# THE IMPACT OF SUBSTANCE USE ON SOCIAL COGNITION AND RECOVERY FROM MENTAL ILLNESS.

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# DECLARATION OF COMPETING INTERESTS

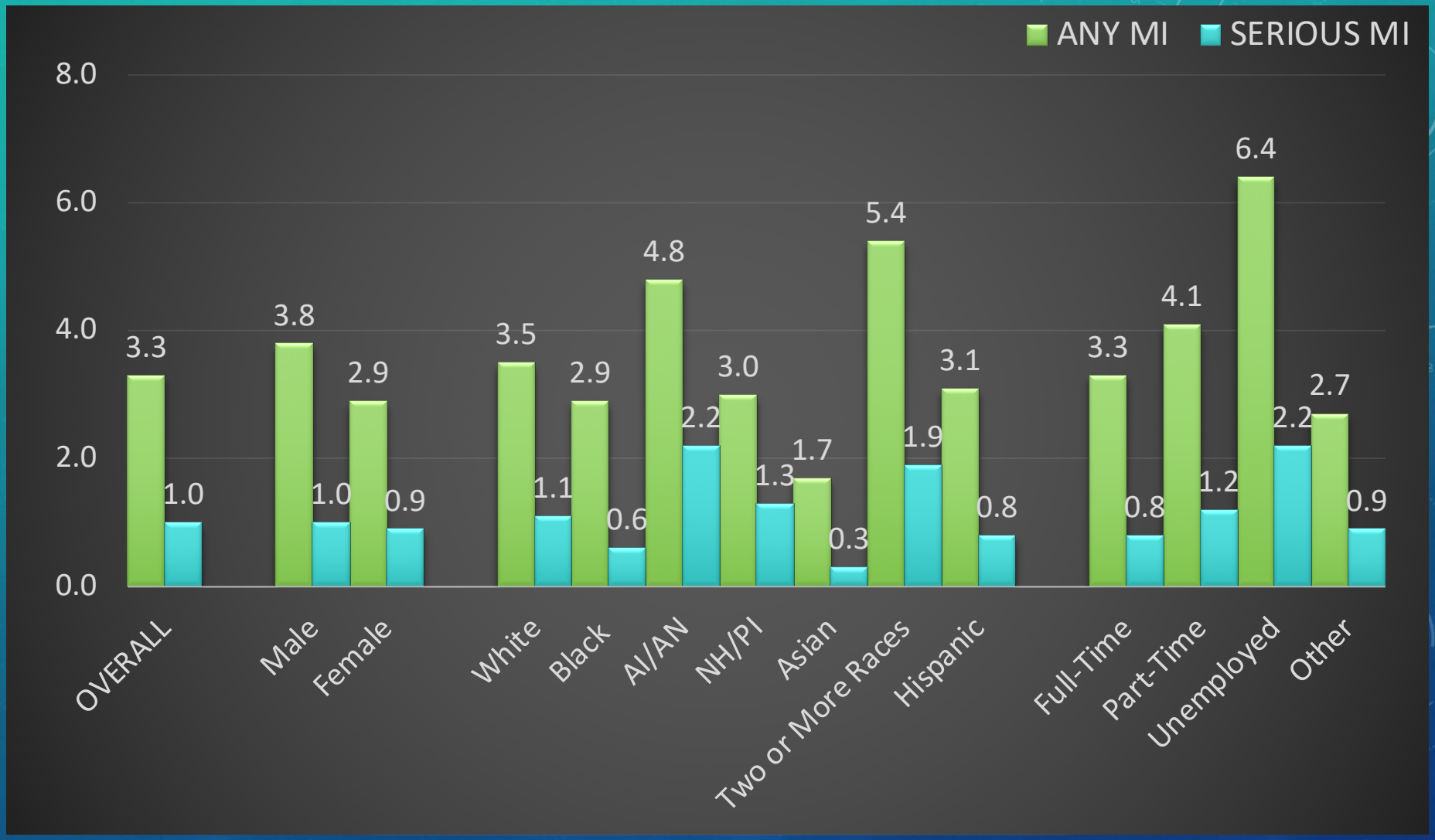
Dr. Okoli has received wages, speaker's honoraria, consultation fees from the following organisations/companies in the previous 12 months:

- East Carolina University
- The Breathing Association
- University of Kentucky
- Bluegrass.org

