

# **PATTERNS OF DAILY FANTASY SPORTS PLAY**

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# Sources of Support

- DraftKings, Inc.
- The Foundation for Advancing Alcohol Responsibility (FAAR)
- Indian Health Services & the National Institutes of Health
- Massachusetts Dept. of Public Health Bureau of Substance Addiction Services
- Massachusetts Gaming Commission

# **A BRIEF HISTORY OF DAILY FANTASY SPORTS (DFS)**

# History of Fantasy Sports

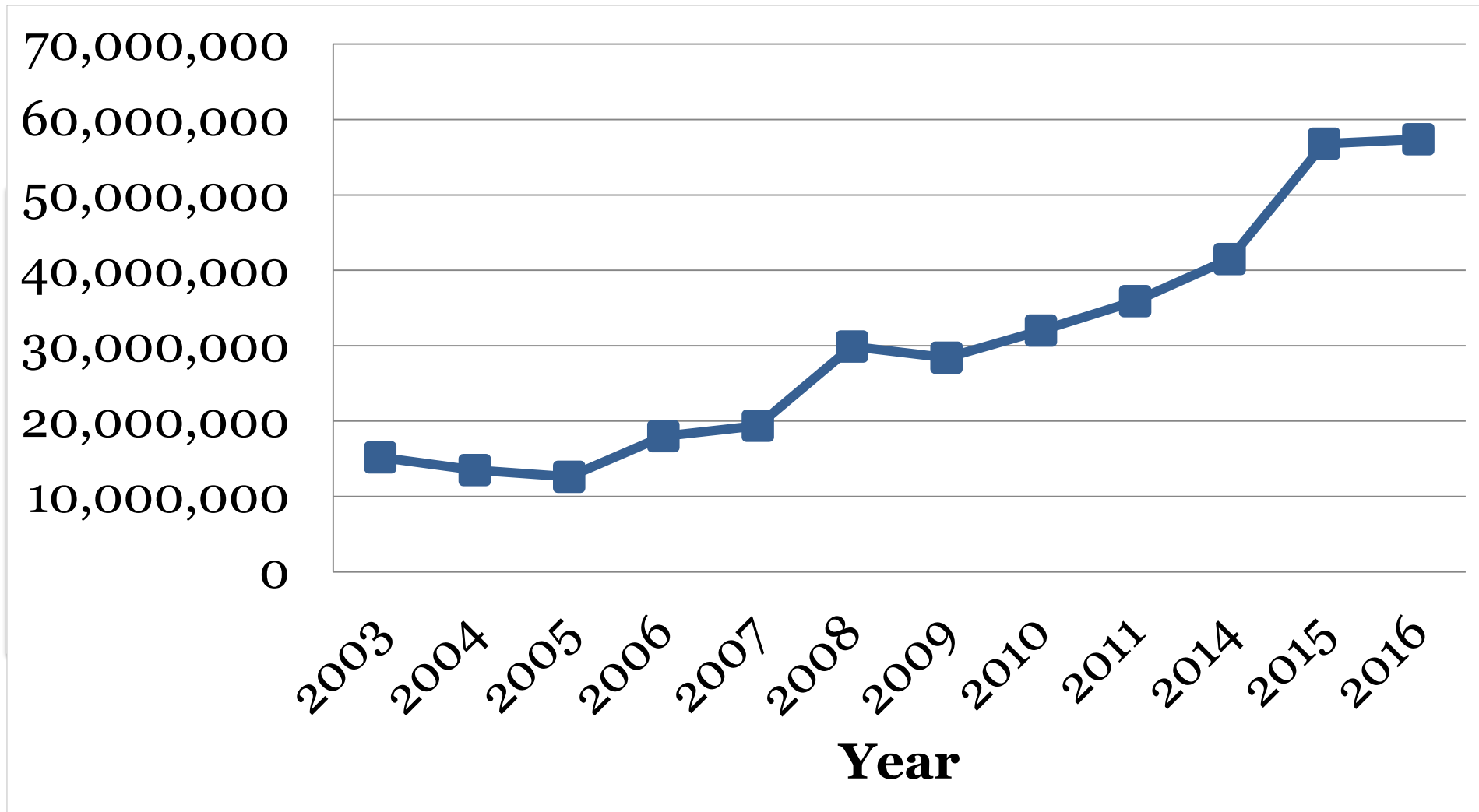
- 1963: Greater Oakland Professional Pigskin Prognosticators League
- 1981: Rotisserie Baseball begins
- 1999: Yahoo! Introduces free online fantasy sports & the Fantasy Sports Trade Association is founded
- 2006: The Unlawful Internet Gambling Enforcement Act bans online gambling but includes an exception for online fantasy sports.
- 2009: FanDuel founded
- 2012: DraftKings founded

# What Is Daily Fantasy Sports?

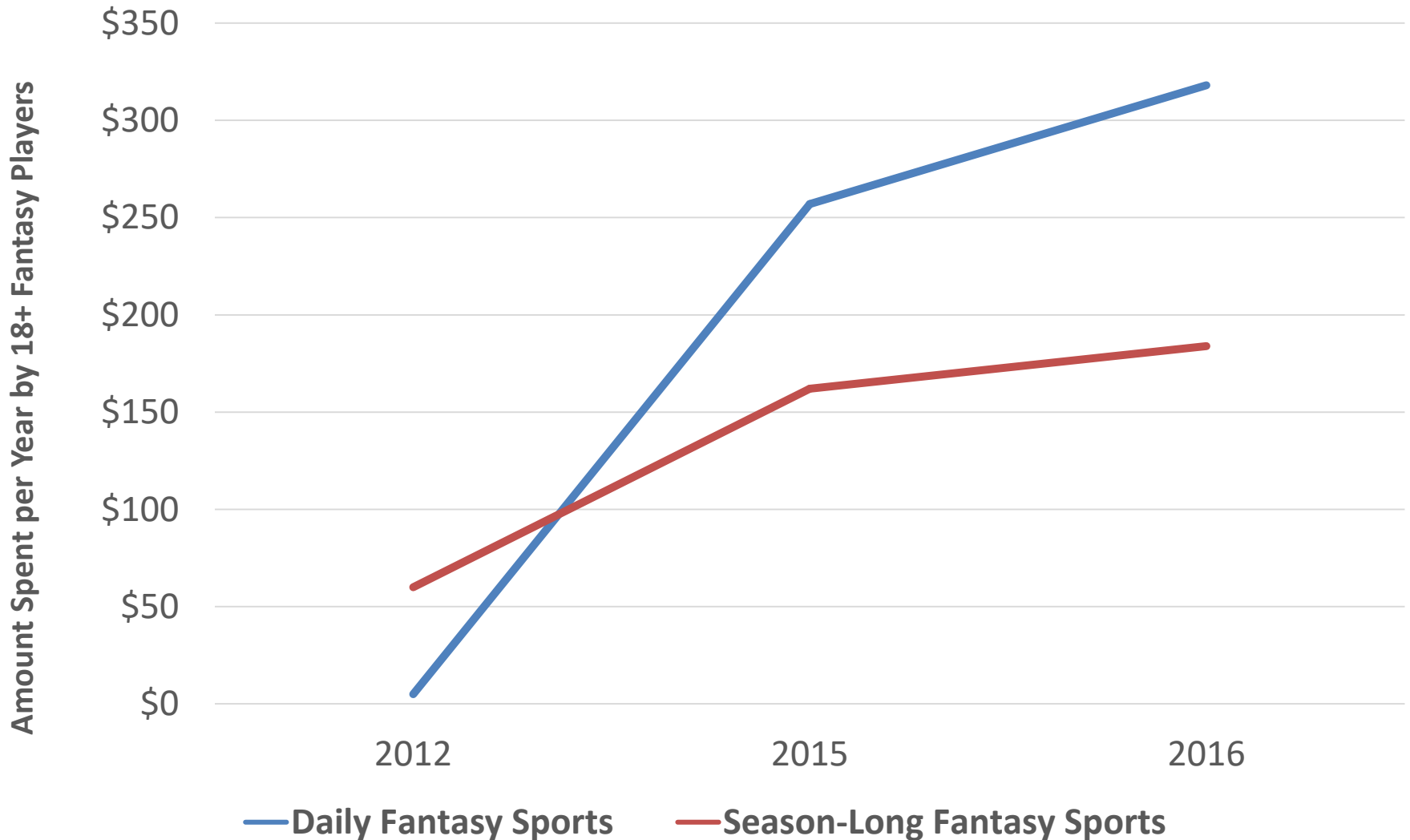
- Whereas fantasy sports traditionally involves drafting, managing, and monitoring a fantasy team across the course of a sports season, DFS allows players to do this over the course of a week or a day.
- Entry fee is paid to enter the contest
- Play against all of those who enter the contest
- Contest pays out either top 50% or a smaller proportion of highest scorers

# Growth

*(Fantasy Sports, not just DFS)*



# Growth



**IS DFS GAMBLING?**



# What is Gambling?

- Risking something of value on the outcome of an event when the probability of winning is less than certain.
- Bet is irreversible
- Chance determines the winners and losers

