

Community Disadvantage, Epigenetics and Problem Gambling: A Public Health Perspective

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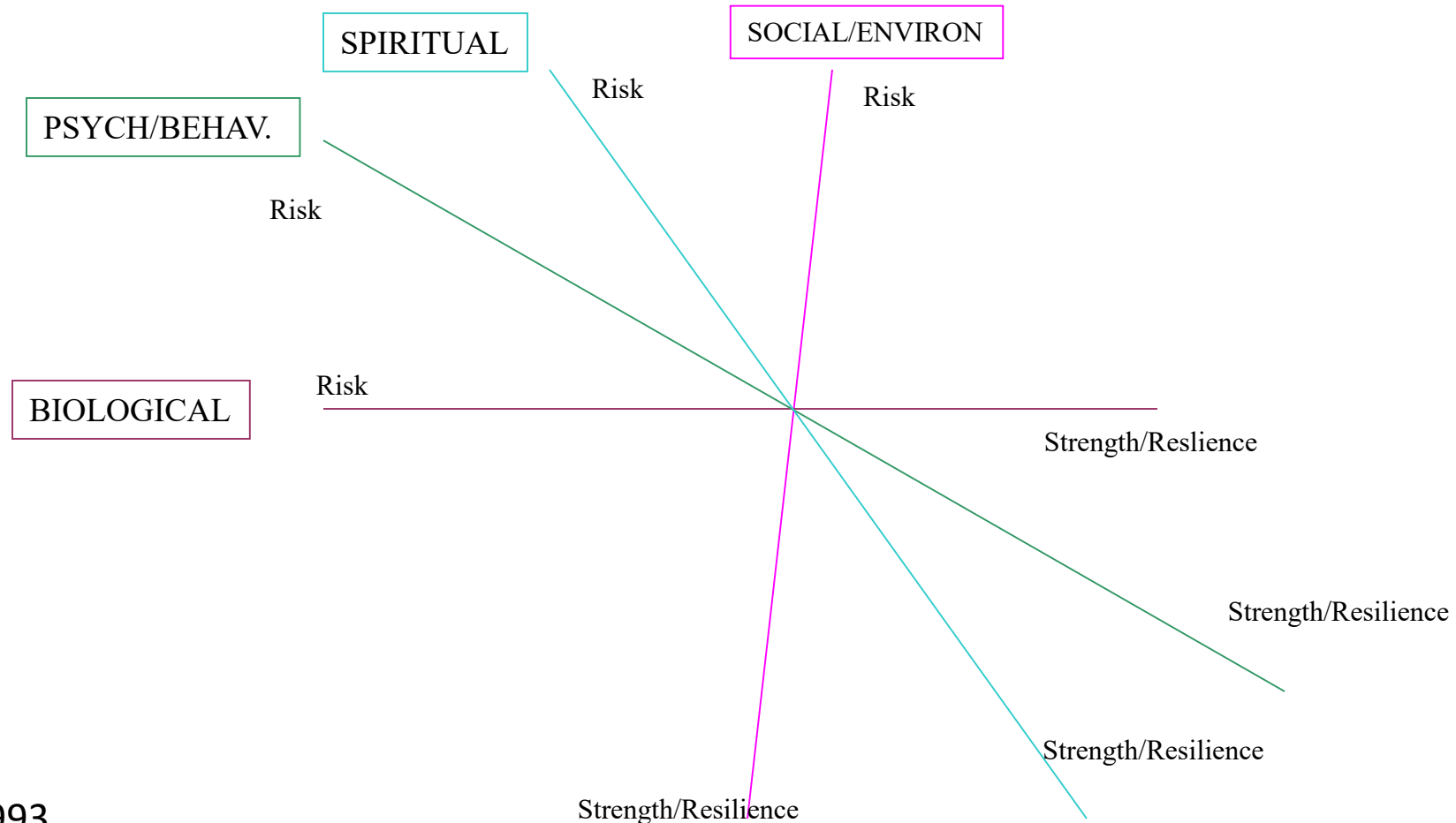
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Agenda

- Biopsychosocial/spiritual perspective
- Social Factors and Neighborhood Disadvantage
- Biological/Genetic Factors
- Epigenetics (the interface between biology and environment)
- Public Health Perspective

Biopsychosocial/spiritual Risk Factors Model for Gambling Disorder



Rugle, 1993



ETHNICITY

People of colour are significantly more likely to gamble and experience gambling harm.

Cultural differences, stressful living conditions, and social inequities experienced by Indigenous peoples contribute to a higher community prevalence of problematic gambling compared to the general public.



AGE

Gambling influences community health and well-being across the lifespan. Youth, young adults and older adults are particularly vulnerable to experiencing gambling harms.

Early gambling behaviour is a risk factor for harm. Free-to-play apps with gambling content continue to grow in popularity, making young people particularly vulnerable.

Older adults are more vulnerable to gambling harms as they may be less able to recover from financial loss.



MENTAL HEALTH

As many as 32% of those who gamble problematically struggle with major depression (national average = 4.7%).

Gambling can serve as a coping mechanism for people who are emotionally vulnerable.

Gambling harm is often associated with social anxiety, ADHD, impulsiveness, mood and anxiety disorders, and other mental health outcomes.



SUBSTANCE USE AND ADDICTION

People who struggle with a gambling problem are 2-4 times more likely to have a tobacco use disorder, and 3-6 times more likely to have an alcohol use disorder.

High school students in Ontario who struggle with problem gambling behaviour are 11 times more likely to report a cannabis use disorder compared to other students.



**GAMBLING RESEARCH
EXCHANGE ONTARIO**
DRIVING KNOWLEDGE INTO ACTION



LIVING CONDITIONS

Gambling harm is associated with:

- Higher neighbourhood disadvantage
- Unstable housing conditions
- Homelessness

Adolescents whose parents gamble are 3-12 times more likely to report at-risk or problem gambling.



EDUCATION

A person's education influences how they gamble and their risk of developing a gambling problem.

Poor academic performance and lower educational attainment are risk factors and strong predictors for problem gambling behaviour.

People with higher education are more likely to gamble online.



SOCIOECONOMIC STATUS

People with lower income spend proportionately more of their income on gambling activities.

Land-based gambling opportunities are generally more readily available in lower income areas.

People who are unemployed are 3 times more likely to experience a gambling problem than those with secure employment.



HEALTH BEHAVIOURS AND RISK FACTORS

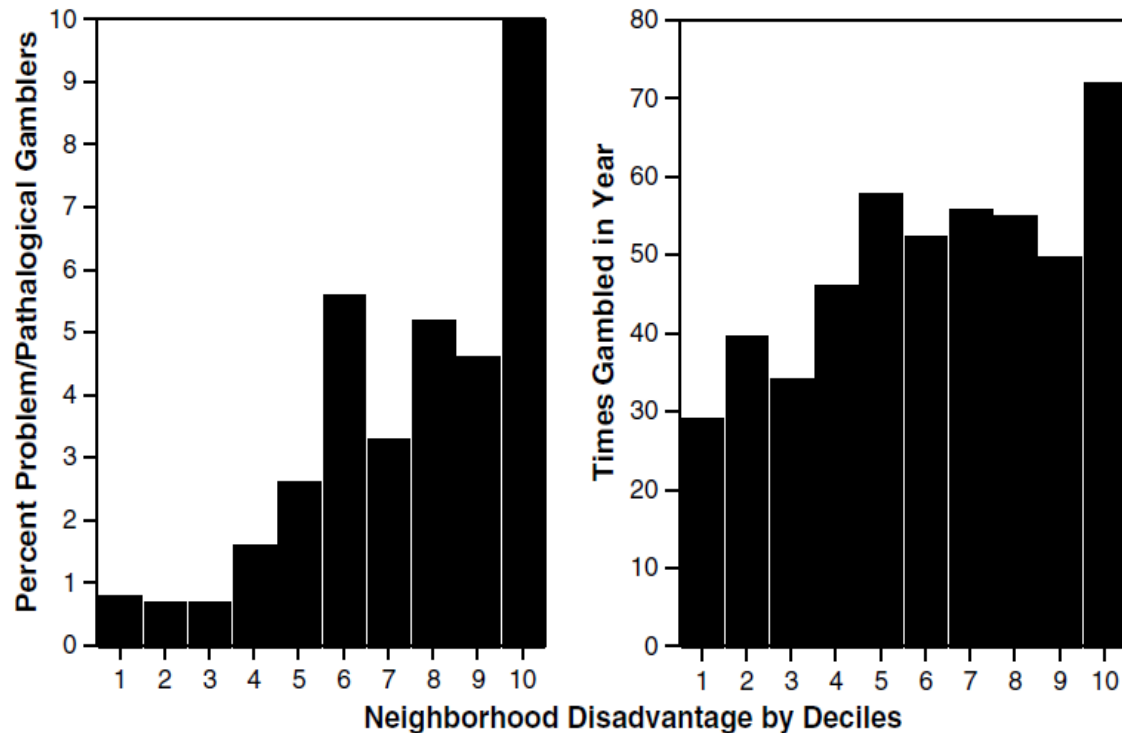
Gamblers are more likely to be sedentary than non-gamblers, and physical activity is associated with a decreased risk for problem gambling. People with a gambling problem are:

- 2 times more likely to report a lack of regular exercise
- 3 times more likely to watch 20+ hours of TV per week

People who gamble problematically are also 3 times more likely to be obese when compared to recreational or non-gamblers.

Socioeconomic Status and Gambling Harm

Gambling involvement by neighborhood disadvantage.



Criteria Neighborhood Disadvantage

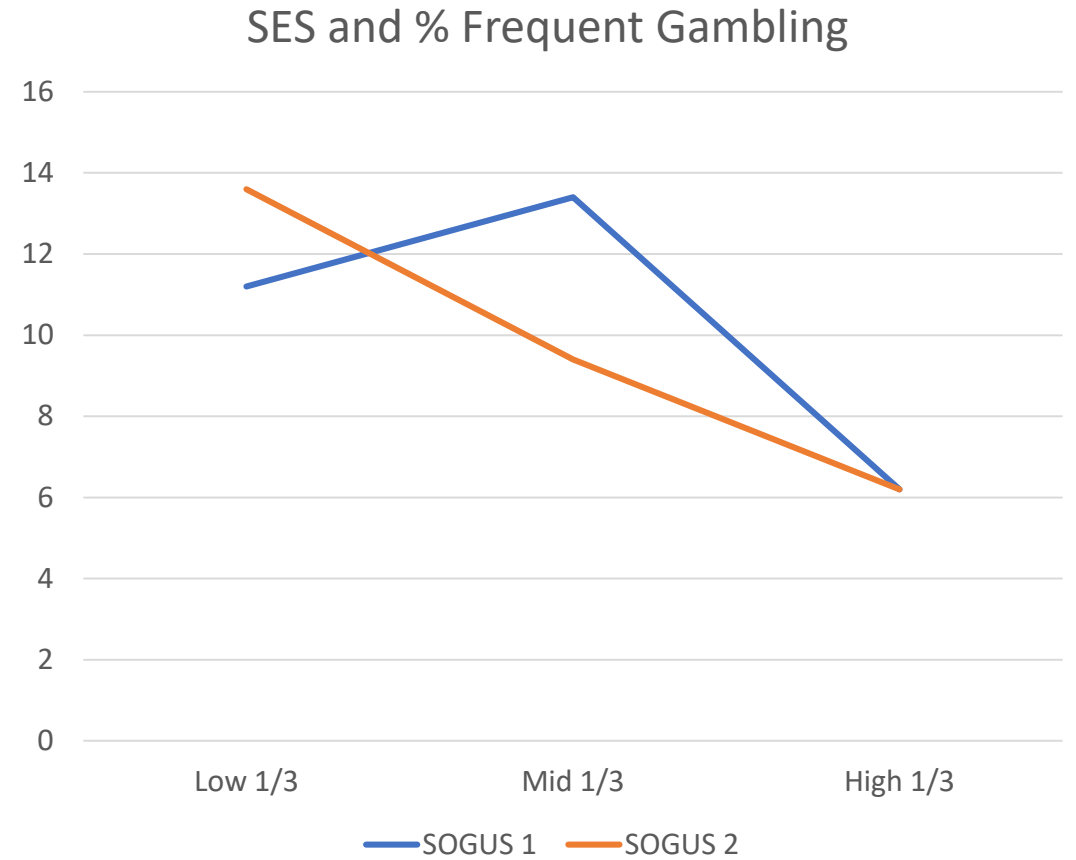
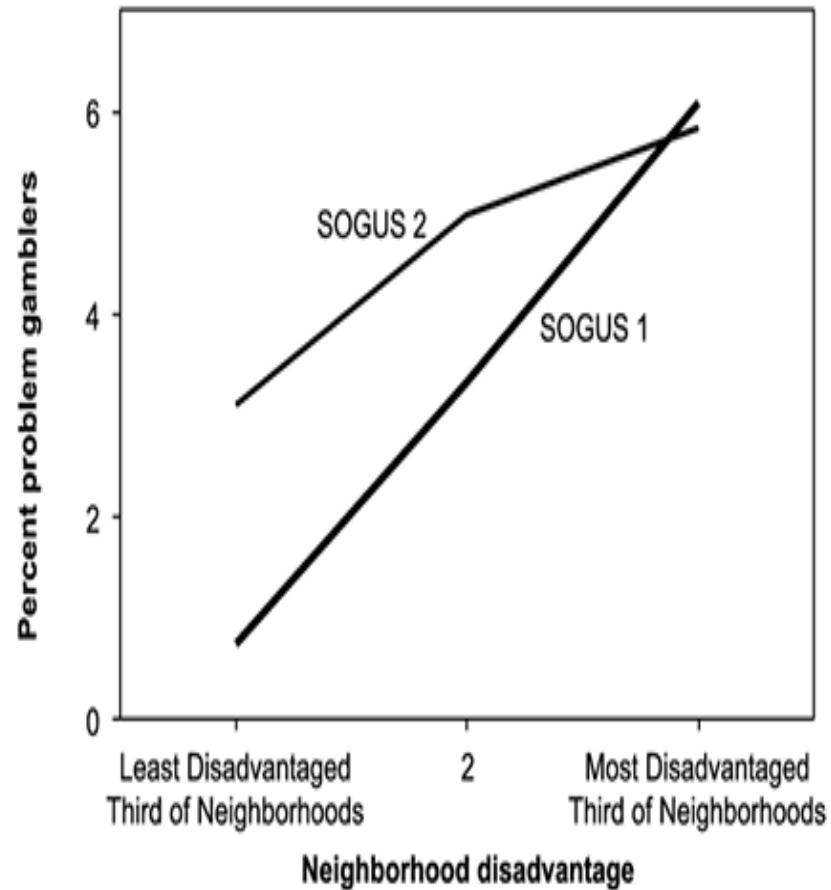
- % households receiving public assistance
- % households headed by female
- % adults unemployed
- % persons in poverty