# OBJECTIVES OF THIS PRESENTATION

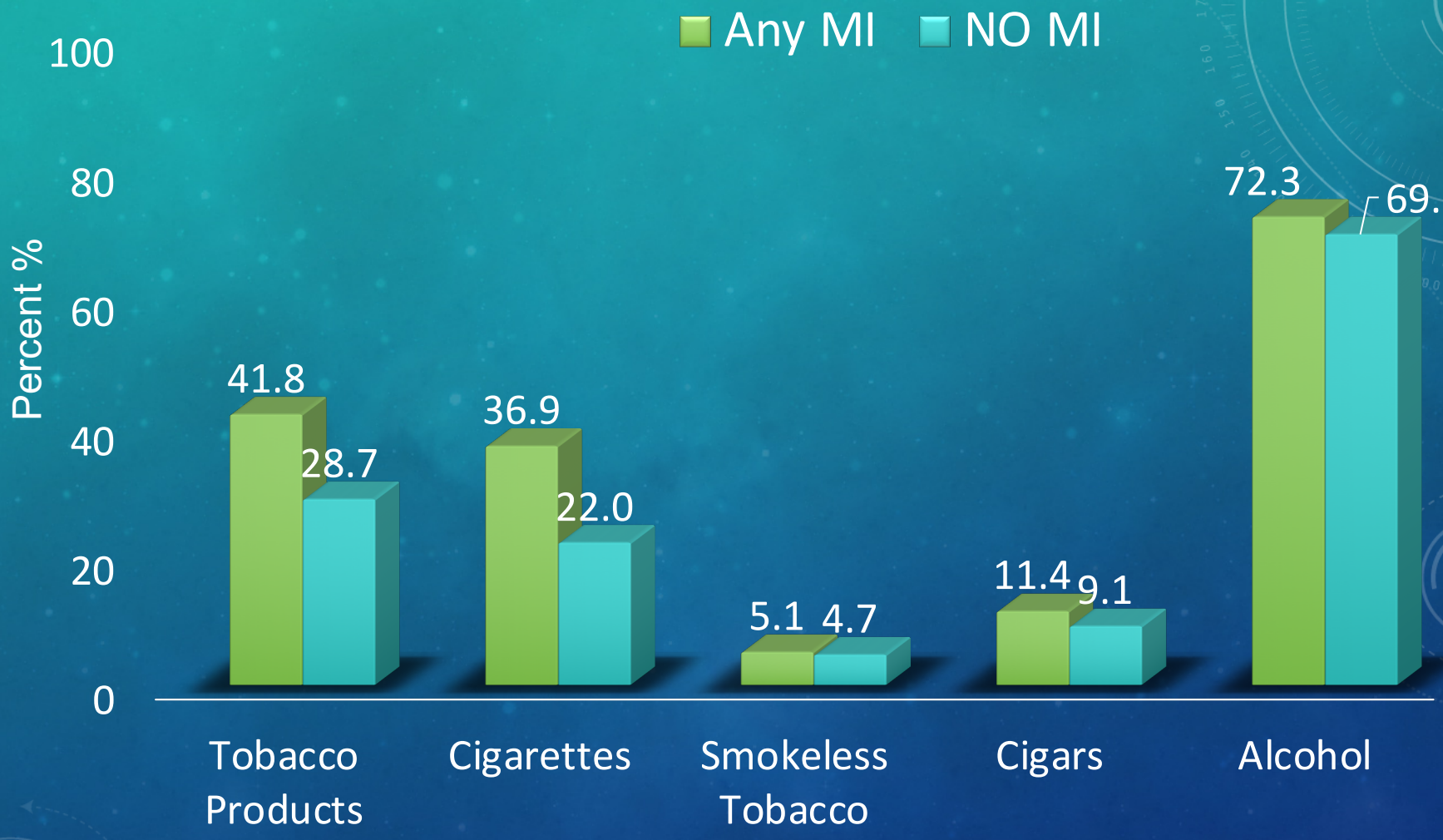
- Explain important factors that promote substance use in populations with mental illnesses
- Describe the impact of substance use on cognition, social cognition, and recovery among persons with mental illnesses
- Discuss three evidence-based methods of assessing for and brief interventions for addressing substance use disorders

# PAST YEAR CO-OCCURRING SUD AND MI (ADULTS ≥ 18 YRS)




SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2014 and 2015.
Serious Mental Illness (SMI) is defined as having a diagnosable mental, behavioral, or emotional disorder, other than a developmental or substance use disorder, assessed by the Mental Health Surveillance Study (MHSS) *Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders—Fourth Edition—Research Version—Axis I Disorders* (MHSS-SCID) which is based on the 4th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV). SMI includes persons with diagnoses resulting in serious functional impairment.