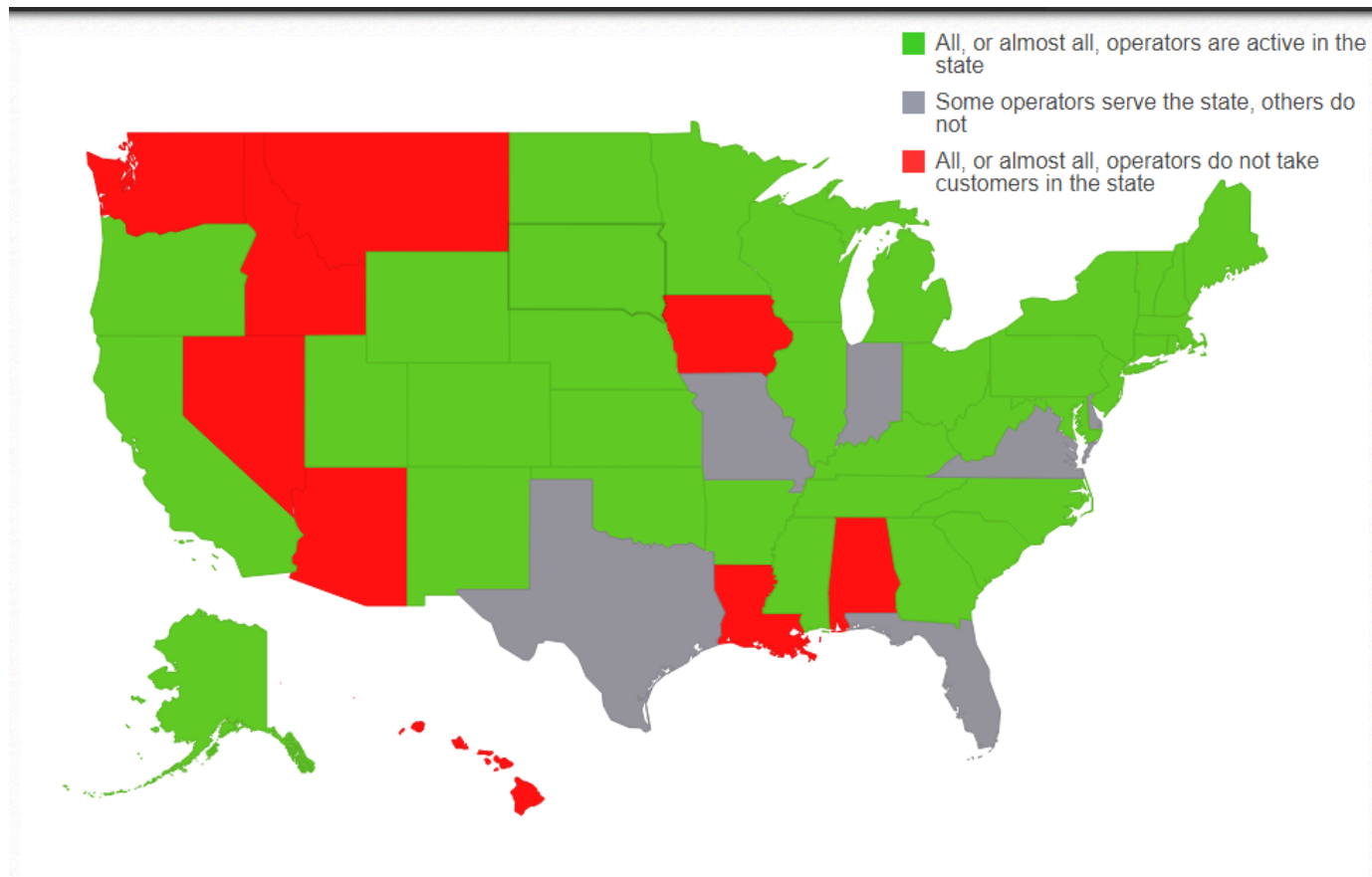
0021	<b>~ \$1.50 Ticket ~ 6:00 - 7:30 p.m.</b> <small>Please keep for prize verification. Thank you for contributing!</small>	<b>Your Name:</b> _____	0021
		<b>Address:</b> _____	
		<b>Phone #:</b> _____	
		<b>~ \$1.50 Ticket ~ 6:00 - 7:30 p.m.</b> Fundraising Raffle will take place on December 10th Must not be present to win. Thank you for contributing!	
		<b>Little Tots Day Care</b> 	

# The Unlawful Internet Gambling Enforcement Act (UIGEA)

- The bill specifically exempts fantasy sports games, educational games or any online contest if
  - Prizes are known in advance and amount is not determined by number of entrants
  - Winning outcomes reflect “relative knowledge and skill of the participants and are determined predominantly by accumulated statistical results of the performance of individuals in multiple real-world sporting or other events.”
  - Winning outcome can’t be based on performance of a single real-world team or a single performance of an athlete

# State-Level Regulation

- Legality and regulation of DFS varies from state to state
- For some, legality hinges on skill vs. chance debate



# CONCERNS ABOUT DFS

# Speculation about DFS

- DFS is prolific and growing
  - Growth increases exposure
- Rapid-cycling nature and increased accessibility makes it more dangerous than season-long fantasy
- No standardized product safety regulations to protect vulnerable populations
- Very similar to early speculation about Internet gambling

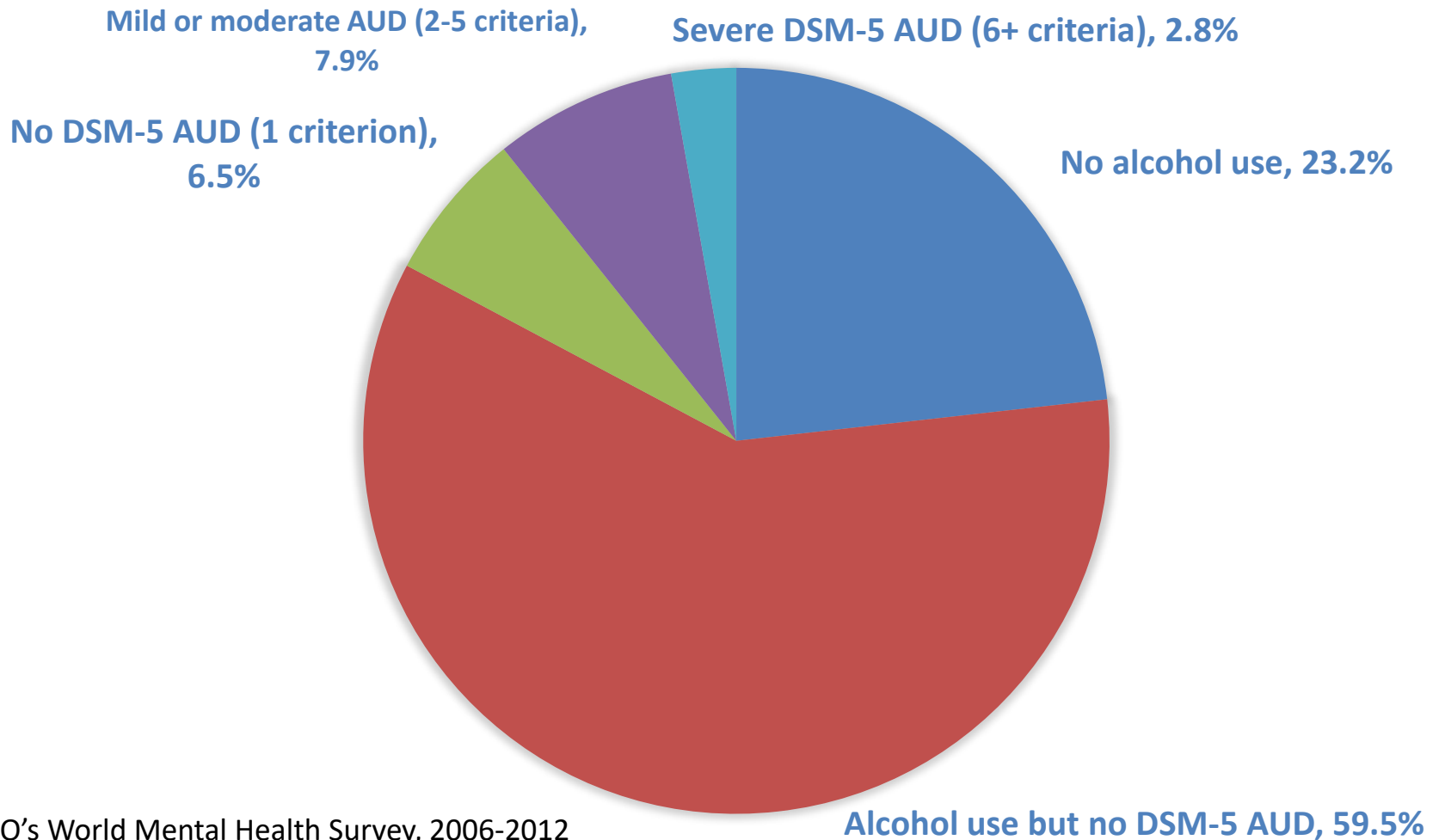


# Early Research Hypotheses about Internet Gambling

- Internet gambling would likely be comparatively excessive due to unique aspects of the modality, such as:
  - Anonymity
  - Proximity/Access
  - Quick pace
  - Marketing



# A Simple but Important Observation



- WHO's World Mental Health Survey, 2006-2012
- Sample size = 31,367
- Assessed lifetime DSM-5 Alcohol Use Disorder

# Integrated View of Addiction

- ***Things do not cause addiction***
- The development of addiction depends upon the interaction among:
  - Our bodies
  - Our minds
  - Our experiences
  - Our social settings
  - Properties of the potential object of addiction





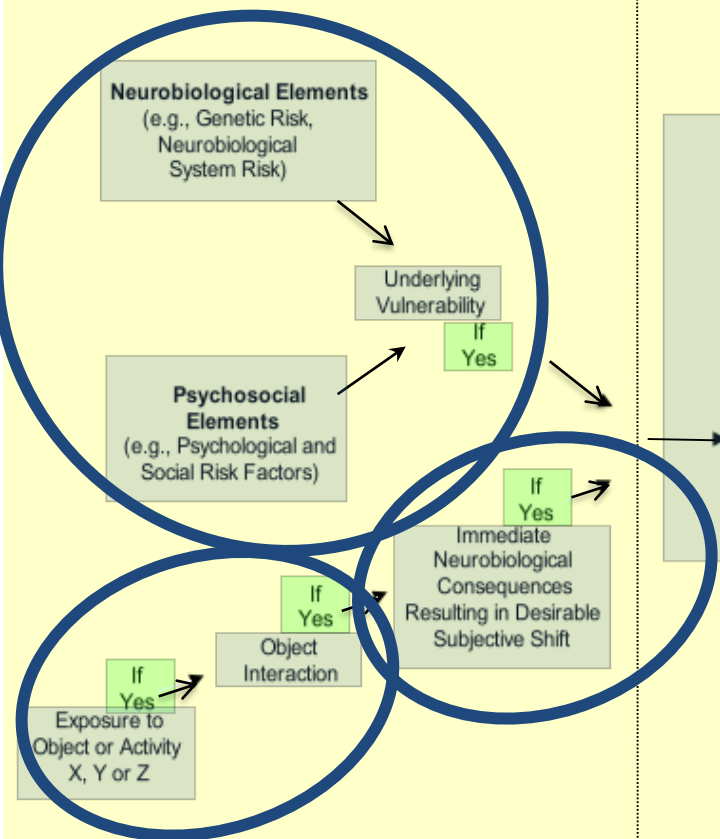
# ADDICTION SYNDROME

Shaffer et al. (2004). Toward a syndrome model of addiction: Multiple expressions, common etiology. *Harvard Review of Psychiatry*. 12, 367-374.