Socioeconomic Status Criteria

- Occupational prestige (U.S. census categories)
- Family income

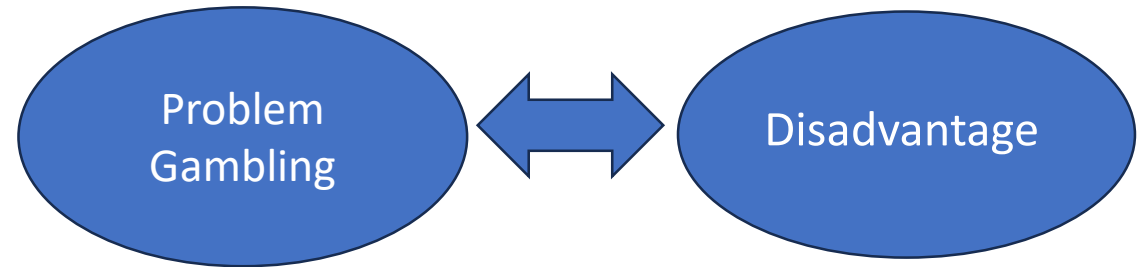
Gambling and Problem Gambling in the United States: Changes Between 1999 and 2013

(Welte et al., 2015)



Which Comes First?

- People of lower SES spend proportionally more on gambling and are more likely to experience gambling problems.
- “While individuals in these disadvantaged groups are more likely to suffer the consequences of PG (financial distress, loss of employment etc) regardless of their participation in gambling, research indicates gambling may exacerbate underlying issues and increase the likelihood of such consequences. This suggests that gambling may contribute to increased socioeconomic inequality.”
- (Cruickshank & Casey, 2013)



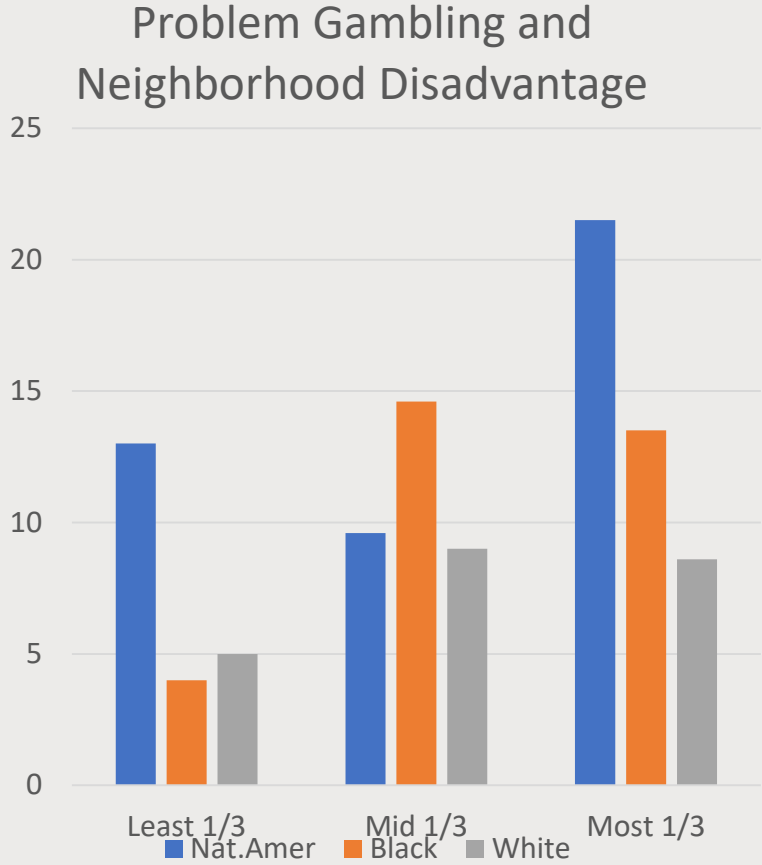
Logistic regressions with problem gambling (4+ symptoms in past year on three problem/pathologic gambling scales) as the dependent variable and demographic, individual and alcohol abuse/dependence independent variables

Independent variables	Main effects only (Odds ratios and Significance)	Significant interactions between race and other variables controlling for main effects
Race (Whites & Others = Reference)		
Blacks	1.49 *	
Native Americans	1.90 ***	
Gender (0=female; 1=males)	1.89 ***	
Age (18 – 90+ years)	NS	
Socio-economic status (SES) (0–10)	.89 **	
Neighborhood disadvantage (standardized)	1.27 ***	
Casino within 30 miles (0=No; 1=Yes) (Geo-coded distance variable)	NS	
Gambling convenience (Self-report) (1–4)	1.80 ***	
Impulsivity (1–6)	1.52 ***	
Alcohol abuse/dependence (past year) (0,1)	2.47 ***	
Significant Interactions with Race		
Native American × Neighborhood disadvantage		1.30 *

* p ≤ .05
 ** p ≤ .01
 *** p ≤ .001

Gambling Involvement among Native Americans, Blacks and Whites in the United States

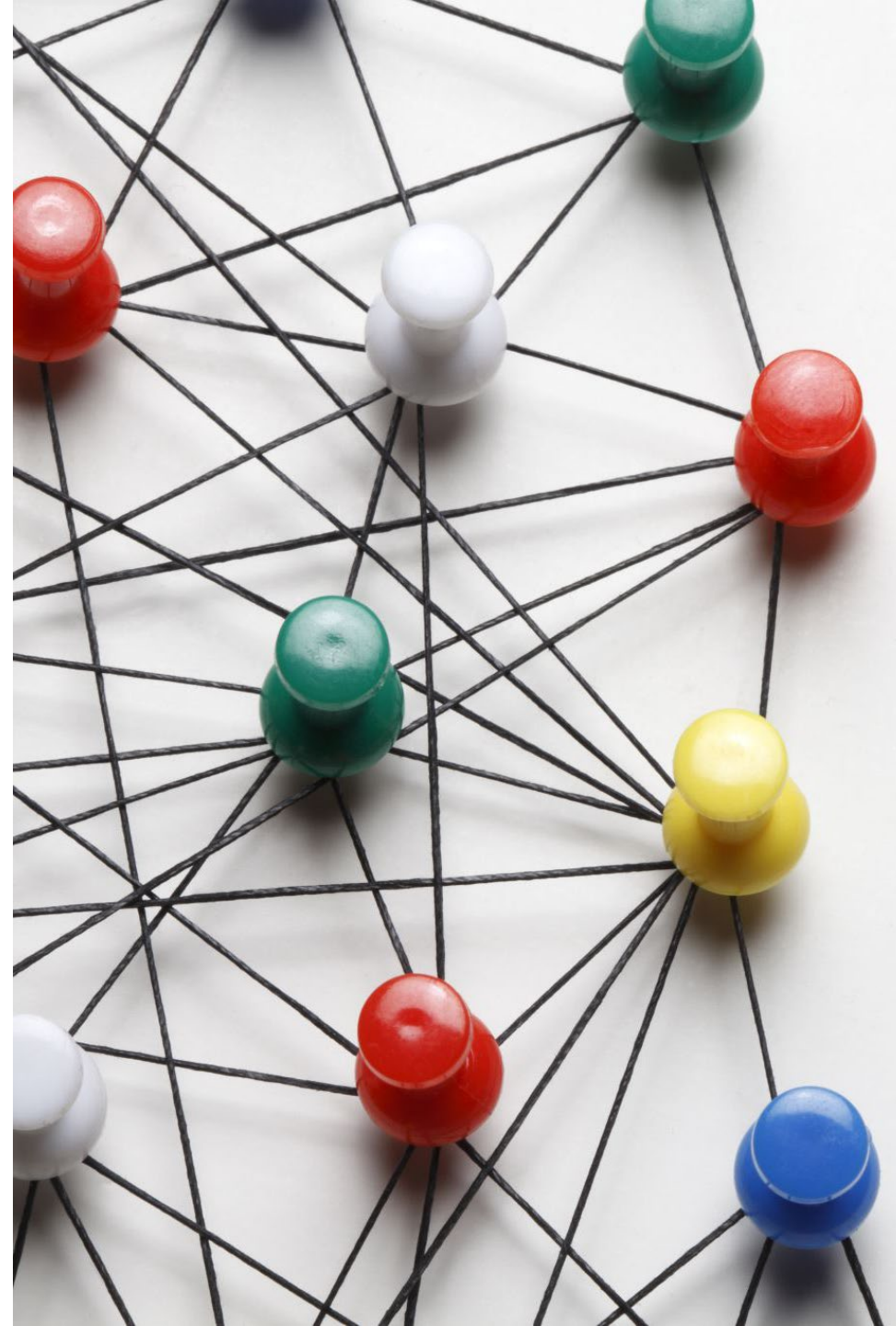
(Barnes et al., 2017)



Gambling Disorder and Minority Populations

Racial and ethnic minority status may simply be a proxy for underlying potential risk factors such as social economic disadvantage, gambling availability, stress and acculturation processes, as well as cultural variations in values and cognitions. The contribution of these different factors in the development of GD is still an area under research. The need for prevention and treatment programs for different cultural group remains unmet (Okuda et al., 2020)