# PAST YEAR TOBACCO AND ALCOHOL USE BY MI STATUS (ADULTS ≥ 18 YRS)




2015 National Survey on Drug Use and Health: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2014 and 2015.

# CLASSES OF SUBSTANCES OF ABUSE

**Opioids/Narcotics**
- Fentanyl
- Heroin
- Hydromorphone
- Methadone
- Morphine
- Opium
- Oxycodone

**Hallucinogens**
- Ecstasy/MDMA
- K2/Spice
- Ketamine
- LSD
- Peyote & Mescaline
- Psilocybin
- Marijuana/Cannabis
- Steroids
- Inhalants

**Stimulants**
- Amphetamines
- Cocaine
- Khat
- Methamphetamine
- Alcohol (low dose)
- Nicotine (high dose)

**Depressants**
- Barbiturates
- Benzodiazepines
- GHB
- Rohypnol®
- Alcohol (high dose)
- Nicotine (low dose)

**Drugs of Concern**
- Bath Salts or Designer Cathinones
- DXM
- Kratom
- Salvia Divinorum

Drug Enforcement Administration. (2011). Drugs of Abuse: 2011 Edition. A DEA Resource Guide. *US Dept of Justice. www. justice. gov/ dea/ drugs_ of_ abuse_.*

# PSYCHOACTIVE EFFECTS OF DIFFERENT SUBSTANCE OF ABUSE CLASSES

| Substance | Sensory effects | Negative effects |
|---|---|---|
| OPIOIDS/NARCOTICS | General sense of well-being by reducing tension, anxiety, and aggression | Drowsiness, inability to concentrate, apathy |
| HALLUCINOGENS | Perceptual distortions of thought associated with time and space | Respiratory depression, coma, convulsions, seizures |
| STIMULANTS | Exhilaration, enhanced self-esteem, improved mental and physical performance, extended wakefulness | Agitation, hostility, panic, aggression, suicidal/homicidal tendencies<br>Paranoia (sometimes with hallucinations) |
| DEPRESSANTS | Sleep, relieve anxiety and muscle spasms, and prevent seizures | Amnesia, reduced reaction time, impaired mental function and judgement, and cause confusion, respiratory depression |

Drug Enforcement Administration. (2011). Drugs of Abuse: 2011 Edition. A DEA Resource Guide. *US Dept of Justice. www. justice. gov/ dea/ drugs of abuse .*

# FACTORS PROMOTING SUD IN POPULATIONS WITH MI

- **Common factor models**
  - **Comorbidity is due to shared risk factors across SUD and MI**
- **Secondary substance use disorder models**
  - **MI increases the chances of developing SUD**
- **Secondary psychiatric disorder models**
  - **SUD increases the chance of developing MI**
- **Bidirectional models**
  - **Either disorder increases risk for the other disorder**

Mueser, K. T., Drake, R. E., & Wallach, M. A. (1998). Dual diagnosis: a review of etiological theories. *Addictive behaviors*, *23*(6), 717-734.

# SUBSTANCE USE AND COGNITIVE FUNCTIONING

- Cues associated with substance abuse can produce physiological responses in the brain that reinforce drug seeking behavior
  - Increases the 'salience' of one's surroundings in relation to the pleasures of a drug
  - Creates an imbalance between the exaggerated value given to drugs and devalued appeal to natural reinforcers (i.e., food, money, sex).
- Substance use can cause changes in the brain regions involved in learning and memory
  - Acute administration of nicotine, amphetamine and cocaine can acutely enhance learning, reaction time, attention, and memory
  - Low doses of alcohol can enhance learning, but high doses disrupt cognitive processes


Franklin, T.R., et al., 2007. Limbic activation to cigarette smoking cues independent of nicotine withdrawal: A perfusion fMRI study. *Neuropsychopharmacology* 32(11):2301-2309

Goldstein & Volkow (2002). Drug addiction and its underlying neurobiological basis: Neuroimaging evidence for the involvement of the frontal cortex. *American Journal of Psychiatry* 159 (10):1642-1652

Bardo, M.T., and Bevins, R.A., 2000. Conditioned place preference: What does it add to our preclinical understanding of drug reward? *Psychopharmacology* (Berl) 153(1):31-43.