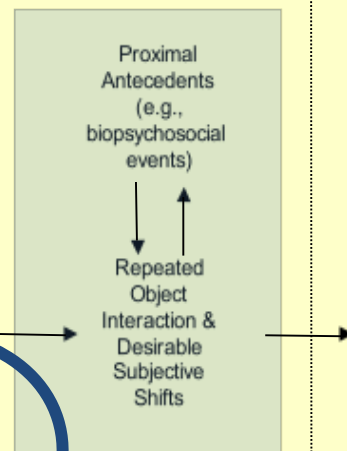
# Syndrome Model of Addiction

- The specific objects of addiction play a less central role in the development of addiction than previously thought
- Evidence of **shared** biopsychosocial antecedents, manifestations, and sequelae (i.e. consequences) reflects an underlying addiction syndrome.
- Addiction should be understood as a syndrome with multiple opportunistic expressions.
  - A cluster of symptoms and signs related to an abnormal underlying condition
  - Not all symptoms or signs are present in every expression of the syndrome, and some manifestations of a syndrome have unique signs and symptoms

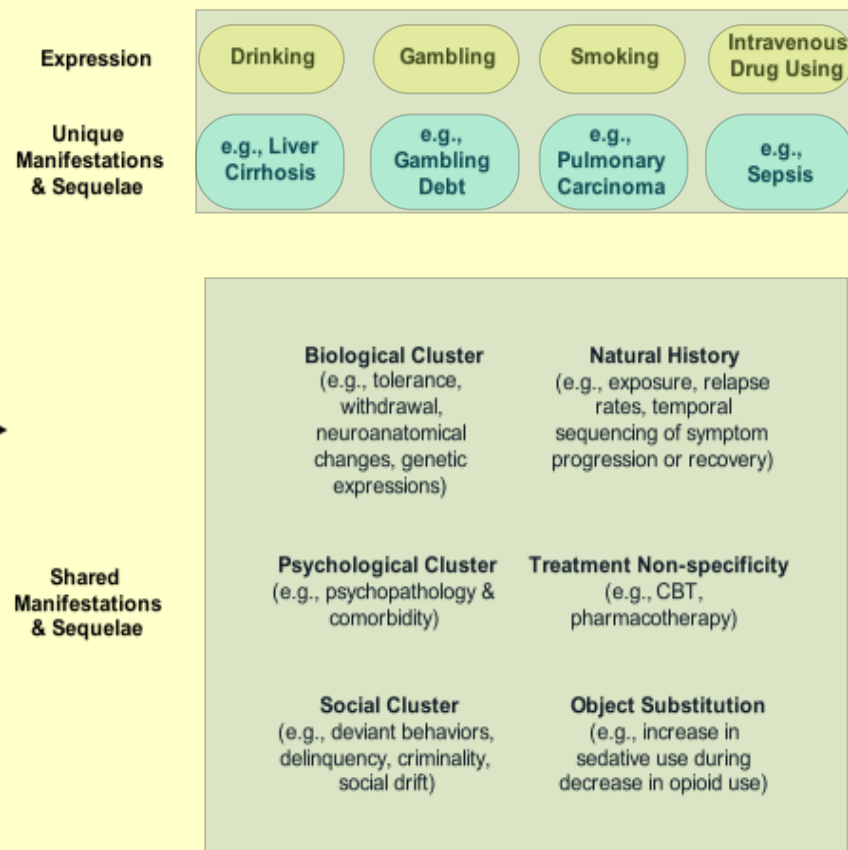
## Distal Antecedents of the Addiction Syndrome



## Premorbid Addiction Syndrome



## Expressions, Manifestations and Sequelae of Addiction Syndrome



## Distal Antecedents of the Addiction Syndrome

## Premorbid Addiction Syndrome

## Expressions, Manifestations and Sequelae of Addiction Syndrome

**Neurobiological Elements**  
(e.g., Genetic Risk, Neurobiological System Risk)

Underlying Vulnerability

If Yes

**Psychosocial Elements**  
(e.g., Psychological and Social Risk Factors)

If Yes

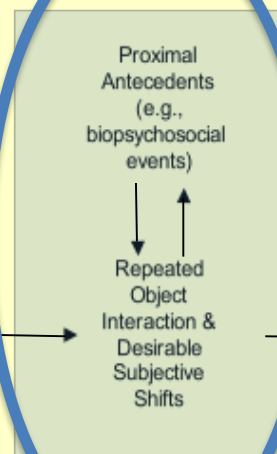
Immediate Neurobiological Consequences Resulting in Desirable Subjective Shift

If Yes

Object Interaction

If Yes

Exposure to Object or Activity X, Y or Z



Expression

Unique Manifestations & Sequelae

Drinking	Gambling	Smoking	Intravenous Drug Using
e.g., Liver Cirrhosis	e.g., Gambling Debt	e.g., Pulmonary Carcinoma	e.g., Sepsis

Shared Manifestations & Sequelae

**Biological Cluster**  
(e.g., tolerance, withdrawal, neuroanatomical changes, genetic expressions)

**Natural History**  
(e.g., exposure, relapse rates, temporal sequencing of symptom progression or recovery)

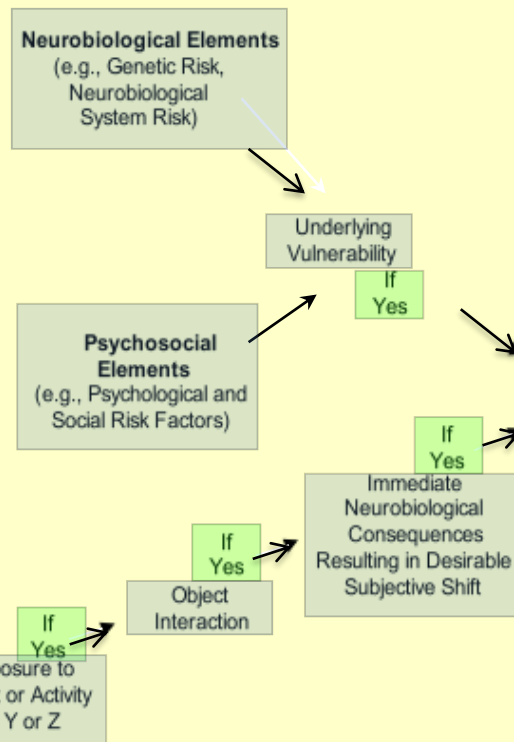
**Psychological Cluster**  
(e.g., psychopathology & comorbidity)

**Treatment Non-specificity**  
(e.g., CBT, pharmacotherapy)

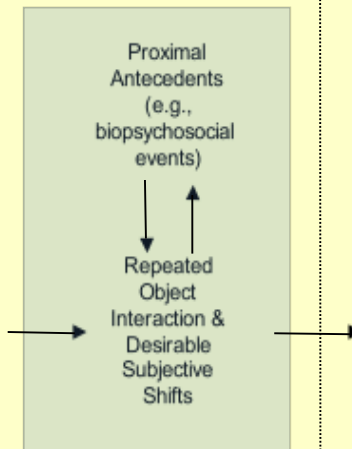
**Social Cluster**  
(e.g., deviant behaviors, delinquency, criminality, social drift)

**Object Substitution**  
(e.g., increase in sedative use during decrease in opioid use)

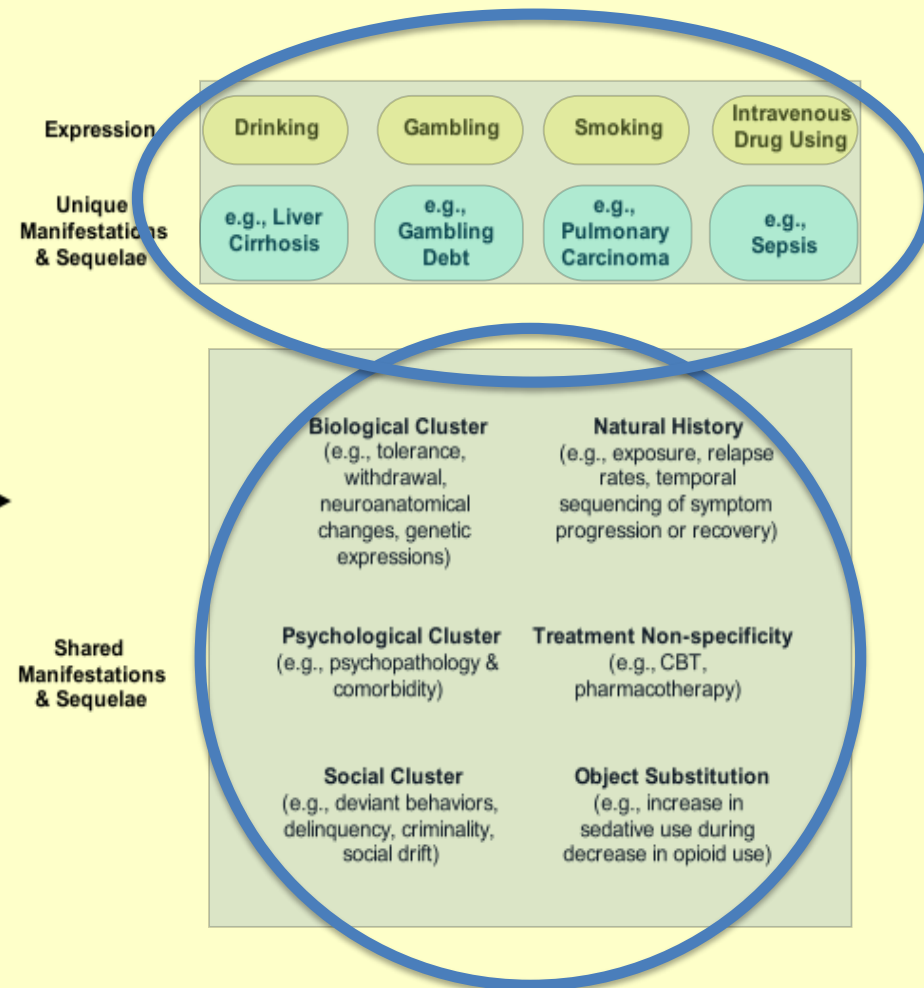
## Distal Antecedents of the Addiction Syndrome