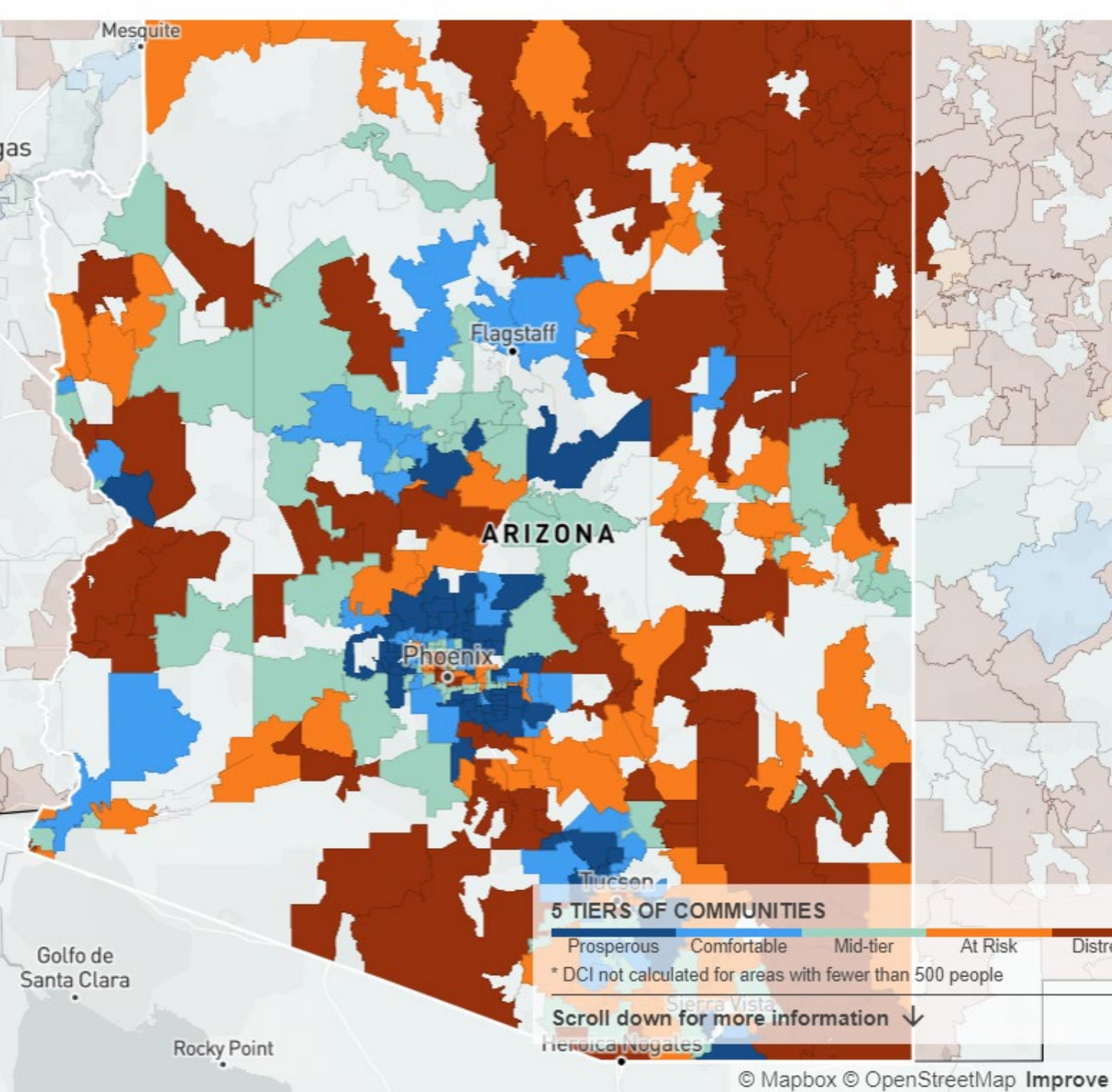
No evidence that effect of income on gambling disorder varies by race/ethnicity. For all race/ethnicity groups combined, low income was associated with increased odds of gambling disorder. (Day et al., 2020)



Gambling and Homelessness

(Vandenberg et al., 2022; Roberts, 2017)

- Disproportionate rate of problem gambling among those experiencing homelessness
- Disproportionate rate of homelessness among those experiencing problem gambling
- Severity of homelessness associated with higher prevalence of problem gambling
- Severity of problem gambling associated with higher prevalence of homelessness

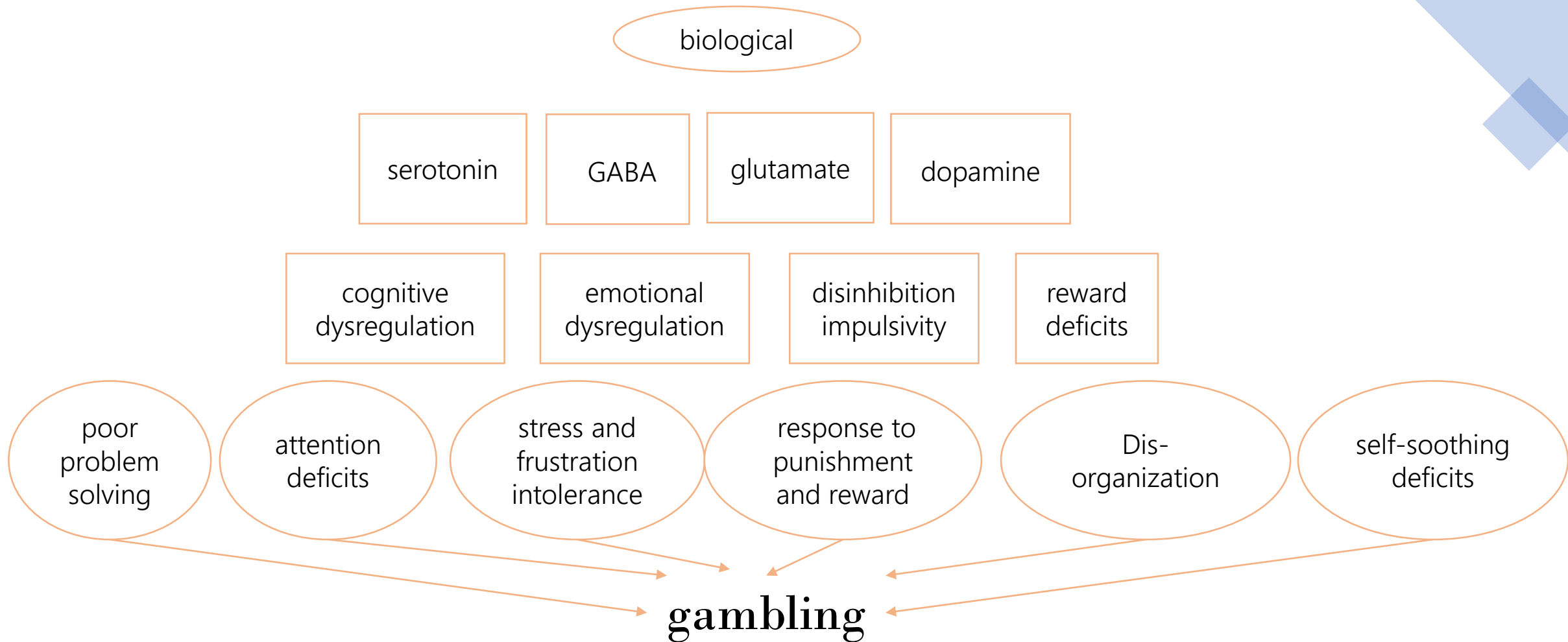


Arizona Distressed Communities (2022)

<https://eig.org/distressed-communities/2022-dci-interactive-map/?path=state/AZ>

Indicators

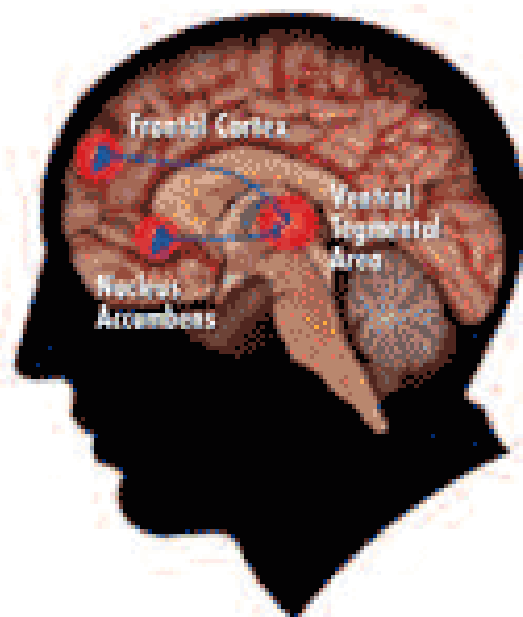
- Adults (25+) without HS diploma or GED
- Adults (25-54) unemployed
- Poverty rate
- Median income ratio
- Change in # of jobs (2016-2020)
- Change in # businesses (2016-2020)



Solution to all problems. Intensity focuses attention (acts as stimulant). Relieves stress. Focus on intermittent rewards. Becomes organizing principle. Acts as mood stabilizer.

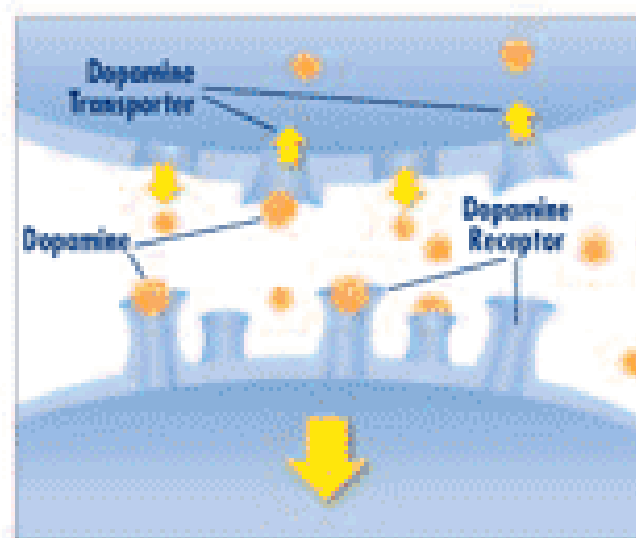
ALL DRUGS OF ABUSE TARGET THE BRAIN'S PLEASURE CENTER

Brain reward (dopamine) pathways

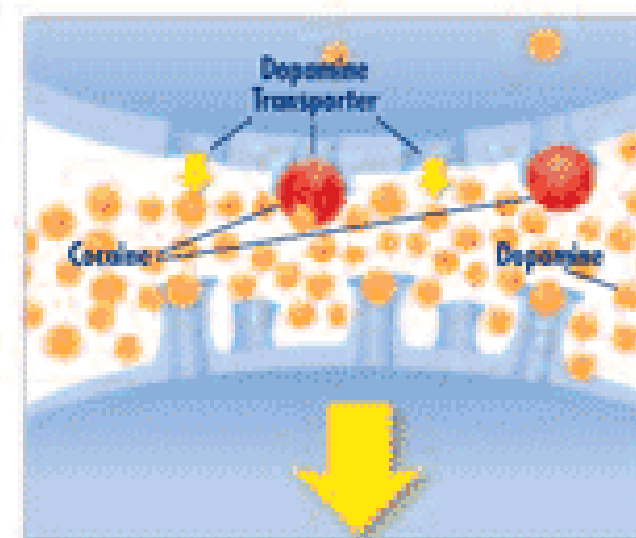


These brain circuits are important for natural rewards such as food, music, and art.