Del, O.N., et al., 2007. Cocaine self-administration improves performance in a highly demanding water maze task. *Psychopharmacology* (Berl) 195(1):19-25.

Kenney, J.W., and Gould, T.J., 2008. Modulation of hippocampus-dependent learning and synaptic plasticity by nicotine. *Molecular Neurobiology* 38(1):101-121.

Mattay, V.S., 1996. Dextroamphetamine enhances "neural network-specific" physiological signals: A positron-emission tomography rCBF study. *Journal of Neuroscience* 16(15):4816-4822.

Swan, G.E., and Lessov-Schlaggar, C.N., 2007. The effects of tobacco smoke and nicotine on cognition and the brain. *Neuropsychology Review* 17(3):259-273.

Ryback, R.S., 1971. The continuum and specificity of the effects of alcohol on memory. A review. *Quarterly Journal of Studies on Alcohol* 32(4):995-1016.

Gulick, D., and Gould, T.J., 2007. Acute ethanol has biphasic effects on short- and long-term memory in both foreground and background contextual fear conditioning in C57BL/6 mice.*Alcoholism: Clinical and Experimental Research* 31(9):1528-1537

# COGNITIVE DEFICITS WITH LONG-TERM SUBSTANCE USE

During periods of abstinence,

- Cocaine and opioids cause deficits in cognitive flexibility
- Amphetamine causes deficits in attention and impulse control
- Alcohol causes deficits in working memory and attention
- Cannabis causes deficits in cognitive flexibility and attention
- Nicotine causes deficits in working memory and declarative learning


Kelley, B.J., et al., 2005. Cognitive impairment in acute cocaine withdrawal. *Cognitive and Behavioral Neurology* 18(2):108-112.
Lyvers, M., and Yakimoff, M., 2003. Neuropsychological correlates of opioid dependence and withdrawal. *Addictive Behaviors* 28(3):605-611.
Moriyama, Y., et al., 2006. Family history of alcoholism and cognitive recovery in subacute withdrawal. *Psychiatry and Clinical Neuroscience* 60(1):85-89.
Pope, H.G., Jr.; Gruber, A.J.; and Yurgelun-Todd, D., 2001. Residual neuropsychologic effects of cannabis. *Current Psychiatry Reports* 3(6):507-512.
Kenney, J.W., and Gould, T.J., 2008. Modulation of hippocampus-dependent learning and synaptic plasticity by nicotine. *Molecular Neurobiology* 38(1):101-121.

# SUBSTANCE USE, COGNITION AND MENTAL ILLNESS

- Persons with MI may experience an increased impact of the effects of substance use, especially with pre-existing cognitive problems associated with their psychiatric disorder

Gould, T. J. (2010). Addiction and cognition. *Addiction science & clinical practice*, *5*(2).

# SOCIAL COGNITION

- The capacity to construct mental representations about oneself, others, and the associations between oneself and others
  - Involves perception, processing and interpretation of social signals

Sergi, Rassovsky, Widmark, Reist, Erhart, Braff, Marder, & Green. (2007). Social cognition in schizophrenia: Relationships with neurocognition and negative symptoms. Schizophrenia Research 90, 316-324
Brune et al., (2007). Mental state attribution, neurocognitive functioning, and psychopathology: What predicts poor social competence in schizophrenia best? *Schizophrenia Research,* 92, 151-159

# WE LEARN BY OBSERVING OTHERS

- Learn about
  - Places
  - Objects
  - Actions
  - Agents (Actors)
- Learn through
  - Associations
  - Rewards
  - Gaze following
  - Mirroring

# HOW MIGHT SUD IMPACT SOCIAL COGNITION?

- SUD can dampen the emotions necessary for social bonding
- SUD can reduce reward responses to mutual social interactions
  - Flattened feelings of pleasantness
  - Reduced orbitofrontal cortex signal to joint gaze relative to nonjoint gaze interactions
    - Orbitofrontal cortex is directly associated with size of social networks



Preller, et al., (2014). Functional changes of the reward system underlie blunted response to social gaze in cocaine users. Proceedings of the National Academy of Science USA, 111:2842-2847