## Premorbid Addiction Syndrome

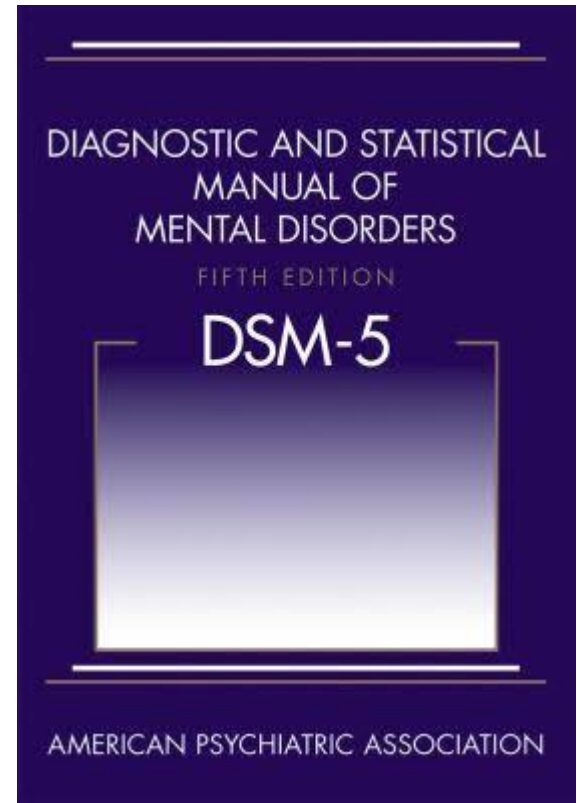


## Expressions, Manifestations and Sequelae of Addiction Syndrome



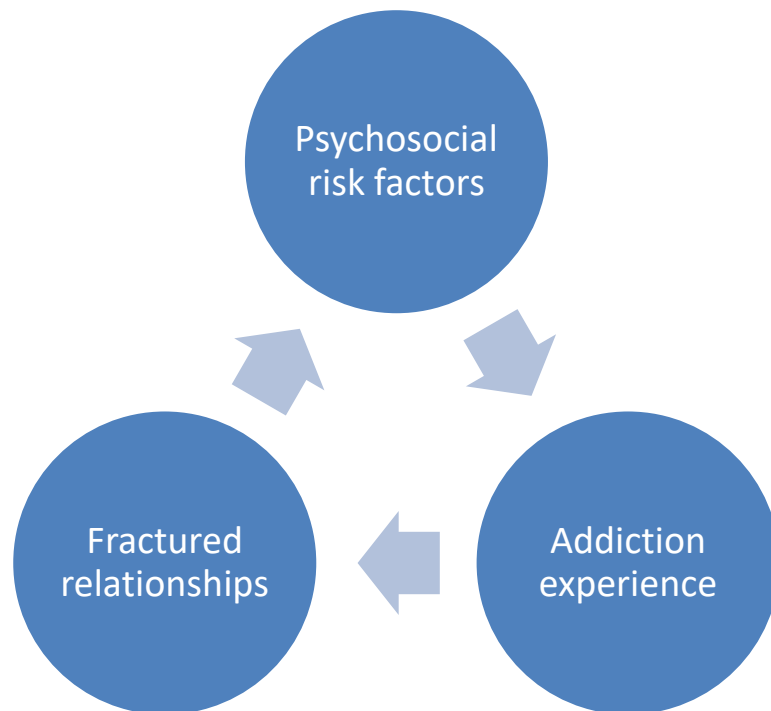
# DSM-5

- In DSM-IV, Gambling Disorder was listed separately from substance use disorders
- Now, Gambling Disorder is listed in a new category, “Substance-related and addictive disorders”
- Internet Gaming Disorder listed as condition for which more research is needed



# Recursive Nature of Syndromes

- Experiencing one expression of addiction can create risk factors for additional experiences of addiction.



**WHO PLAYS DFS?**

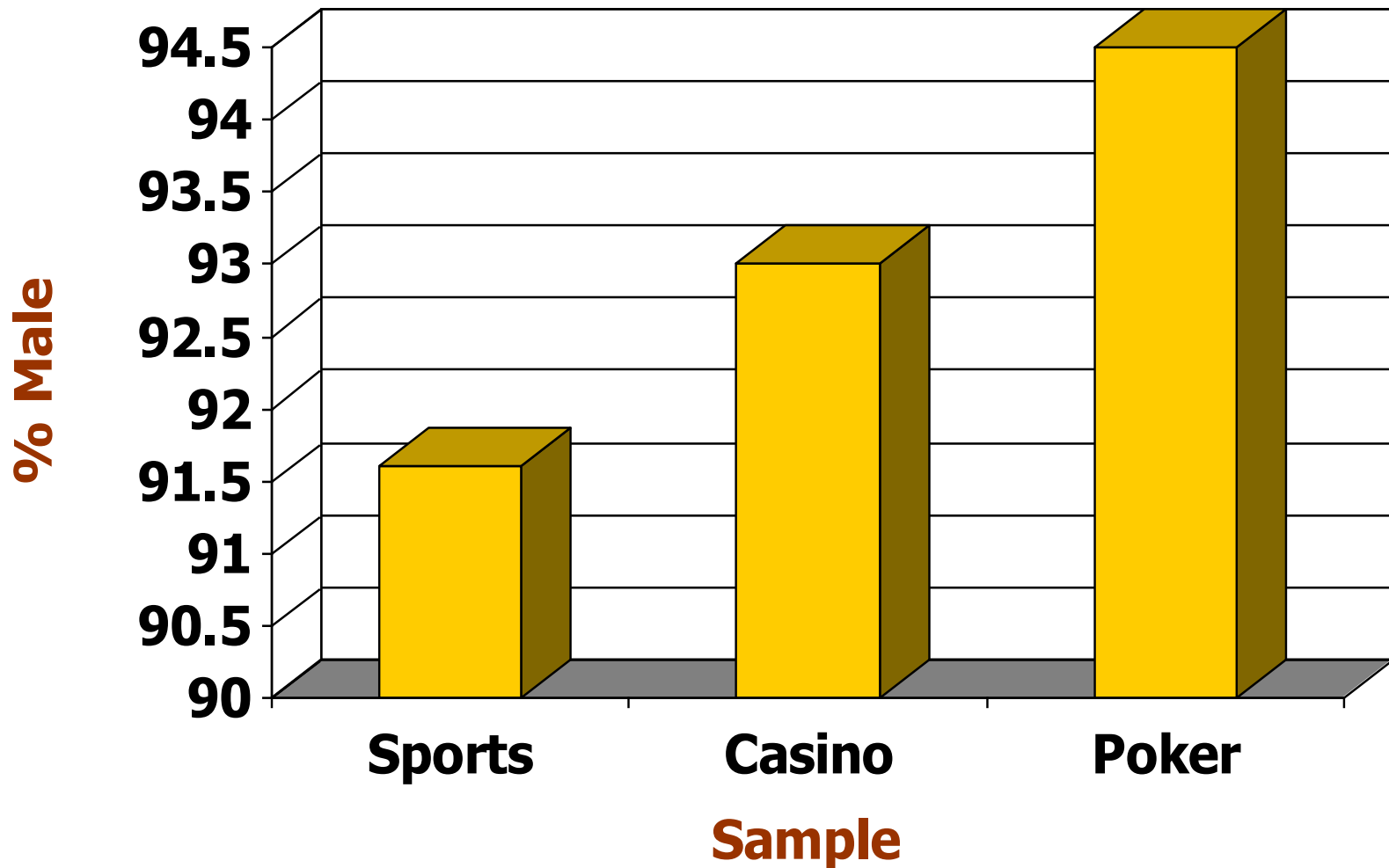


# Demographics

*(Fantasy Sports, not just DFS)*

- 71% Male
- 89% White
- 52% not married
- Mean age: 32
- 21% of US population (age 12+)
- 70% pay to play
- Top games: Football and baseball

# Internet Gambling Demographics - Gender



# Internet Gambling Demographics - Age

- Sports bettors
  - M = 31 years old; SD = 10.0
- Casino gamblers
  - M = 30 years old; SD = 9.0
- Poker players
  - M = 28 years old; SD = 8.4

# Fantasy Sports Motivations

*(Fantasy Sports, not just DFS)*



Camaraderie



Interest in Sports



Enjoyment



Entertainment



Competition

# Fantasy Sports: College Students

- Martin, R. J., & Nelson, S. (2014). Fantasy sports, real money: Exploration of the relationship between fantasy sports participation and gambling-related problems. *Addictive Behaviors*, 30, 1377-1382.
- Martin, R. J., Nelson, S., & Gallucci, A. & Lee, J. G. L. (2017). Daily and season-long fantasy sports participation and gambling-related problems among a sample of college students at three universities. *International Gambling Studies*.