All drugs of abuse increase dopamine



FOOD

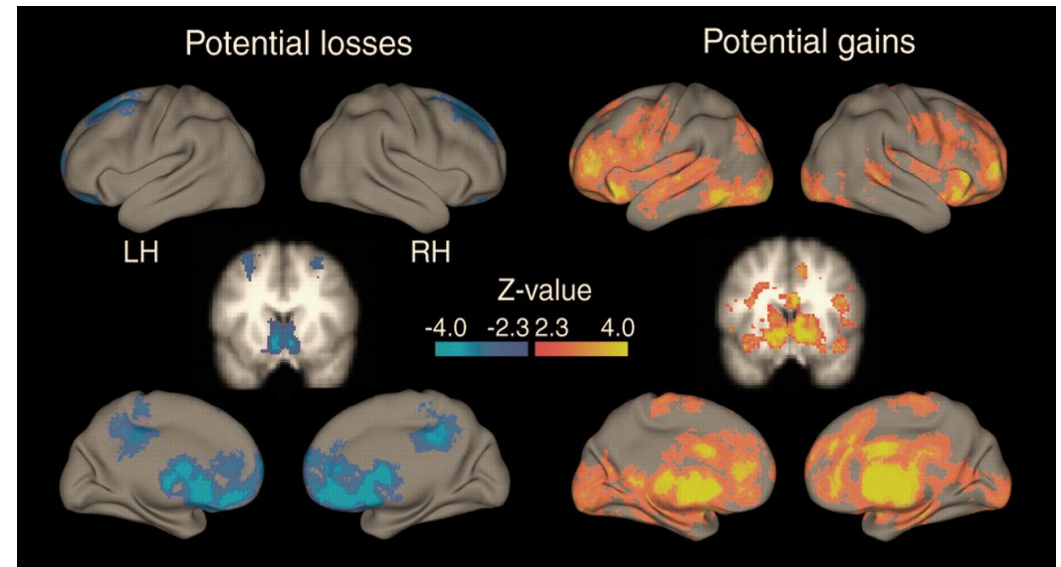


COCAINE

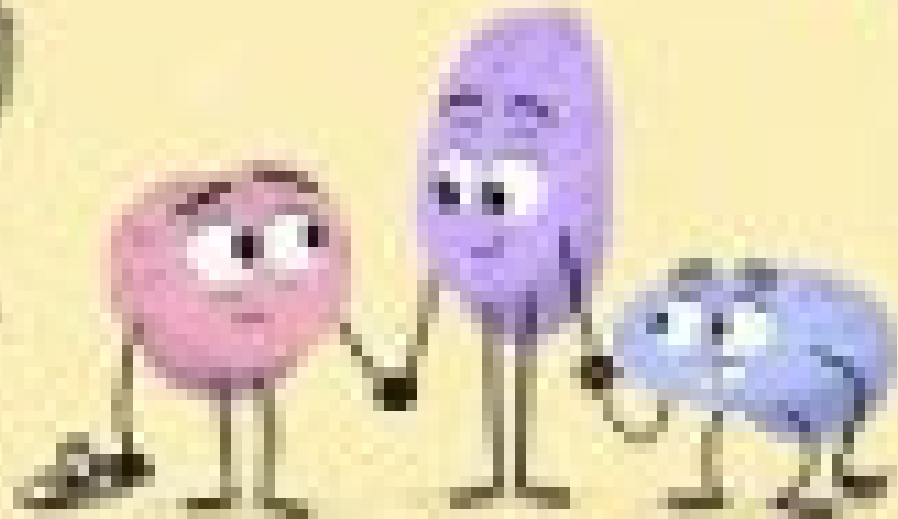
Typically, dopamine increases in response to natural rewards such as food. When cocaine is taken, dopamine increases are exaggerated, and communication is altered.

The two sets of images illustrate how brain activity differs when we contemplate financial losses and gains.

- The blue areas at left are those that become deactivated as we make decisions that will likely cause us to lose money.
- The orange and red areas at right show the activation that occurs in the brain when we believe the odds are in our favor and we'll win money.



(Tom et al., 2007)





Genetics of Gambling Disorder

- GENETIC ANALYSIS

(Blum et al., 2020; Guillot et al., 2015)

- Polygenetic model: multiple genetic variants contribute to risk for gambling disorder

- Not one problem gambling gene

- TWIN STUDIES

(Yan-Hua et al., 2017; Slutske et al., 2015)

- Establish genetic contribution for risk for gambling disorder vs. environmental risk

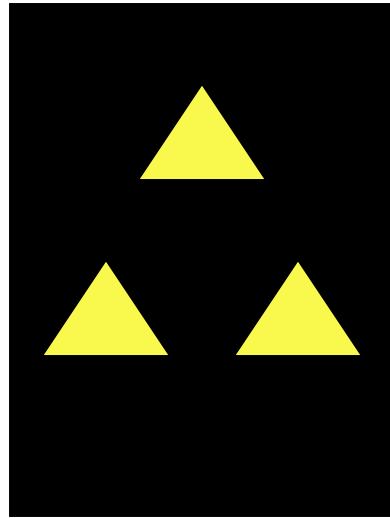
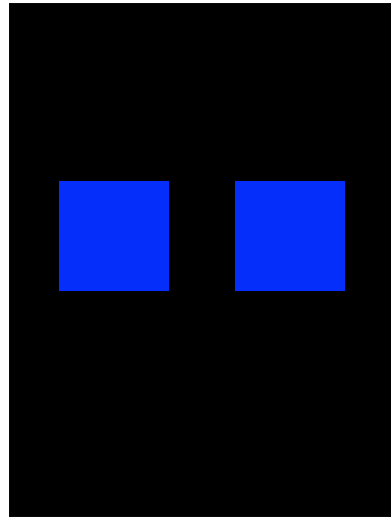
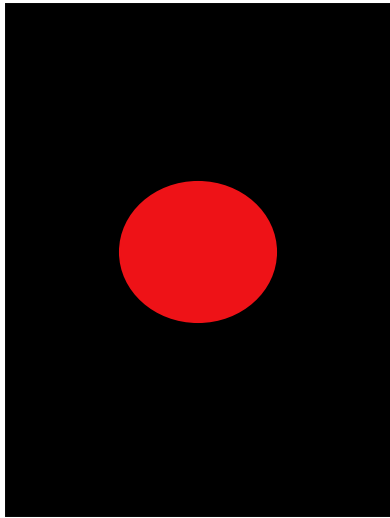


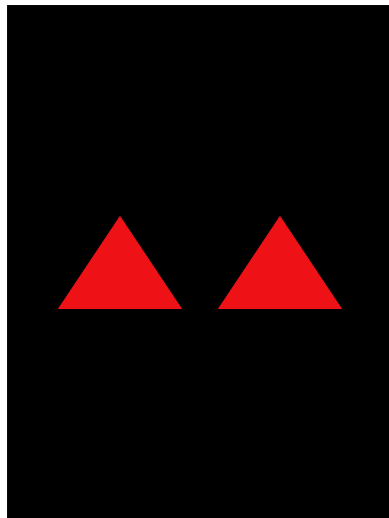
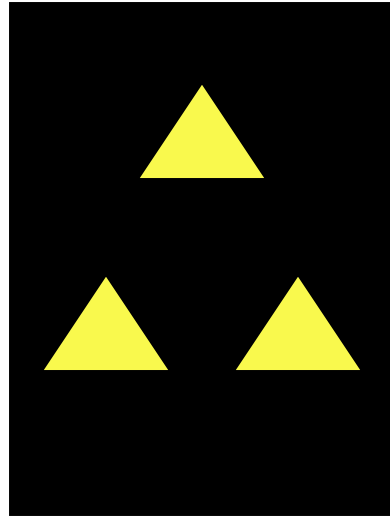
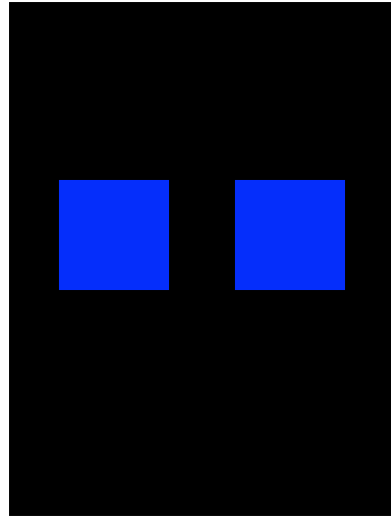
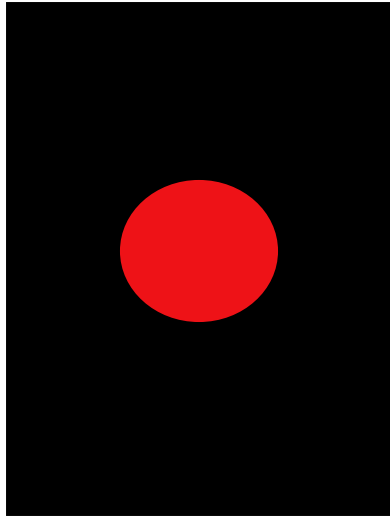
Risk Factors and Executive Function

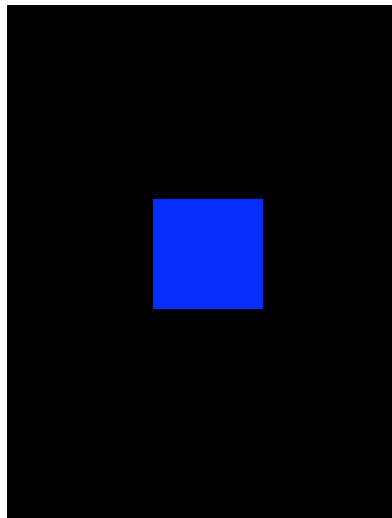
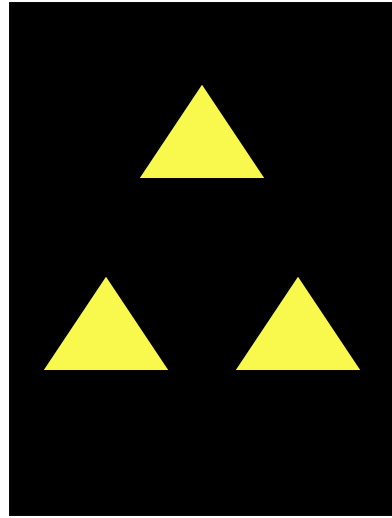
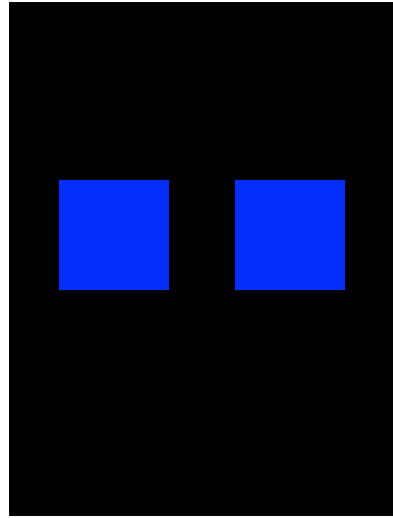
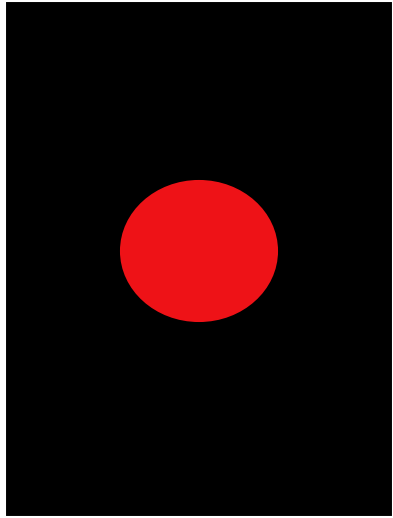


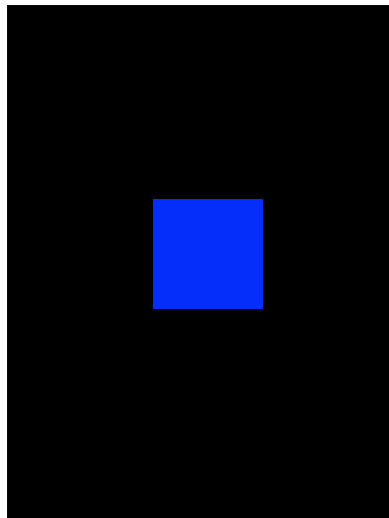
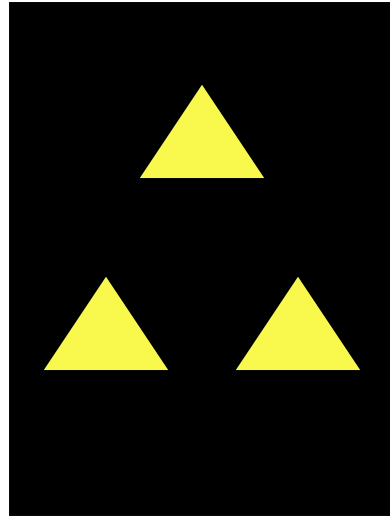
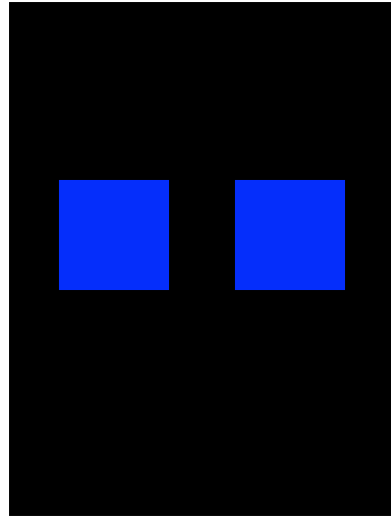
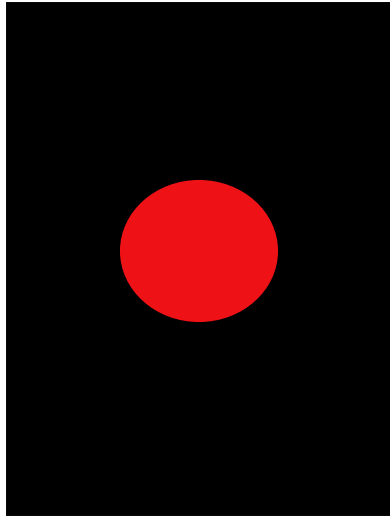
Rugle, 1993