# HOW MIGHT SUD IMPACT SOCIAL COGNITION?

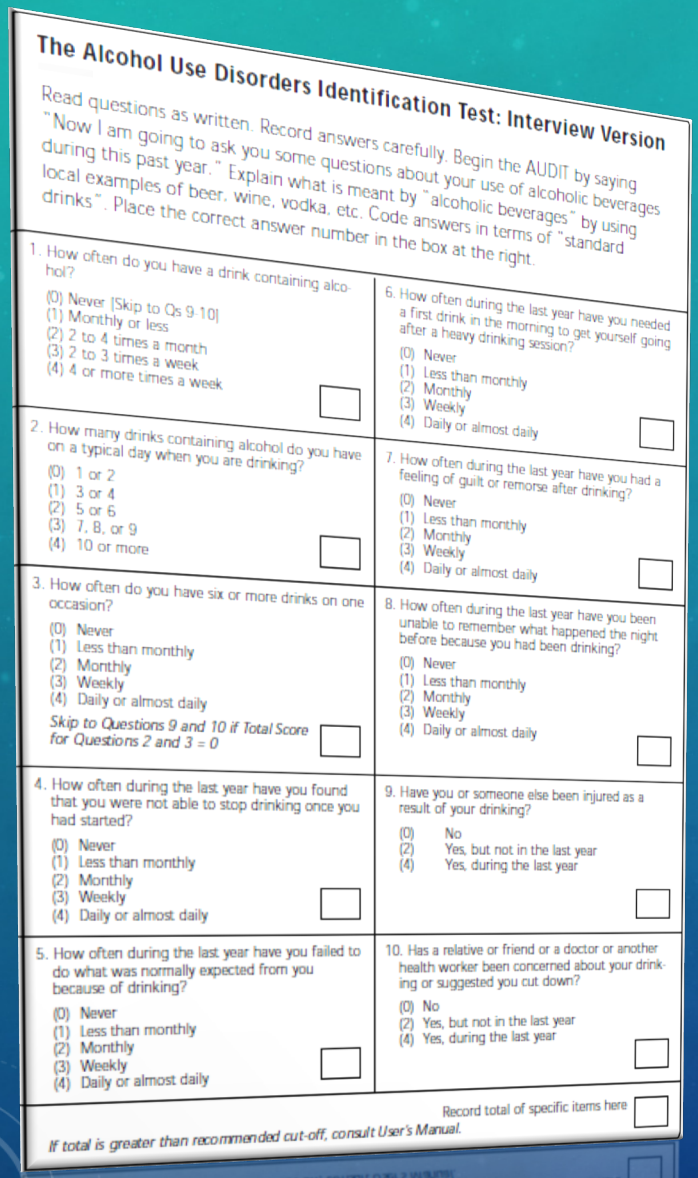
Underrating of social interactions resulting from substance use can undermine the importance of social well-being (i.e., re-integration to the family or building friendships) or the risk of social breach (i.e., harming others or violating the law) when making decisions

Verdejo-Garcia (2014). Social cognition in cocaine addiction. PNAS, 11 (7), 2406-2407

# METHODS TO SCREEN AND INTERVENE FOR SUD

- Alcohol Use Disorders Identification Test (AUDIT)
- CAGE
- Fagerstrom Test for Nicotine Dependence (FTND)

# Alcohol Use Disorders Identification Test (AUDIT)



**The Alcohol Use Disorders Identification Test: Interview Version**

Read questions as written. Record answers carefully. Begin the AUDIT by saying "Now I am going to ask you some questions about your use of alcoholic beverages during this past year." Explain what is meant by "alcoholic beverages" by using local examples of beer, wine, vodka, etc. Code answers in terms of "standard drinks". Place the correct answer number in the box at the right.

1. How often do you have a drink containing alcohol?
   (0) Never [Skip to Qs 9-10]
   (1) Monthly or less
   (2) 2 to 4 times a month
   (3) 2 to 3 times a week
   (4) 4 or more times a week

2. How many drinks containing alcohol do you have on a typical day when you are drinking?
   (0) 1 or 2
   (1) 3 or 4
   (2) 5 or 6
   (3) 7, 8, or 9
   (4) 10 or more

3. How often do you have six or more drinks on one occasion?
   (0) Never
   (1) Less than monthly
   (2) Monthly
   (3) Weekly
   (4) Daily or almost daily
   *Skip to Questions 9 and 10 if Total Score for Questions 2 and 3 = 0*

4. How often during the last year have you found that you were not able to stop drinking once you had started?
   (0) Never
   (1) Less than monthly
   (2) Monthly
   (3) Weekly
   (4) Daily or almost daily