# Fantasy Sports: College Students

- 2012: 1,556 students at a southeastern university
  - 12% reported fantasy sports participation (28% of males; 2% of females); Just under half played with money involved
  - 6% of sample endorsed 1+ DSM-5 criteria for gambling disorder
    - 15% of those who played fantasy sports without money involved
    - 27% of those who played fantasy sports with money involved

# Fantasy Sports: College Students

- 2016: 941 students from three universities
  - 17% reported season-long fantasy sports participation
    - 9% with entry fees
  - 5% reported DFS participation
    - 4% with entry fees
  - DFS players were more likely to gamble (93%) than season-long fantasy players (54%) who were more likely to gamble than those who did not play fantasy sports (19%).
  - Those who paid entry fees were more likely to gamble than those who did not.
  - DFS players endorsed more DSM-5 gambling disorder criteria than season-long fantasy players who endorsed more than those who did not play fantasy sports

# Nower et al., 2015

- N=3,634 New Jersey residents
  - Caveat: Low response rate, combined online and telephone samples; not representative of general population
  - Online response rate not reported
- 69.8% gambled in past 12 months
- 6.3% PGSI 8+ (10.5% of online panel; 0.3% of land-based panel)
- 336 (9.2%) played DFS
  - 97.9% gambled past year
  - 41.4% PGSI 8+
  - Higher levels of other mental health and substance use problems than the rest of the sample



# **PARALLELS TO INTERNET GAMBLING**

# Conventional Wisdom

- Internet gambling availability would lead to an epidemic of gambling problems
  - Rapid-cycling
  - 24/7 access
  - Intermittent reinforcement, near misses
  - Little social interaction

# Early Internet Gambling Studies

- **General population** surveys have indicated that individuals who report participating in Internet gambling are at increased risk for gambling-related problems
  - e.g., 2007 BGPS, whereas .3% had problems, generally, among those who gambled online, 5% had problems
- **Special population** surveys also indicated increased risk for gambling-related problems, but varied widely

# Problems

- Approaches need to go beyond retrospective self-report and include objective measures, such as actual Internet gambling behavior
- Using actual behavior avoids the difficulties inherent in self-report as well as the need to compress the information about actual behavior occurring during long intervals into a few summary descriptions elicited by survey questions

# Assessing the Playing Field, Inside the Virtual Casino, Sitting at the Virtual Poker Table: *Studies of Actual Internet Gambling Behavior*

- LaBrie, R. A., LaPlante, D. A., Nelson, S. E., Schumann, A., & Shaffer, H. J. (2007). [Assessing the playing field: A prospective longitudinal study of Internet sports gambling behavior](#). *Journal of Gambling Studies*, 23, 347-362.
- LaBrie R.A., Kaplan, S.A., LaPlante, D.A., Nelson, S.E., and Shaffer, H.J. (2008). [Inside the virtual casino: A prospective longitudinal study of actual Internet casino gambling](#). *European Journal of Public Health*, 18, 410-416.
- LaPlante, D. A., Kleschinsky, J. H., LaBrie, R. A., Nelson, S. E., & Shaffer, H. J. (2009). [Sitting at the virtual poker table: A prospective epidemiological study of actual Internet poker gambling behavior](#). *Computers in Human Behavior*, 25(3), 711-717.

# Samples and Designs

- Internet Sports Betting (LaBrie et al., 2007):
  - Epidemiological description of characteristics of 40,499 sequentially subscribed Internet sports gamblers over the course of 8 months
- Internet Casino Gambling (LaBrie et al., 2008):
  - Epidemiological description of characteristics of 4,222 sequentially subscribed Internet casino gamblers (3+ times playing) over the course of 24 months
- Internet Poker Play (LaPlante et al., 2009):
  - Epidemiological description of characteristics of 3,445 sequentially subscribed Internet poker players over the course of 24 months

# Sports Gambling: Types of Bets

- Fixed Odds (39% Fixed Odds Only)
  - bets made on the outcomes of sporting events or games in which the amount paid for a winning bet is set by the betting service
  - relatively slow-cycling betting propositions; the outcomes of a bet are generally not known for hours or even (in the case of cricket matches) days
- Live Action (2% Live Action Only)
  - bets made on propositions about outcomes within a sporting event (e.g., which side will have the next corner kick or whether the next tennis game in a match will be won at love by the server)
  - More rapidly cycling betting propositions; provides many, relatively quick-paced, betting propositions posed in real-time during the progress of a sporting event
- 59% played both

# Frequency

	<b>Mean (SD)</b>	<b>Median</b>
<b>Fixed Odds (n=39719)</b>	<b>32% (27)</b>	<b>23%</b>
<b>Live Action (n=24794)</b>	<b>42% (37)</b>	<b>27%</b>
<b>Casino (n=4222)</b>	<b>16% (21)</b>	<b>7%</b>

Frequency = % of active days on which participant placed a bet



# Bets per Betting Day

	Mean (SD)	Median
<b>Fixed Odds (n=39719)</b>	<b>4.1 (7.7)</b>	<b>2.5</b>
<b>Live Action (n=24794)</b>	<b>4.3 (5.0)</b>	<b>2.8</b>
<b>Casino (n=4222)</b>	<b>116 (192)</b>	<b>49</b>

# Euros per Bet/Session

	Mean (SD)	Median
<b>Fixed Odds (n=39719)</b>	<b>12 (32)</b>	<b>4</b>
<b>Live Action (n=24794)</b>	<b>11 (25)</b>	<b>4</b>
<b>Casino (n=4222)</b>	<b>35 (184)</b>	<b>4</b>
<b>Poker (n=3445)</b> <b>(Euros per Session)</b>	<b>35 (187)</b>	<b>13</b>

# Take-Home: Internet Gambling Patterns

Despite the caveat , the results do suggest excessive gambling is not as common among Internet gamblers as the speculations and the consequent conventional wisdom suggested.

# HOW DOES THE TYPICAL PLAYER PLAY DFS?

# Methods

- 12,041 DFS players randomly selected from all subscribers to DraftKings between 8/1/14 and 9/30/14.
  - Analytic sample includes 10,385 who played at least one paid NFL contest in 2014
- Measures (2014 NFL season)
  - Types of games and sports played
  - # of contests entered
  - Frequency of play
  - Entry fees paid
  - Net loss

# Player Characteristics

- Mean age: 34
- Geographic distribution (top 3 states)
  - 9% California
  - 7% Texas
  - 7% New York
- No gender information available, but DraftKings subscribers are predominantly male

# 2014 NFL Season

	Mean (SD)	Median
<b>Frequency</b>	20% (23)	12%
<b># of Contests Entered</b>	57 (155)	20
<b>Entries per Contest</b>	1.2 (0.5)	1.0
<b>Contests per Entry Day</b>	2.6 (3.2)	2.0
<b>Average Entry Fee</b>	\$7.3 (\$20.1)	\$4.0
<b>Total Entry Fees</b>	\$520 (\$4,154)	\$87
<b>Net Loss</b>	-\$1.6 (\$9,896)	\$30.7
<b>Percent Loss</b>	47% (124)	53%
<b>Percent Contests Won</b>	19% (15)	18%

*Note. Frequency = % of days on which subscriber entered a contest; Net loss = Total winnings – Total entry fees; Percent loss = Net loss / Total entry fees.*