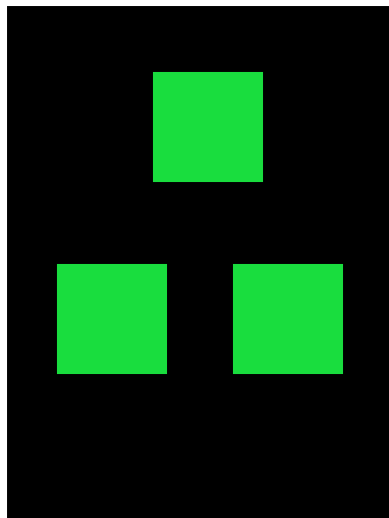
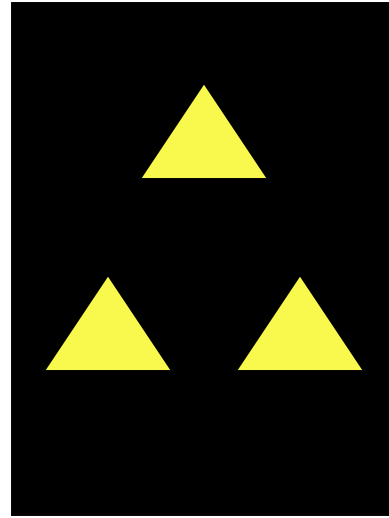
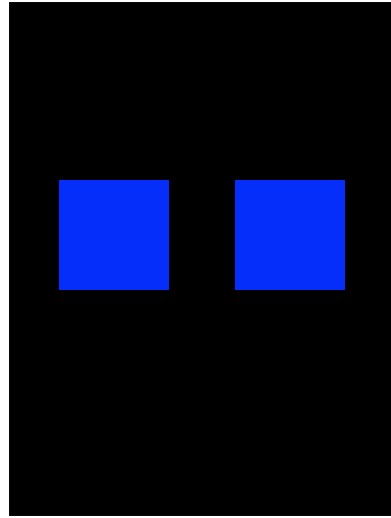
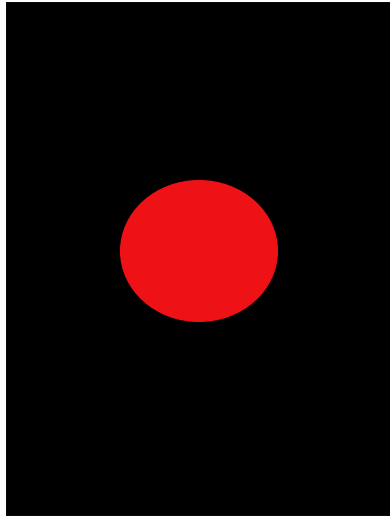


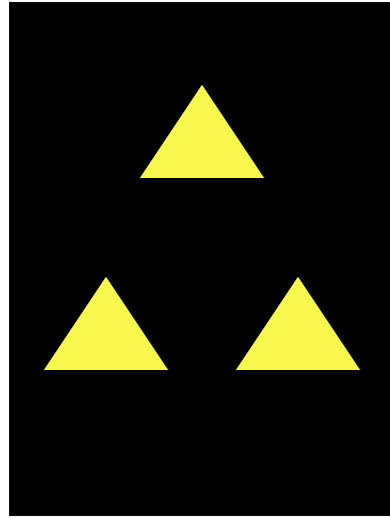
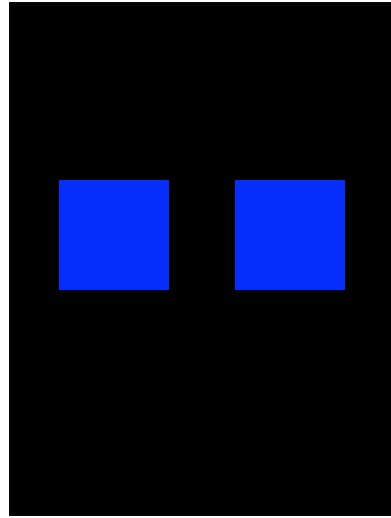
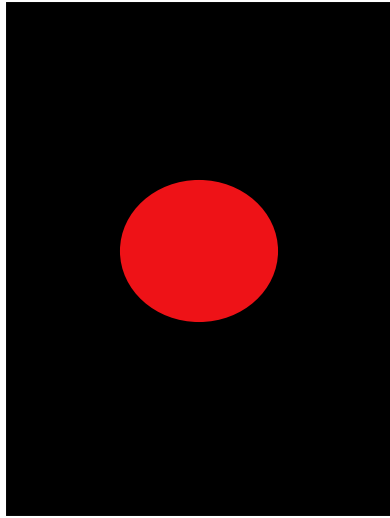


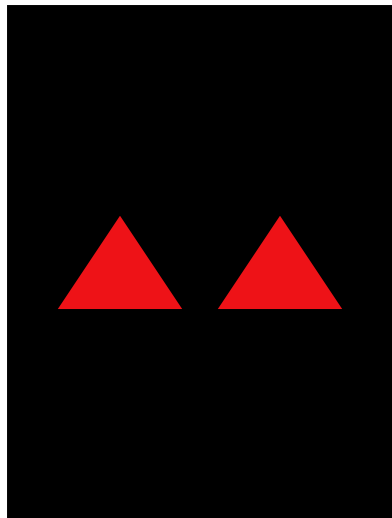
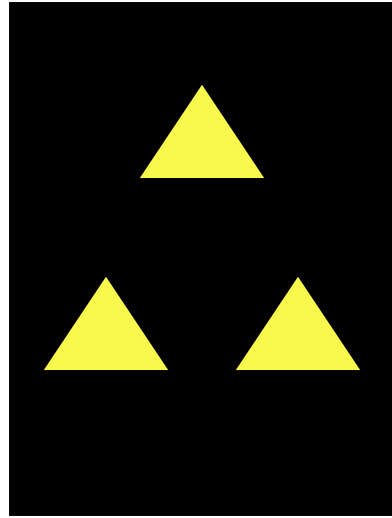
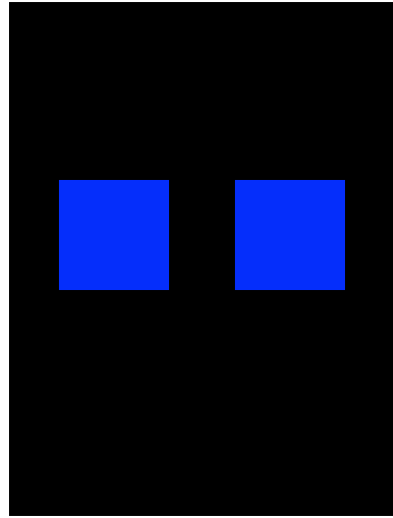
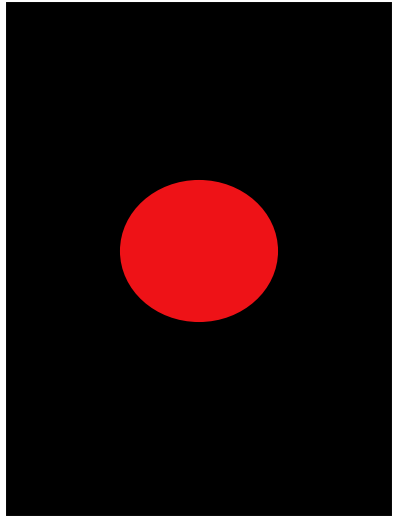