5. How often during the last year have you failed to do what was normally expected from you because of drinking?
   (0) Never
   (1) Less than monthly
   (2) Monthly
   (3) Weekly
   (4) Daily or almost daily

6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?
   (0) Never
   (1) Less than monthly
   (2) Monthly
   (3) Weekly
   (4) Daily or almost daily

7. How often during the last year have you had a feeling of guilt or remorse after drinking?
   (0) Never
   (1) Less than monthly
   (2) Monthly
   (3) Weekly
   (4) Daily or almost daily

8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?
   (0) Never
   (1) Less than monthly
   (2) Monthly
   (3) Weekly
   (4) Daily or almost daily

9. Have you or someone else been injured as a result of your drinking?
   (0) No
   (2) Yes, but not in the last year
   (4) Yes, during the last year

10. Has a relative or friend or a doctor or another health worker been concerned about your drinking or suggested you cut down?
    (0) No
    (2) Yes, but not in the last year
    (4) Yes, during the last year

Record total of specific items here

*If total is greater than recommended cut-off, consult User's Manual.*

- 10 item screening tool that assesses:
  - Alcohol consumption
  - Drinking behaviors
  - Alcohol-related problems
- Has both a clinician-administered and a self-report version
- Developed by the World Health Organization

NIDA: https://www.drugabuse.gov/nidamed-medical-health-professionals/tool-resources-your-practice/screening-assessment-drug-testing-resources/chart-evidence-based-screening-tools-adults

# CAGE-AID QUESTIONS

## *CAGE and CAGE-AID Questions*

1. In the last three months, have you felt you should cut down or stop drinking or *using drugs?*
   Yes No
2. In the last three months, has anyone annoyed you or gotten on your nerves by telling you to cut down or stop drinking or *using drugs?*
   Yes No
3. In the last three months, have you felt guilty or bad about how much you drink *or use drugs*?
   Yes No
4. In the last three months, have you been waking up wanting to have an alcoholic drink or *use drugs*?
   Yes No

**Each affirmative response earns one point. One point indicates a possible problem. Two points indicate a probable problem.**

Reference: The Society of Teachers of Family Medicine. Project SAEFP Workshop Materials, Screening and Assessment Module, page 18. Funded by the Division of Health Professionals, HRSA, DHHS, Contract No. 240-89-0038. Used with permission.

4-item questionnaire adapted to assess alcohol and other drug use

NIDA: https://www.drugabuse.gov/nidamed-medical-health-professionals/tool-resources-your-practice/screening-assessment-drug-testing-resources/chart-evidence-based-screening-tools-adults

# FAGERSTROM TEST FOR NICOTINE DEPENDENCE

| | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| 1. How soon after you wake up do you smoke your first cigarette? | After 60 Minutes | 31 – 60 minutes | 6-30 minutes | Within 5 minutes |
| 2. Do you find it difficult to refrain from smoking in places where it is forbidden, e.g., in church, at the library, cinema, etc? | No | Yes | | |
| 3. Which cigarette would you hate most to give up? | All others | The first one in the morning | | |
| 4. How many cigarettes/day do you smoke? | 10 or less | 11-20 | 21-30 | 31 or more |
| 5. Do you smoke more frequently during the first hours of waking than during the rest of the day? | No | Yes | | |
| 6. Do you smoke if you are so ill that you are in bed most of the day? | No | Yes | | |

- 6-item measure examining degree of physical dependence to nicotine
- Available in several languages
- Has been used extensively and demonstrates modest reliability and validity
- Predicts smoking, likelihood of cessation, relapse vulnerability

http://cde.drugabuse.gov/instrument/d7c0b0f5-b865-e4de-e040-bb89ad43202b

# SCREENING, BRIEF INTERVENTIONS, AND REFERRAL TO TREATMENT (SBIRT)

- An evidence-based approach to identify, reduce, and prevent problematic use, abuse and dependence on substances
- SBIRT has three main components:
  - **Screening:** assessment by a health care provider for risky substance use using standardized screening tools (e.g., AUDIT, CAGE, FTND)
  - **Brief Interventions**: engaging a patient in a short conversation and providing feedback and advice (may use Motivational Interviewing)
  - **Referral to Treatment**: providing referral to brief therapy or additional treatment for patients who screen positively and are in need of additional services.
- SBIRT should be used with every patient at every appointment

https://www.samhsa.gov/sbirt

# QUESTIONS??