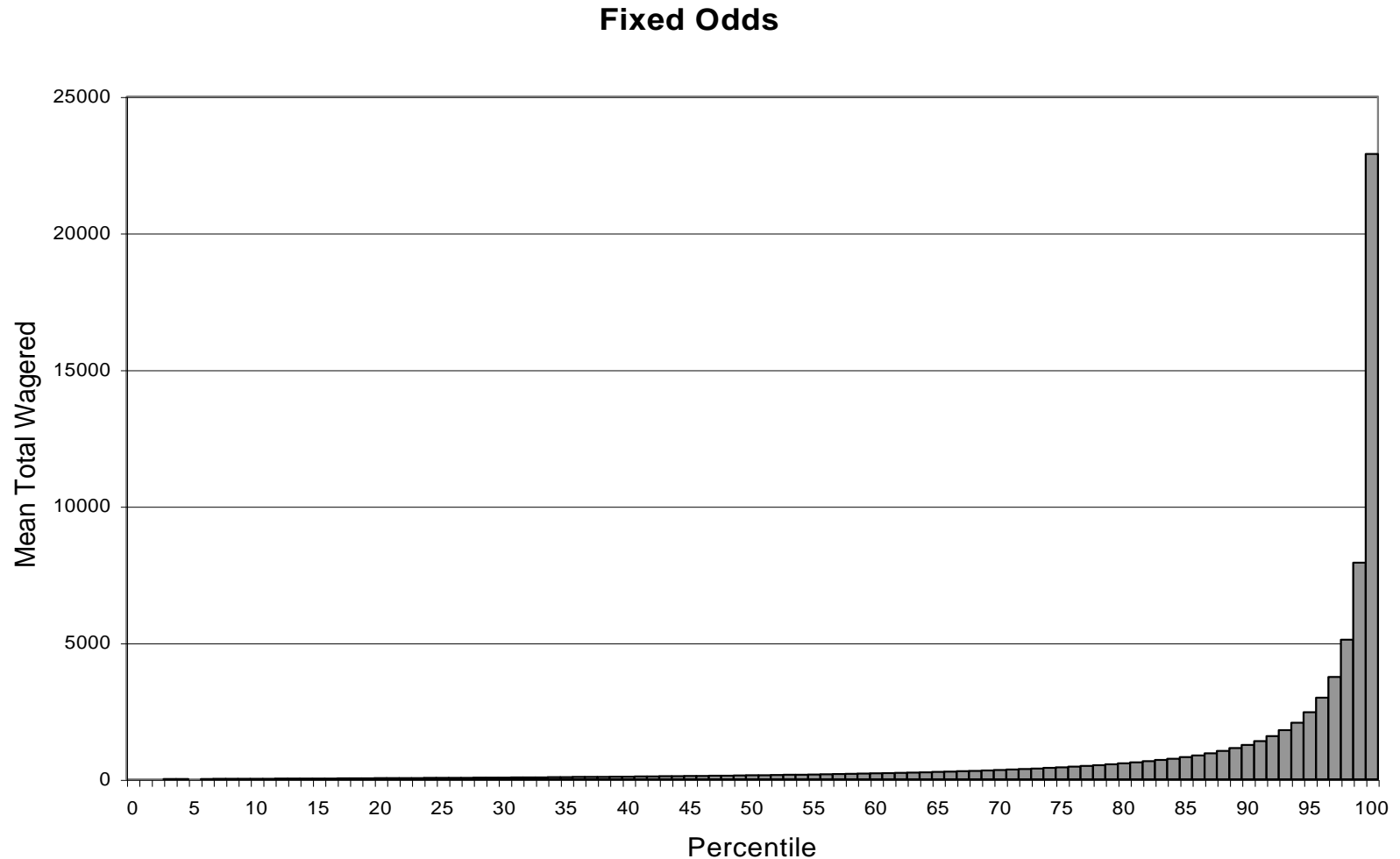
# 2014 NFL Season

Type of Sport	%
NFL Only	49%
NFL & NBA	8%
NFL & Other	21%
NFL & NBA & Other	22%



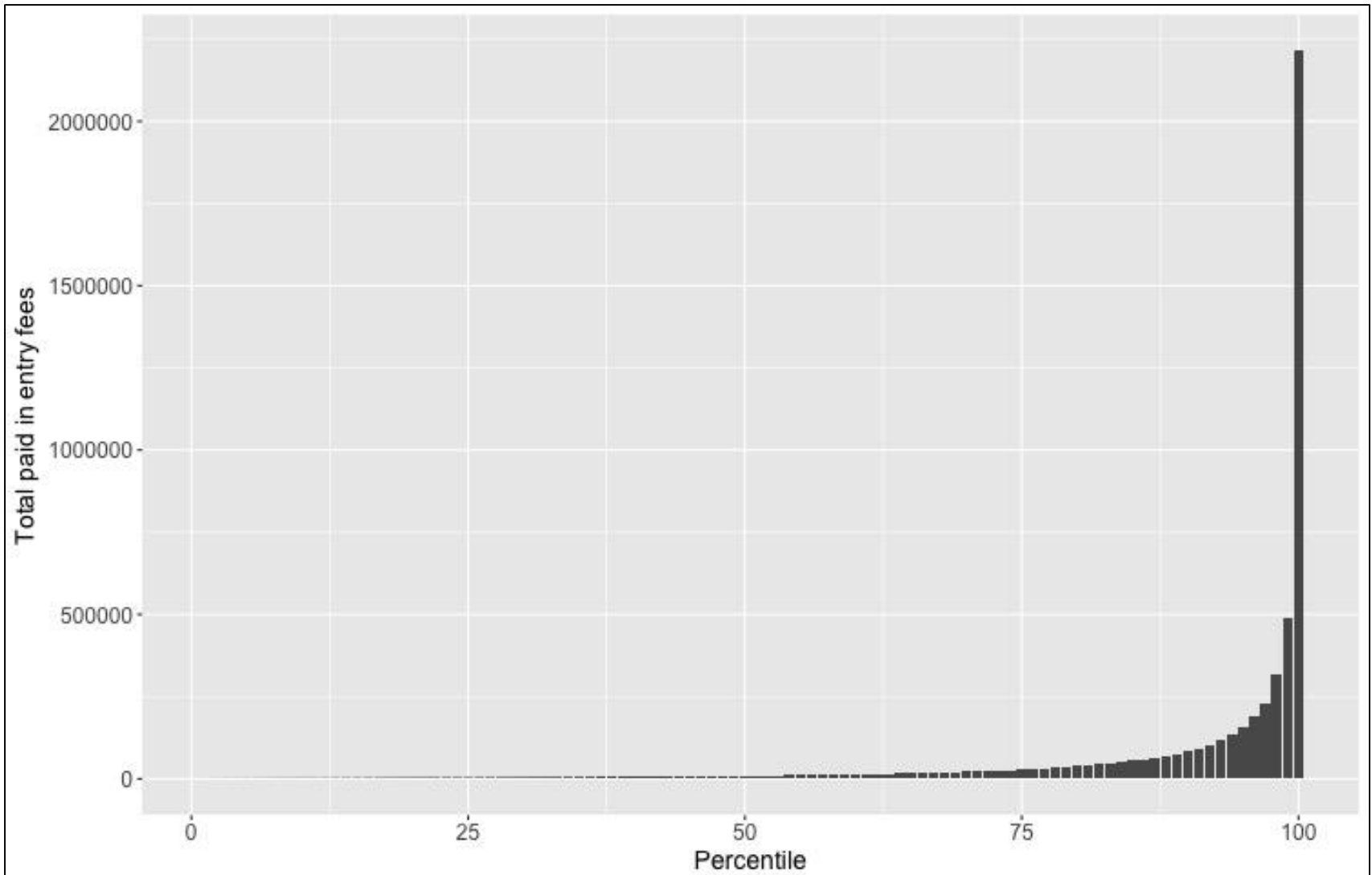
# **CAN WE IDENTIFY PLAYERS WHO PLAY DFS EXCESSIVELY?**

# Internet Gambling: Heavily Involved Sports Bettors

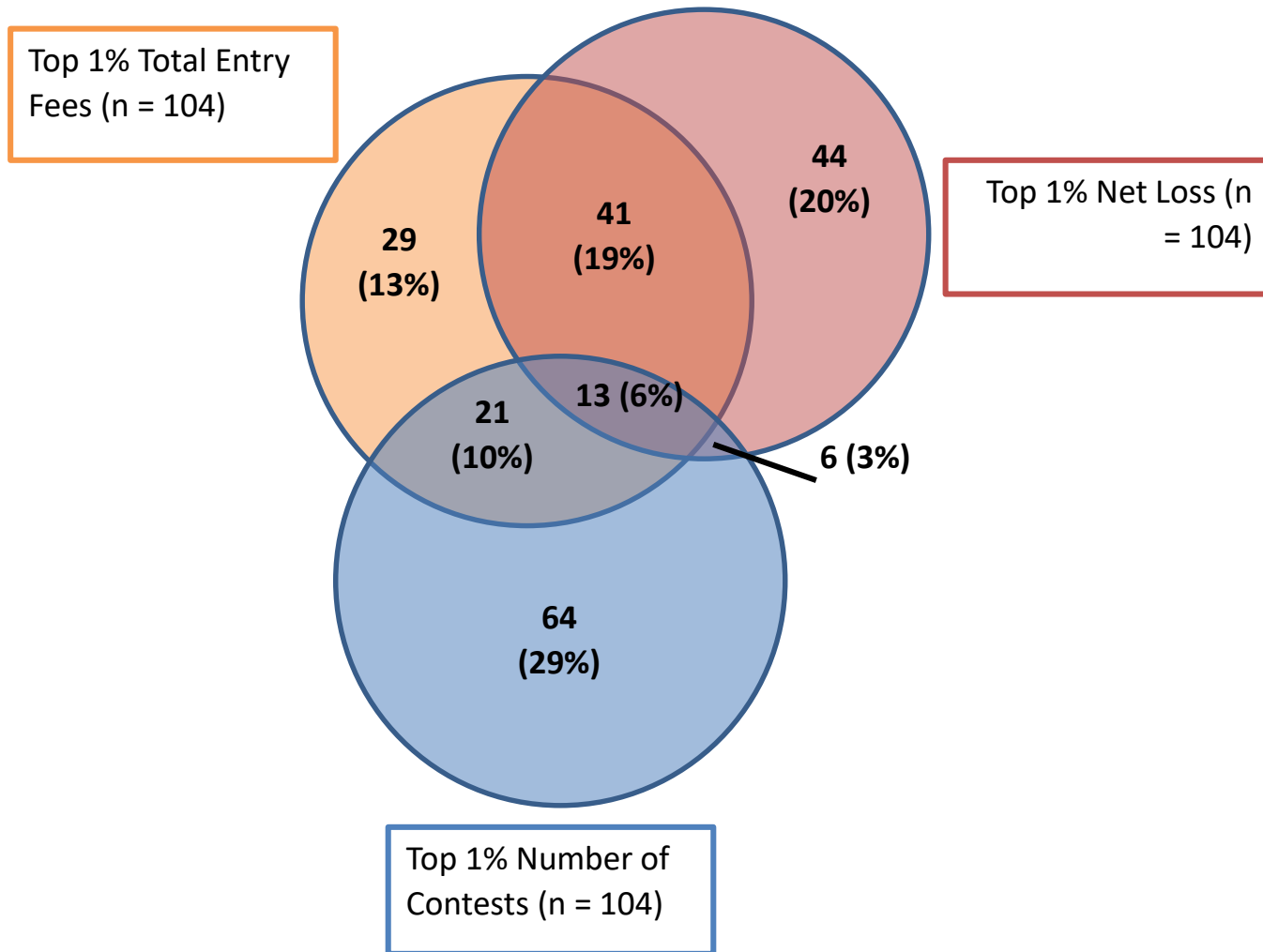


(LaBrie et al., 2007)

# DFS: Heavily Involved DFS Players



# DFS: Heavily Involved DFS Players



Top 1% Groups (n = 218). [n (%)]

## Internet Gambling: Gambling of Extreme 1 and 99% Subgroups of Sports Gamblers (Total Wagered)

Median Behaviors – Fixed Odds		
Measure	Total (39,719)	Top 1% (397)
Duration	116 (of 244)	217 (of 244)
Frequency	23%	48%
Bets/day	2.5	4.7
Euros/bet	4	44
Total Wagered	148	16,784
Net Loss	33	1,544
% Lost	29%	9%