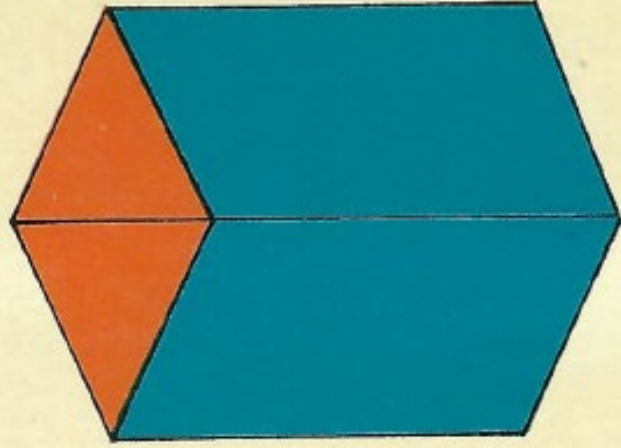


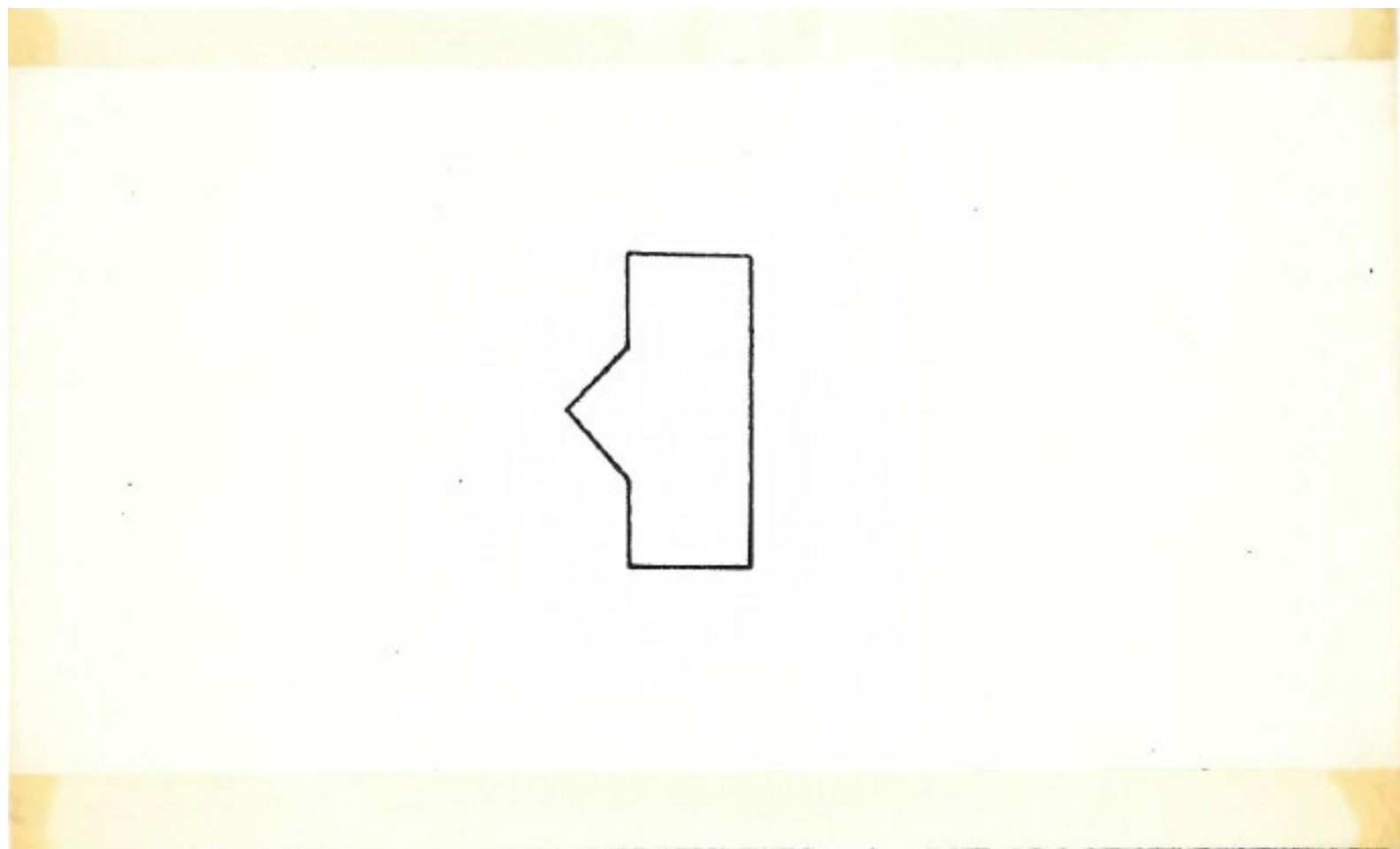


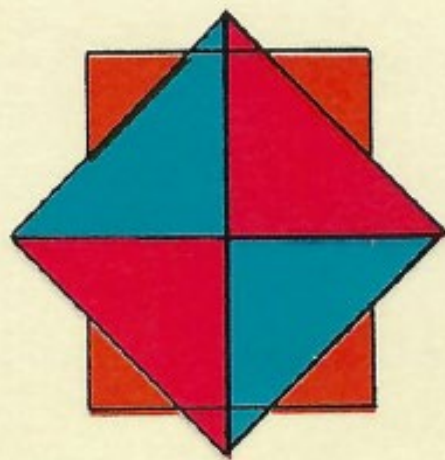


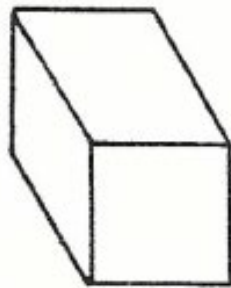








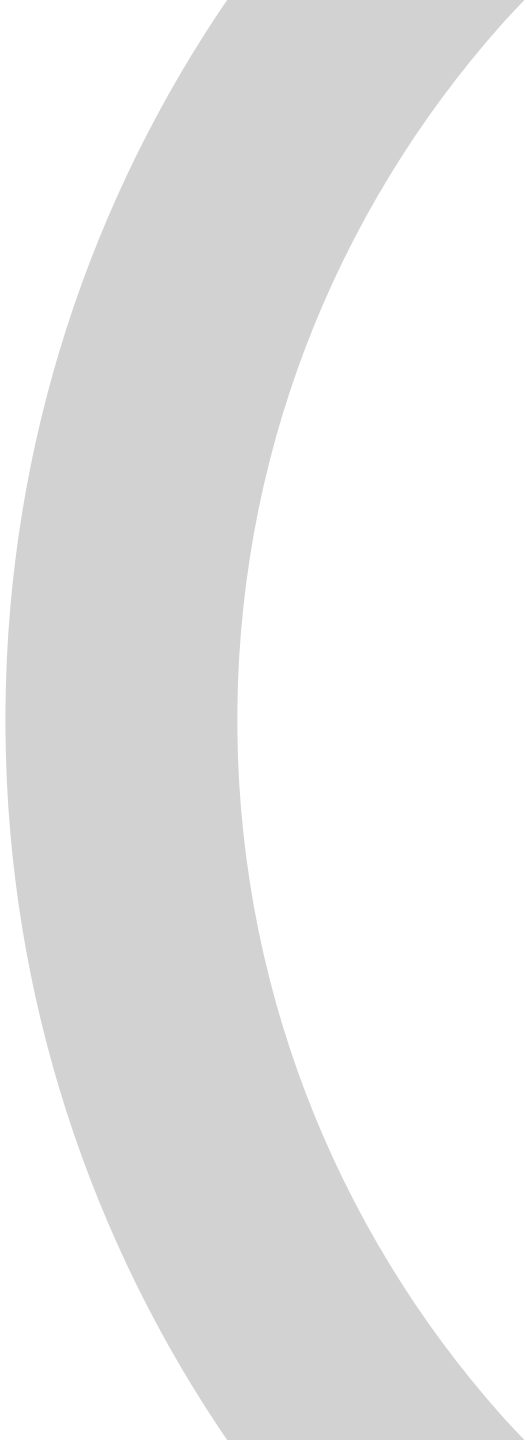






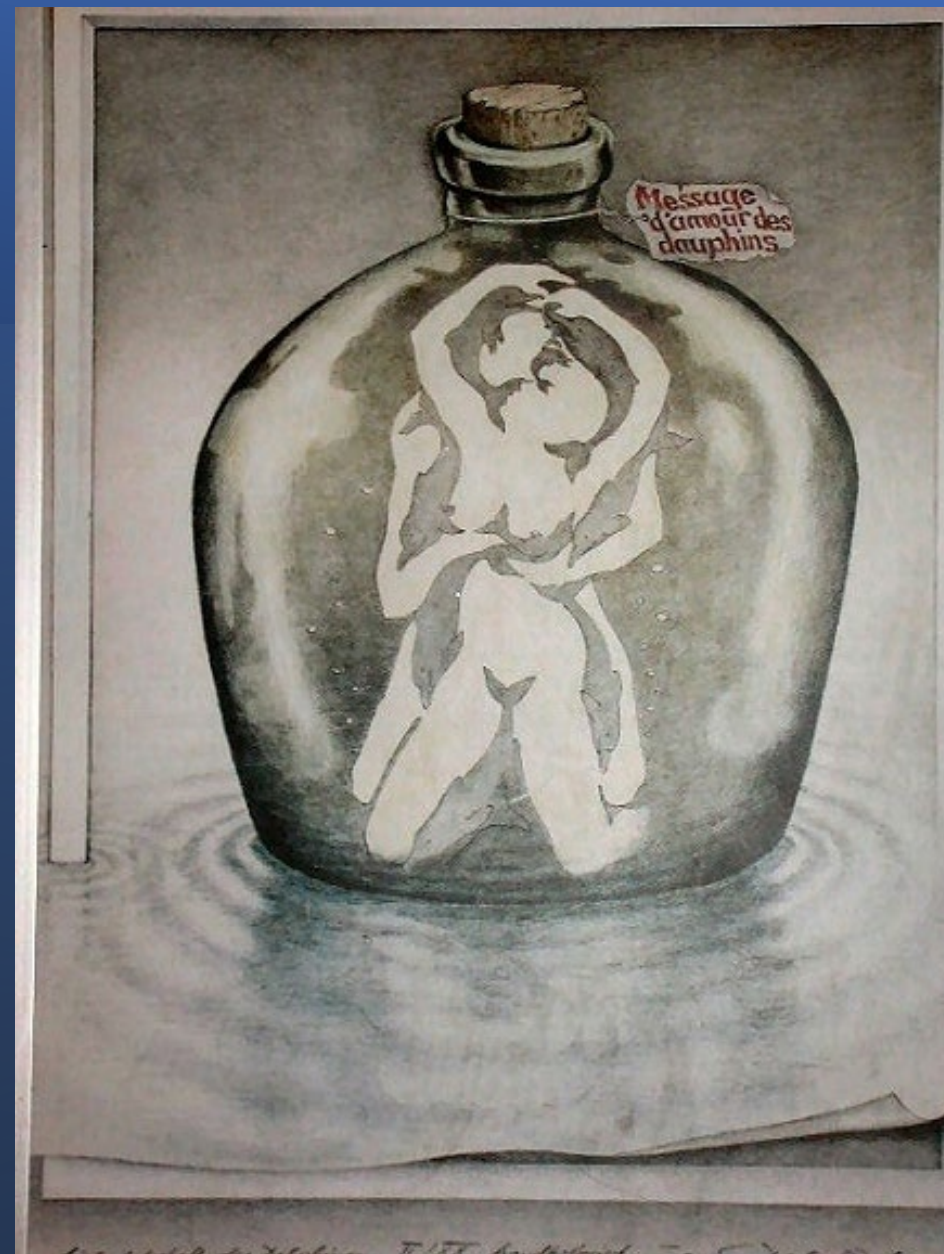
How Many
Faces Do You
See?







Find the
Man





Impulsivity and Problem Gambling

Pagani, 2009

- 163 Kindergarten students rated by teachers on inattention, distractibility, hyperactivity on scale of 1-9
- Students interviewed 6 years later
 - Many reported gambling on bingo, cards, lottery, video poker, video games and sports
 - Every 1 point increase on kindergarten impulsivity rating correlated with a 25% jump in gambling by the 6th grade

Marshmallow Experiment



Delayed Discounting

- \$50 Now
- \$60 Now
- \$70 Now
- \$80 Now
- \$90 Now
- \$100 1 week
- \$100 1 week
- \$100 1 week
- \$100 1 week
- \$100 1 week

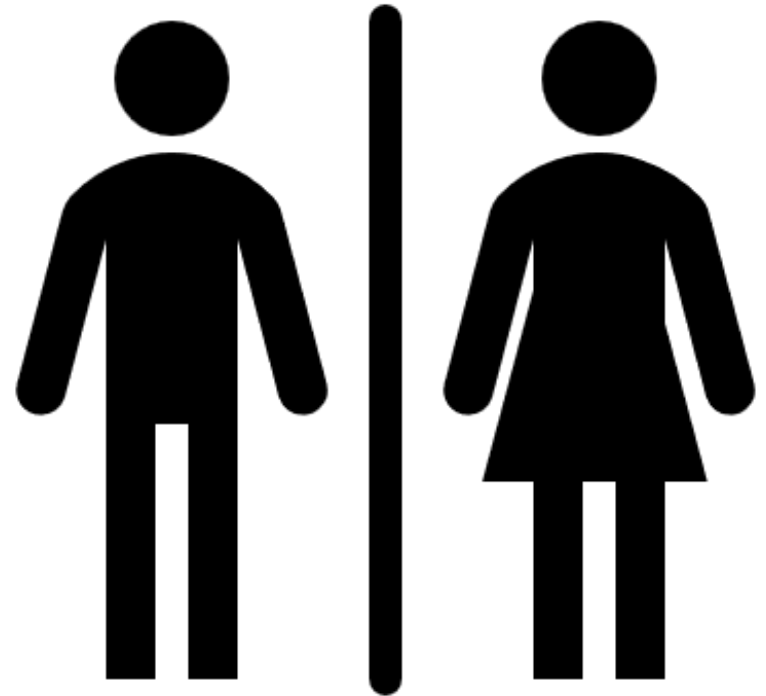


Genetic Risk Factors: Twin Studies

- **Slutske, et al., 2000**
 - **Problem and Pathological gambling have many, if not all, same risk factors in common**
 - **Problem gambling differs from Pathological Gambling in requiring fewer, not different risk factors**
 - **Relationship between problem and pathological gambling similar to that of substance abuse and dependence**
 - **12 – 20% of genetic risk for PG in common with genetic risk for Alcohol dependence (less than nicotine and about same as marijuana)**

