, PhD, MSW, MPH

Clinical Professor, Boston University School of Social Work

Director, MSW/MPH Dual Degree Program & CISWH Global Health Core

Summary: This lecture will examine the relationship between trauma/violence, substance use, and related mental health symptoms. These topics will be analyzed within a socio-cultural context working with Latinos(as)/Latinx and other ethnically diverse groups. Utilizing a strengths perspective framework, we will explore a community participatory approach to

substance use prevention and treatment for survivors of trauma due to intrafamily violence, community violence or forced displacement.

Objectives:

- 1) Identify the connection between addiction, trauma/violence & mental health
- 2) Analyze socio-cultural perspectives, taboos, and stigma in the treatment of trauma and addiction among Latinos(as)/Latinx
- 3) Describe two effective evidenced based trauma intervention models for substance use treatment and a smart phone relapse prevention tool.
- 4) Illustrate ways to increase access to trauma informed prevention and substance use services.

Outline:

- I. Addiction opioid crisis among Latinos(as)/Latinx
- II. Substance use myths and controversies
- III. Addiction: cultural taboos and stigma
- IV. Discuss the application of two evidenced-based trauma informed interventions
 1. Seeking Safety, by Lisa Najavitz
 2. Trauma Recovery Empowerment Model (TREM) by Maxine Harris & M-TREM,
 3. Trauma Recovery Empowerment Model for Men by Roger Fallot & Maxine Harris
- VI. Small groups case discussion

Recommended Readings:

- Armstrong, E. M. (2023) Promise and pitfalls: trauma informed care, trauma services, and efforts to address both, substance use disorders and intimate partner violence. *Journal of Family Violence* (2023) 38:841–853. <https://doi.org/10.1007/s10896-022-00378-6>
- Fortuna, L. R., Falgas-Bague, I., Ramos, Z., Porche, M. V., & Alegría, M. (2020). Development of a cognitive behavioral therapy with integrated mindfulness for Latinx immigrants with co-occurring disorders: Analysis of intermediary outcomes. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(8), 825–835. <https://doi.org/10.1037/tra0000949>
- Fallot, R. D., & Harris, M. (2002). The Trauma Recovery and Empowerment Model (TREM): Conceptual and practical issues in a group intervention for women. *Community Mental Health Journal*, 38, 475-485.
- Muroff J, Robinson W, Chassler D, López LM, Lundgren L, Guauque C, Dargon-Hart, Stewart E, Dejesus D, Johnson K, Pe-Romashko K, Gustafson DH. (2019). An Outcome Study of the CASA-CHESS Smartphone Relapse Prevention Tool for Latinx Spanish-Speakers with Substance Use Disorders. *Substance Use and Misuse*. 2019; 54(9):1438-1449. doi: 10.1080/10826084.2019.1585457. PMID: 30931681
- Najavits, LM, Krinsley, K., Waring, M. E., Gallagher, M. W., & Skidmore, W. (2018). A randomized controlled trial for veterans with PTSD and substance use disorder: Creating Change versus Seeking Safety. *Substance Use and Misuse*, doi: 10.1080/10826084.2018.1432653.
- Kanamori, M., Shrader, C.-H., St George, S., Adkins, T., Bartholomew, T. S., Sanchez, M., & de

la Rosa, M. (2022). Influences of immigration stress and occupational exploitation on Latina seasonal workers' substance use networks: A qualitative study. *Journal of Ethnicity in Substance Abuse*, 21(2), 457–475.

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Lecture 12 (December 7): The Politics of Addiction Prevention: From Tobacco to Alcohol to Cannabis

David Jernigan, PhD

*Professor, Department of Health Law, Policy and Management
Boston University School of Public Health*

Summary: This session will explore the politics of policy making in the addiction field, focusing primarily on alcohol policy. The leading drugs of addiction for young people in the U.S. are tobacco, alcohol and cannabis. All three are increasingly in the hands of industries whose primary responsibility is return of profit to owners and shareholders rather than prevention of addiction. Based on 35 years of work on alcohol policies, the lecture will begin by reviewing prevalence of drug use among youth, and then focus on the policies shown most effective in preventing youth alcohol use. Examples will be drawn both from public health and policy research into the structure and activities of the alcohol industry, and its efforts to influence alcohol policy making, up through the COVID-19 pandemic. It will address the role of research in policy development in the field of addiction prevention, and describe industry efforts to shape and counter that research.

Objectives: At the end of the session, students will be able to:

1. Describe the policies most effective in reducing youth alcohol use;
2. Articulate and illustrate key conflicts of interest in addiction policy-making, with particular reference to alcohol;
3. Understand the implications of the alcohol and tobacco experiences for cannabis policy-making.

Outline:

1. Overview of youth drug use
2. CDC and WHO recommendations for the reduction and prevention of alcohol-related harm, including youth alcohol use
3. Structure of consumption of alcohol and alcohol industry conflicts of interest
 - a. Case studies in conflict of interest in alcohol research
4. Review of the structure and tactics of the alcoholic beverage industry
 - a. Industry concentration
 - b. Implications of concentration for policy making
 - c. Use of social aspects organizations
 - d. Case studies in alcohol industry efforts to influence policy
5. Public health responses
6. Implications for cannabis policy

Required Readings:

- Jernigan D, Ross CS. The Alcohol Marketing Landscape: Alcohol Industry Size, Structure, Strategies, and Public Health Responses. *J Stud Alcohol Drugs Suppl.* 2020 Mar; Sup 19:13-25.
- Jernigan DH, Trangenstein PJ. What's next for WHO's global strategy to reduce the harmful use of alcohol? *Bulletin of the World Health Organization* 98(3):222-223, 2020. Available at <https://www.who.int/bulletin/volumes/98/3/19-241737/en/>
- Mialon M, McCambridge J. Alcohol industry corporate social responsibility initiatives and harmful drinking: a systematic review. *European Journal of Public Health.* 2018:cky065-cky065. doi:10.1093/eurpub/cky065.

Student Presentations – December 14

Final Exam – December 21