# DFS: DFS Play of Extreme 1 and 99% Subgroups

Median Behaviors				
Measure	Top 1% on Total Entry Fees	Top 1% on Net Loss	Top 1% on # of Contests	Remainder of Player Pool
Frequency	49%	37%	64%	12%
# of Contests Entered	321	191	730	19
Entries per Contest	1.6	1.5	1.3	1.0
Contests per Entry Day	4.6	3.6	9.9	2.0
Average Entry Fee	\$22.2	\$24.9	\$2.7	\$3.9
Total Entry Fees	\$11,693	\$6,375	\$3,618	\$83
Net Loss	\$1,792	\$2,668	\$271	\$30
Percent Loss	19%	42%	16%	54%
Percent Contests Won	26%	20%	26%	18%

## DFS: DFS Play of Extreme 1 and 99% Subgroups

Type of Sport	Top 1% on Total Entry Fees	Top 1% on Net Loss	Top 1% on # of Contests	Remainder of Player Pool
<b>NFL Only</b>	8.7%	13.5%	5.8%	50.2%
<b>NFL &amp; NBA Only</b>	11.5%	15.4%	2.9%	7.9%
<b>NFL &amp; Other Only</b>	8.7%	13.5%	6.7%	21.3%
<b>NFL &amp; NBA &amp; Other</b>	71.2%	57.7%	84.6%	20.6%

# **EXPOSURE AND ADAPTATION**

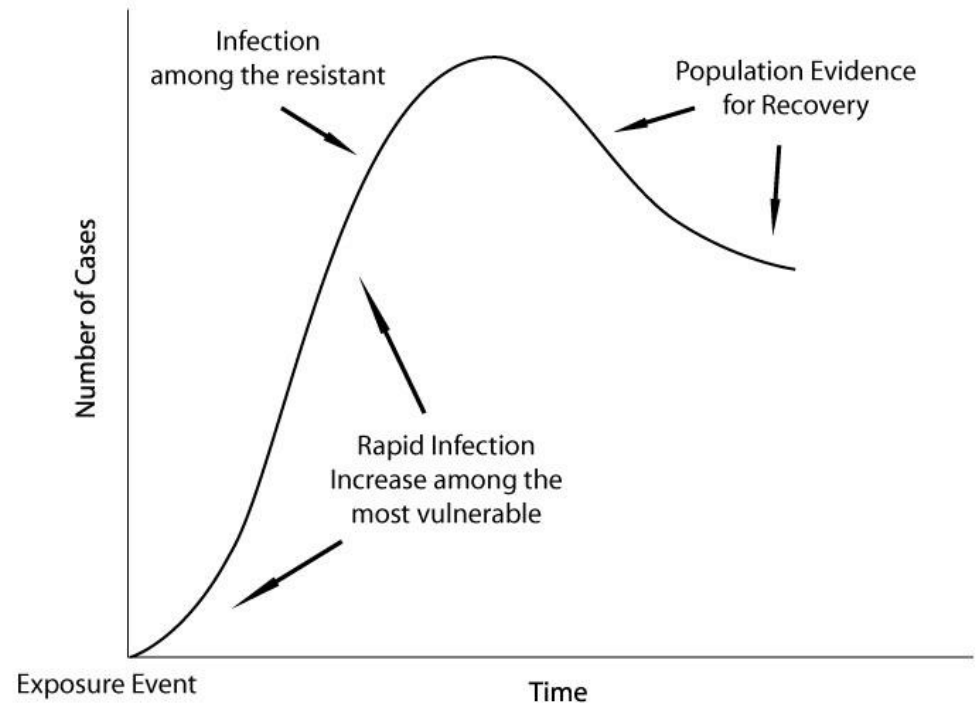


# Conventional Wisdom

- Exposure to objects of addiction will lead to increases in use and addiction.
- The relationship between exposure and problems is direct and linear
  - more exposure = more problems

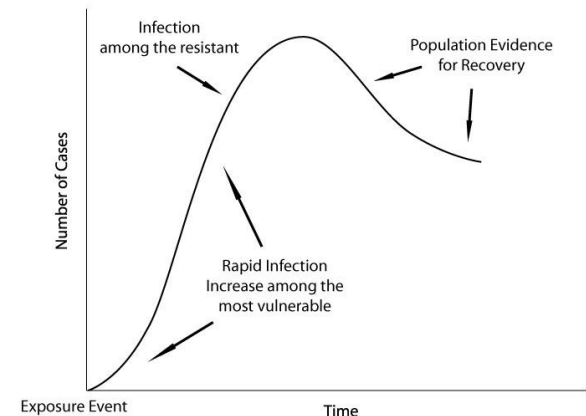
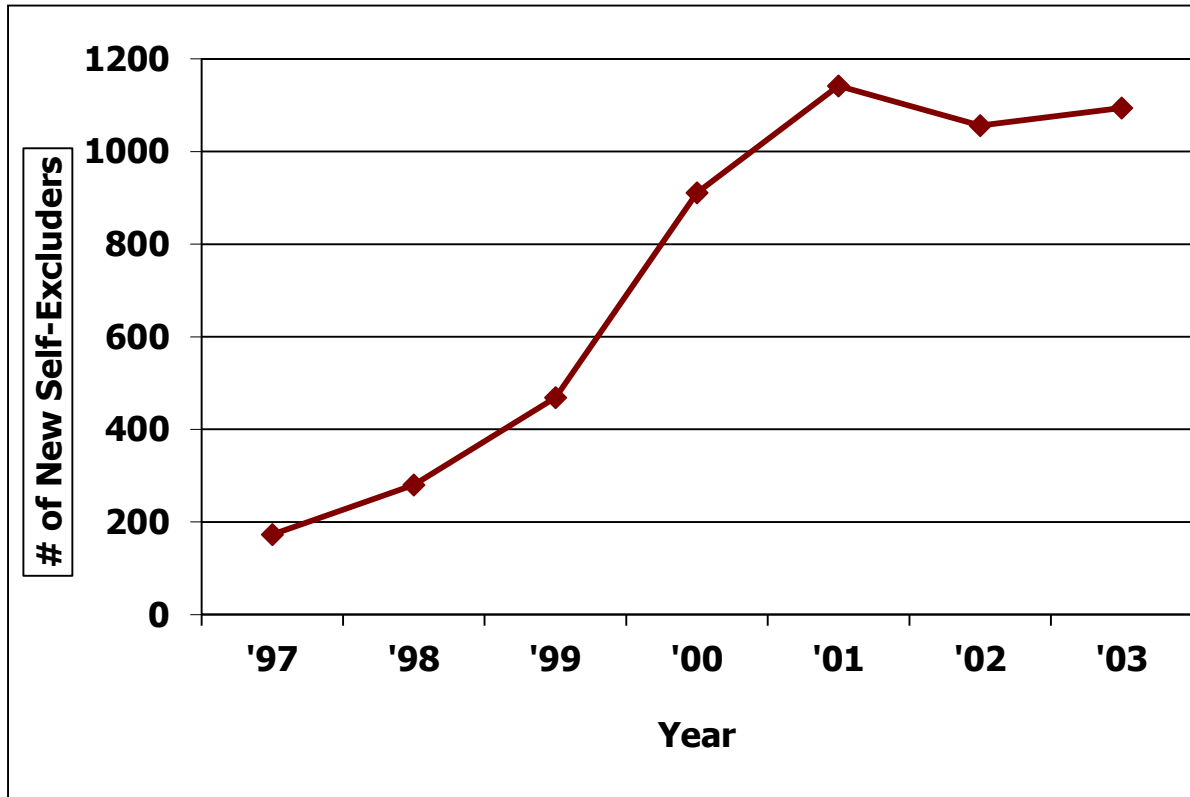
# Typical Course of Infection

- Exposure leads to a rapid increase of infection
  - Viruses target the most vulnerable
- Rates slow
  - People who are not yet infected are more resistant
- Decline evident
  - People recover, incidence rate declines



Adapted from Buehler, J. W., Berkelman, R. L., Hartley, D. M., & Peters, C. J. (2003). Syndromic Surveillance and Bioterrorism-related Epidemics. *Emerging Infectious Diseases*, 9(10), 1197-1204.