Genetics

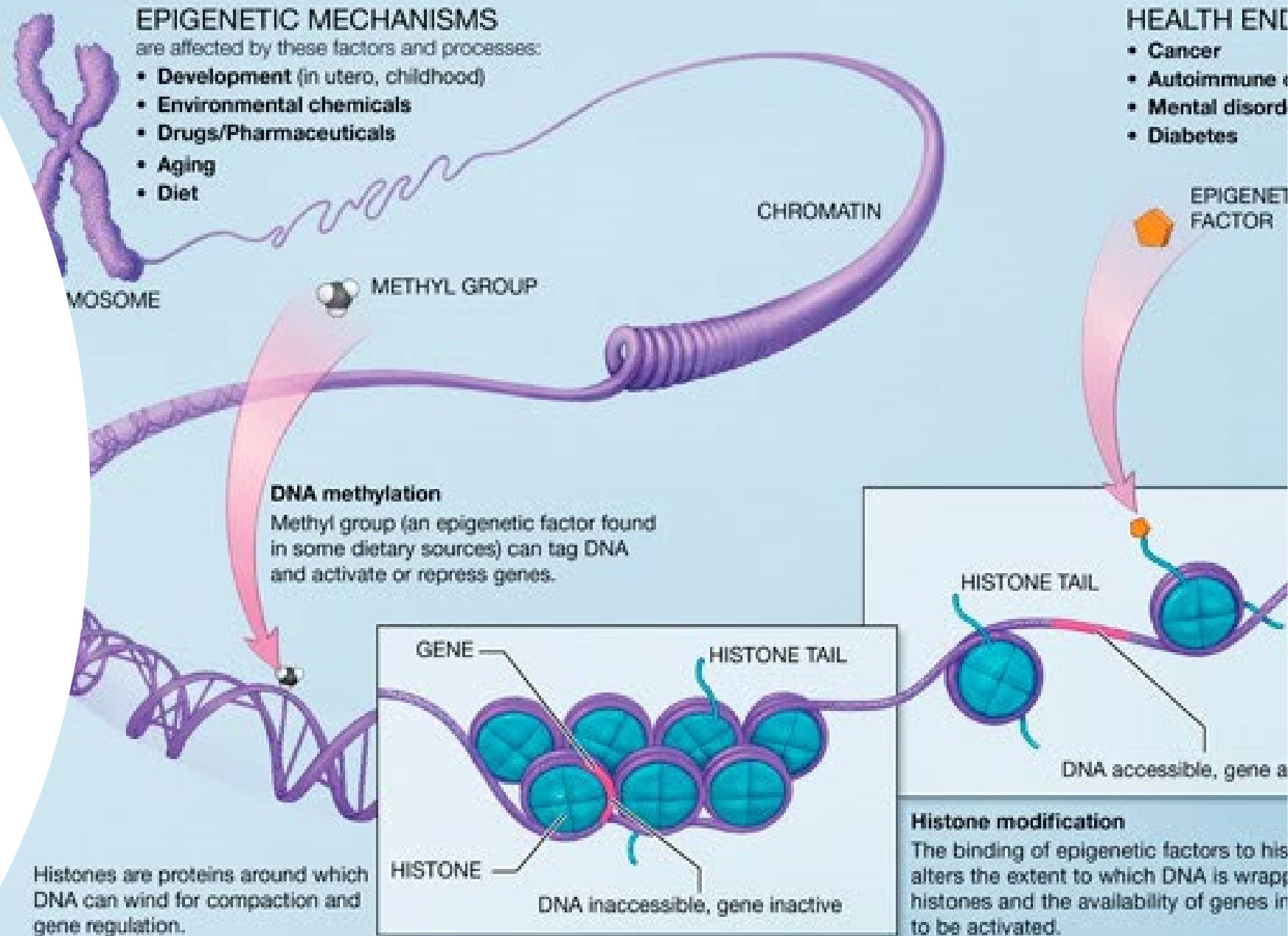
- Slutske, et al, 2010
 - Establishes “genes are as important in the etiology of disordered gambling in women as men.”
 - No evidence for quantitative or qualitative gender differences of variation in disordered gambling liability.

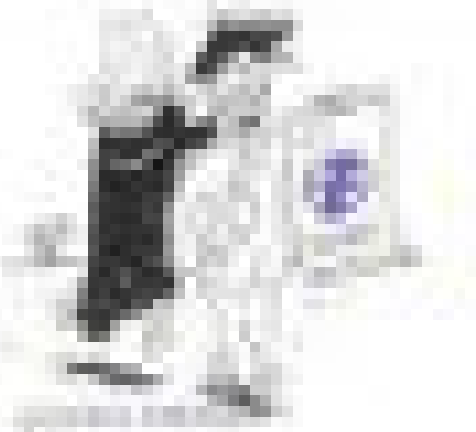
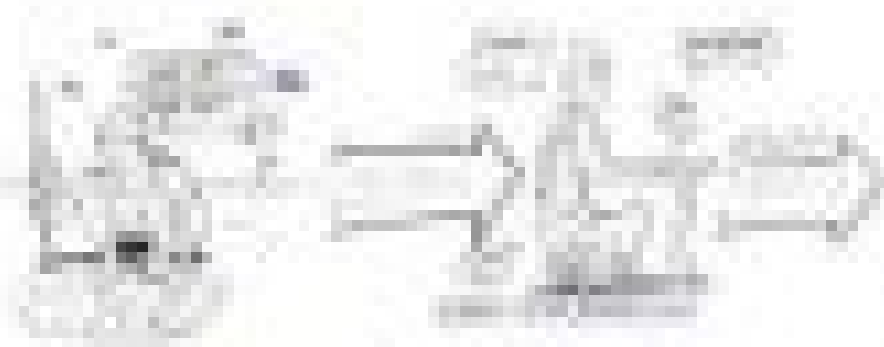


Epigenetics

Epigenetics

- Science of gene expression
- Chemical compounds (i.e., methyl groups) on or attached to DNA
- Can be environmentally influenced by things like diet, pollutants, and trauma
- Research has established that trauma response can be inherited through generations contributing to depression, anxiety, addiction as well as physical disorders such as heart disease, obesity, and cancer

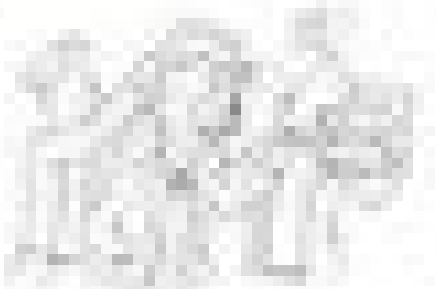
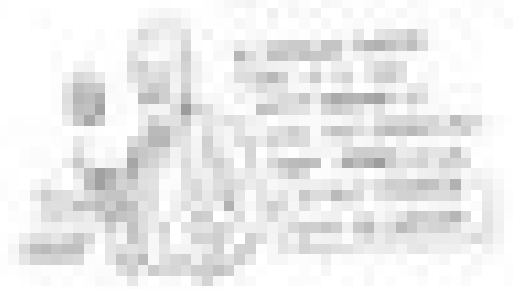


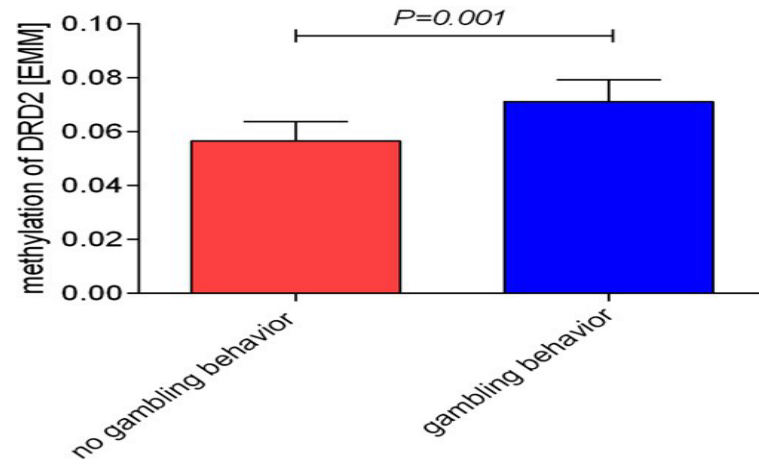
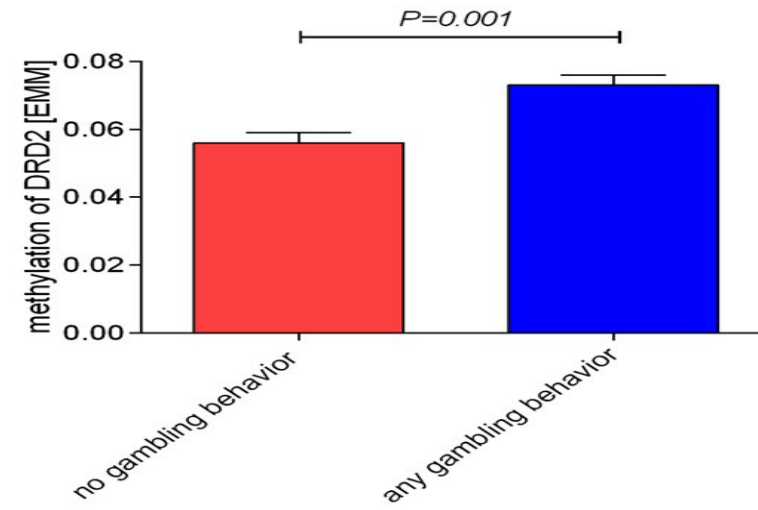
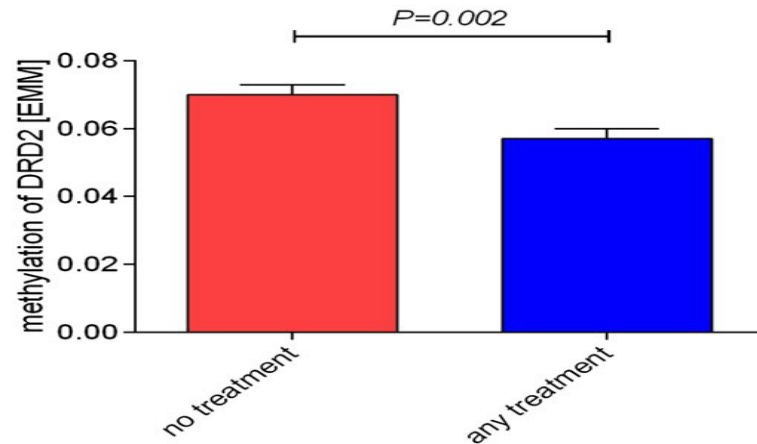
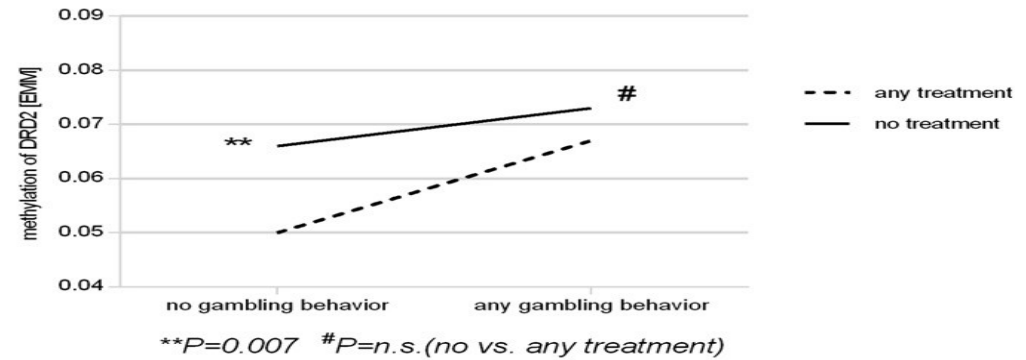


EPIGENETICS

NATURE

NATURE



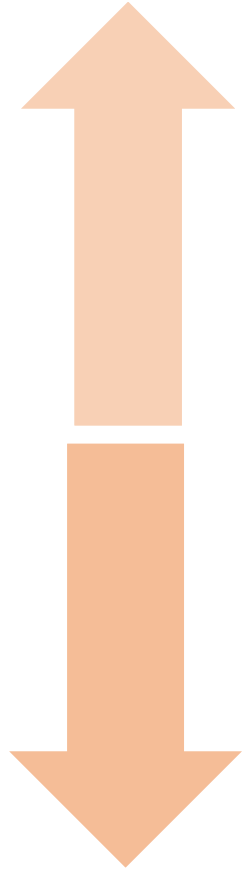
A**DRD2 methylation and gambling behavior during last 12 months****B****DRD2 methylation and gambling behavior during last 30 months****C****DRD2 methylation and treatment utilization during last 12 months****D****Interaction between treatment utilization and gambling behavior during last 12 months**

Transgenerational Inheritance

- Ancestral traumas can negatively impact the well-being of grandchildren and great grandchildren.
- While most research on transgenerational epigenetic inheritance has been conducted in animals, studies in humans have shown ancestor's exposure to trauma, poor nutrition, and toxic chemicals can impact the health of descendants across several generations.
- A role for evidence-based trauma treatments, culturally adapted prevention and intervention programs, and enrichment opportunities is strongly indicated to reduce and prevent the impact of personal and ancestral adversities.
- In addressing ancestral traumas, however, true healing will require acknowledgement of the harms that were done, and broader systemic level changes.



Epigenetics, Stress Response, Generational Trauma



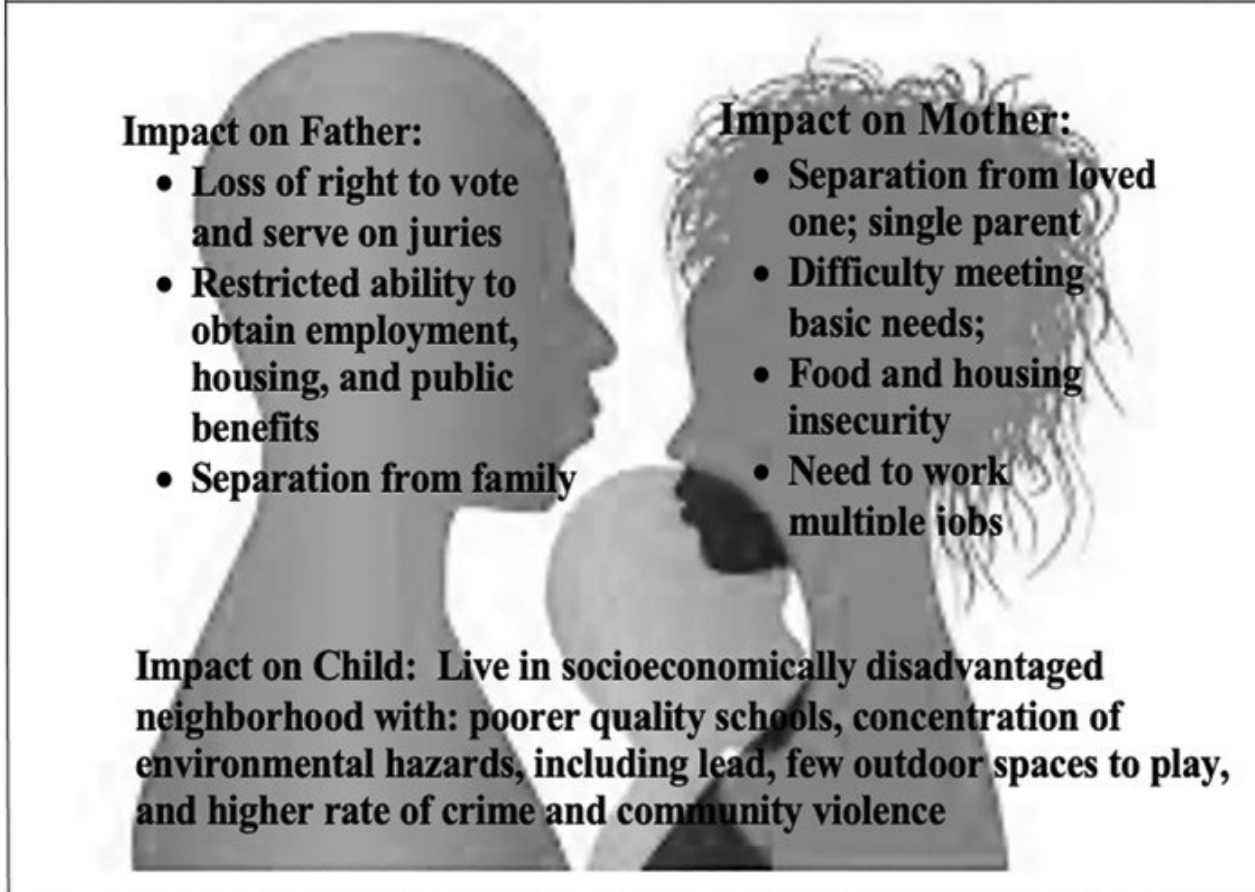
overactive
amygdala
(emotional
center)

underactive
prefrontal cortex
(thinking center)

underactive anterior
cingulate cortex
(attending center)



Impact of incarceration

The image features three silhouettes: a man on the left, a woman on the right, and a child in the center. The man and woman are facing each other, and the child is positioned between them, slightly lower. The background is white, and the silhouettes are dark gray.

Impact on Father:

- Loss of right to vote and serve on juries
- Restricted ability to obtain employment, housing, and public benefits
- Separation from family

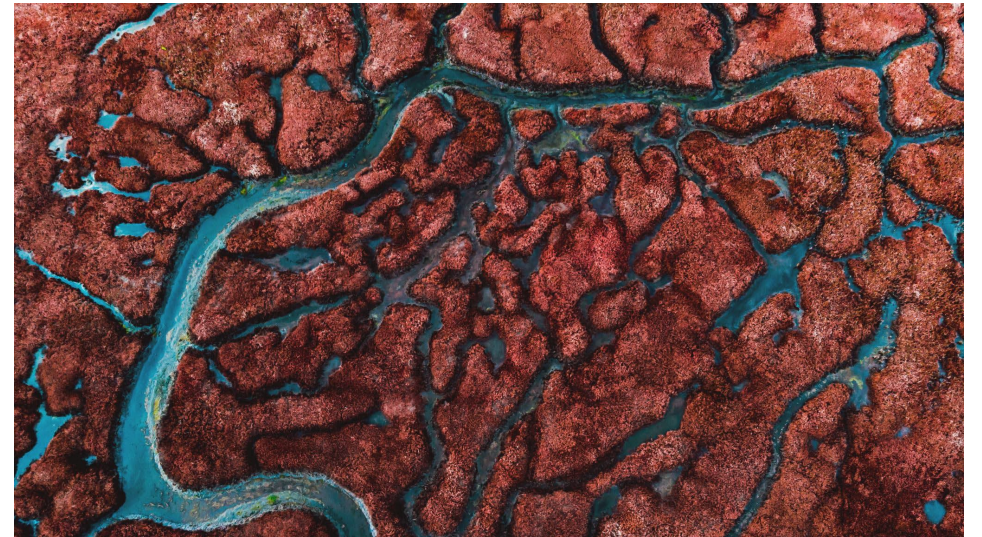
Impact on Mother:

- Separation from loved one; single parent
- Difficulty meeting basic needs;
- Food and housing insecurity
- Need to work multiple jobs

Impact on Child: Live in socioeconomically disadvantaged neighborhood with: poorer quality schools, concentration of environmental hazards, including lead, few outdoor spaces to play, and higher rate of crime and community violence

Gambling, Genetics and Environment

- Slutske et al, 2015
 - A portion of the genetic risk to gamble was explained by moving to or remaining in a disadvantaged area
 - The genetic risk associated with gambling involvement and disordered gambling is associated with greater sensitivity to the effects of being exposed to living in a disadvantaged area
 - The relationship between local area disadvantage and gambling involvement and disorder was stronger in regions where there was a greater density of gambling venues (availability of EGMs)



Epigenetics and Neuroplasticity

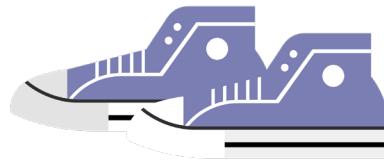
Environment can also heal epigenetic changes



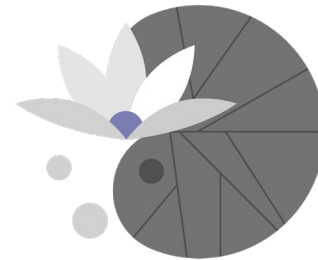
•Healthy diet



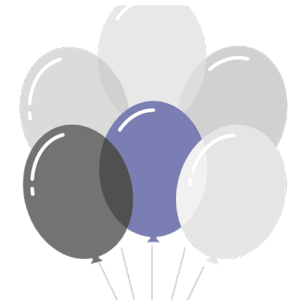
Nurturing
environment



Exercise



Mindfulness
and
meditation



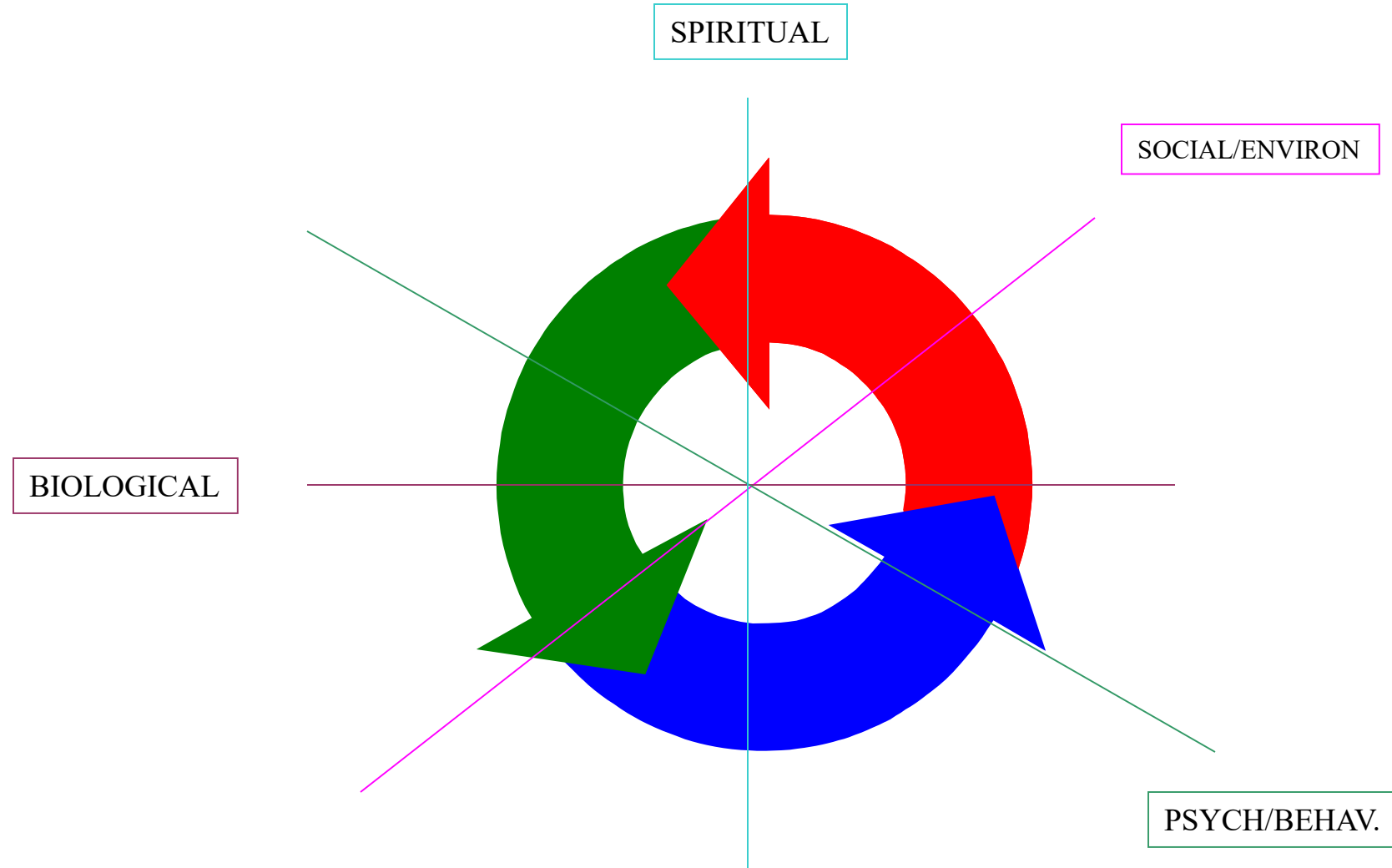
Play and
creativity

Mindfulness and Neuroplasticity

- In meditators cortical areas were the same thickness as nonpractitioner 20 years younger
- Increased grey matter in brain areas that:
 - allow shifting perspective
 - allow empathy
 - management of emotional distress
- Decreased grey matter in amygdala
 - emotional reactivity



Full Circle: We need to heal our environments as well as our minds





Defining a Public Health Approach to Gambling

Elements of the Public Health Approach

- Moving away from PG and emphasis on individual responsibility
- A combination of population wide and targeted initiatives for high-risk groups
- Acknowledgement of the complex interplay between determinants of health and health behaviours and outcomes
- Interventions and strategies delivered across a range of settings and the life course
- Simultaneously implemented multi-pronged interventions
- Developing upstream interventions
- Integrating the impact of gambling consideration into broad range of health promotion activities

Addressing epigenetic risk factors

- We can help individuals heal their brains and we can create environments that nurture healthier brain functioning
- Reducing epigenetic risk factors by creating:
 - Environments where healthy food is accessibility
 - Environments where quality education at all levels is accessible
 - Environments that are safe and have space for play and exercise
 - Environments where employment opportunities offering livable wages are available
 - Environments in which opportunity is equitable
 - Environments in which gambling is not perceived as the best/only option for financial success.
 - Environments in which there are many forms of recreation equally as accessible as gambling
- As well as individual access to quality health care, behavioral health care, trauma informed care

“Adopting a public health approach has more to do with a fundamental shift in our way of thinking and acting, and less to do with traditional organizational roles and boundaries.”



Questions