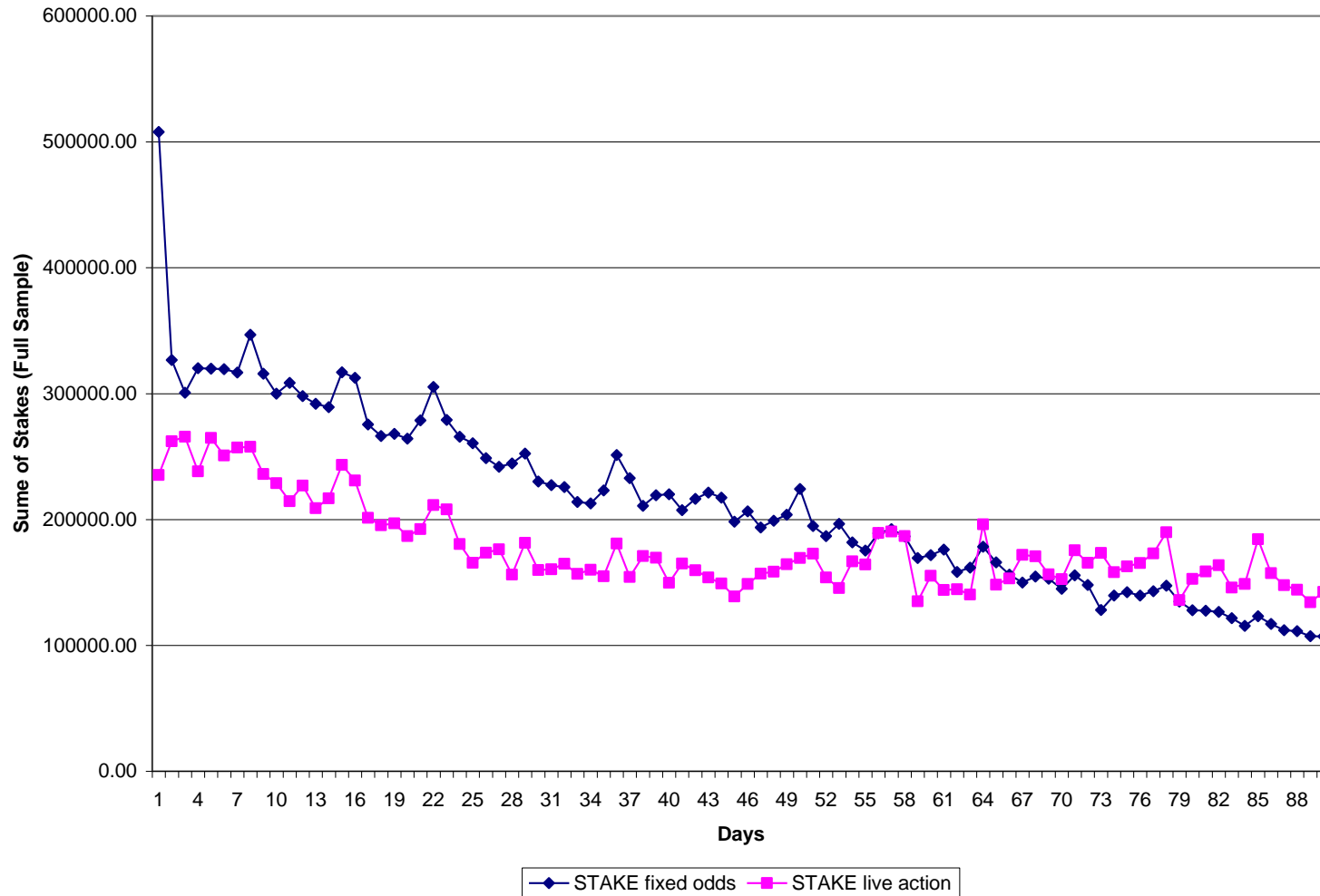
# Enrollments by Time



LaBrie, R. A., Nelson, S. E., LaPlante, D. A., Peller, A. J., Caro, G., & Shaffer, H. J. (2007). [Missouri Casino self-excluders: Distributions across time and space](#). *Journal of Gambling Studies*, 23(2), 231-243.

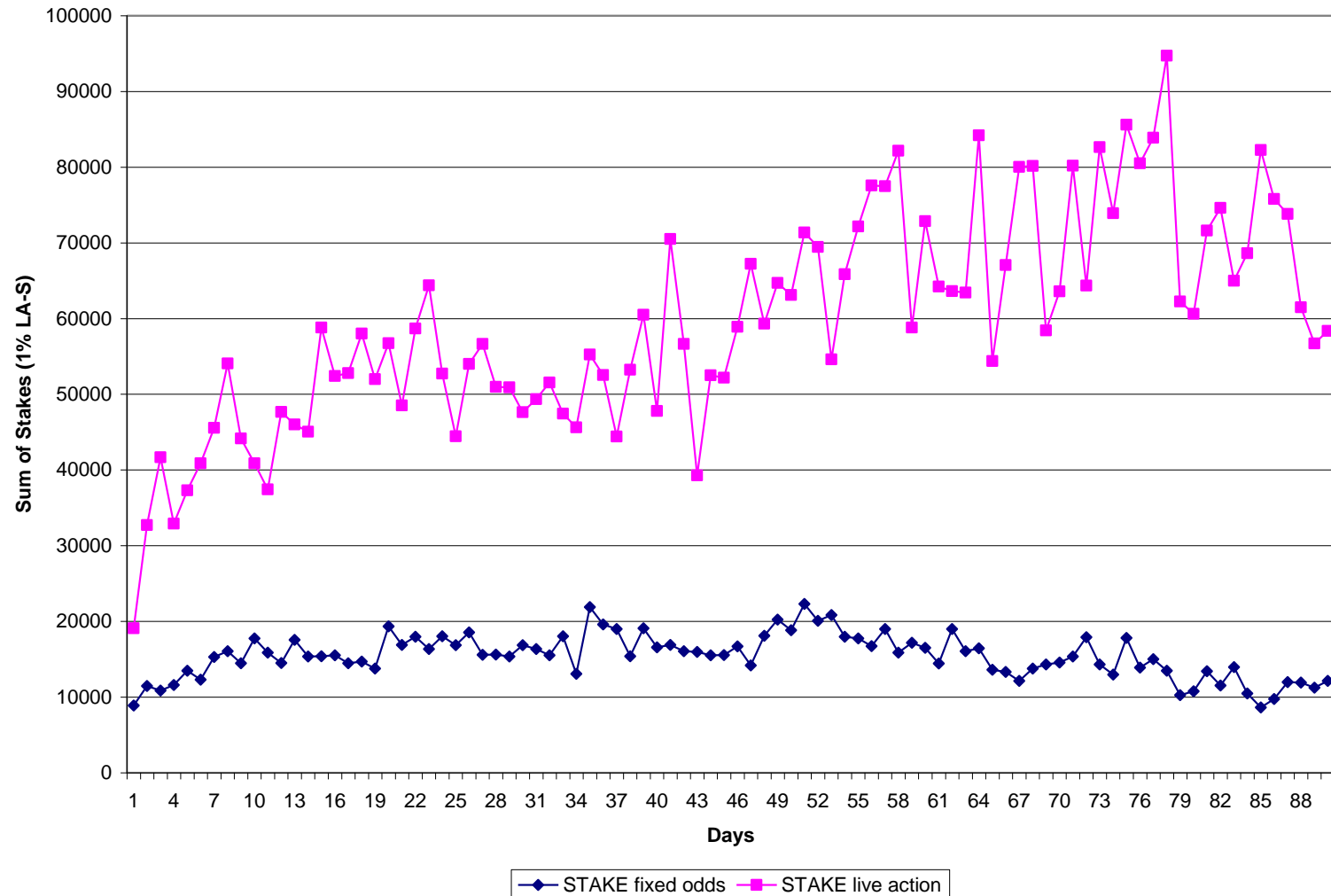
# Internet Gambling: Sum of Stakes by Day

## (Total Sample)



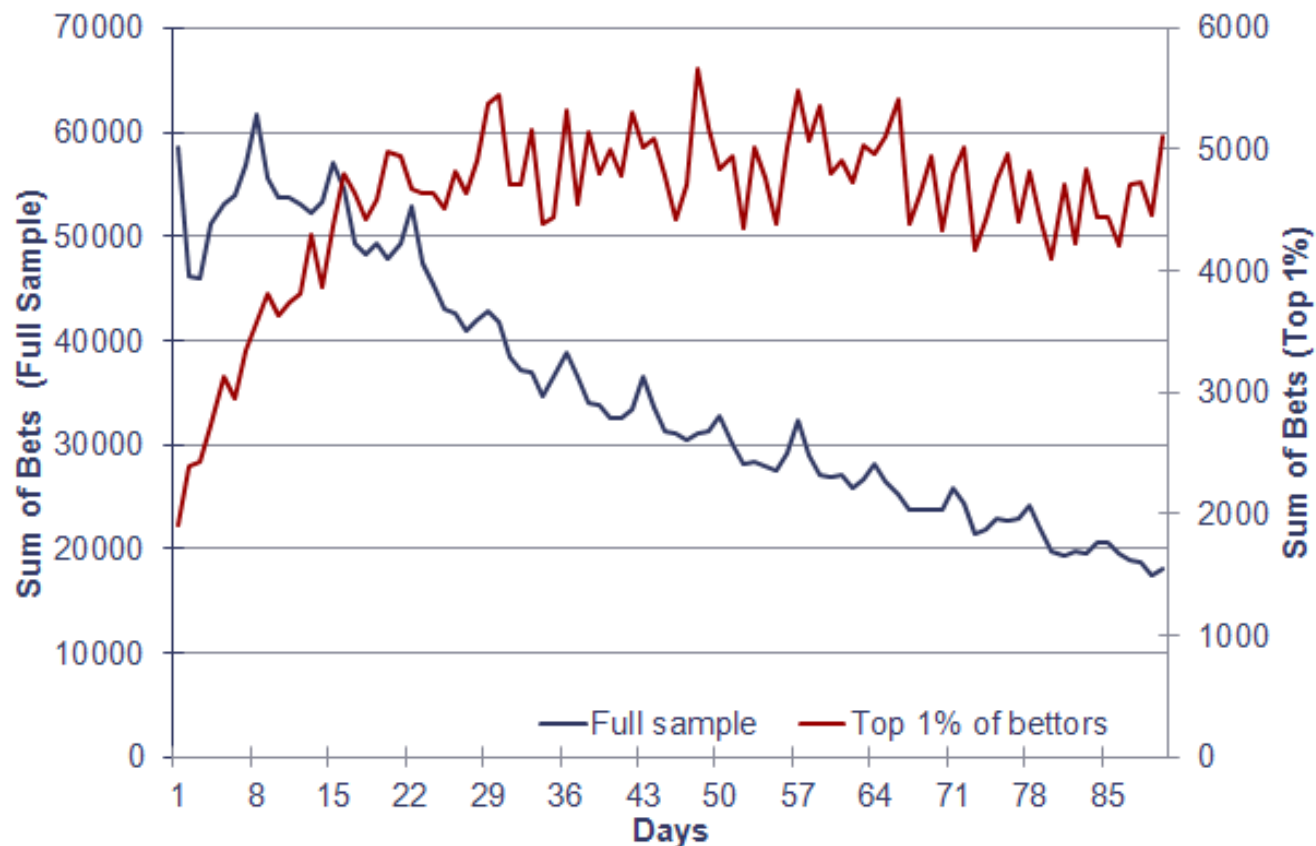
# Internet Gambling: Sum of Stakes By Day

## (Most Involved Live Action)



(LaPlante et al., 2008)

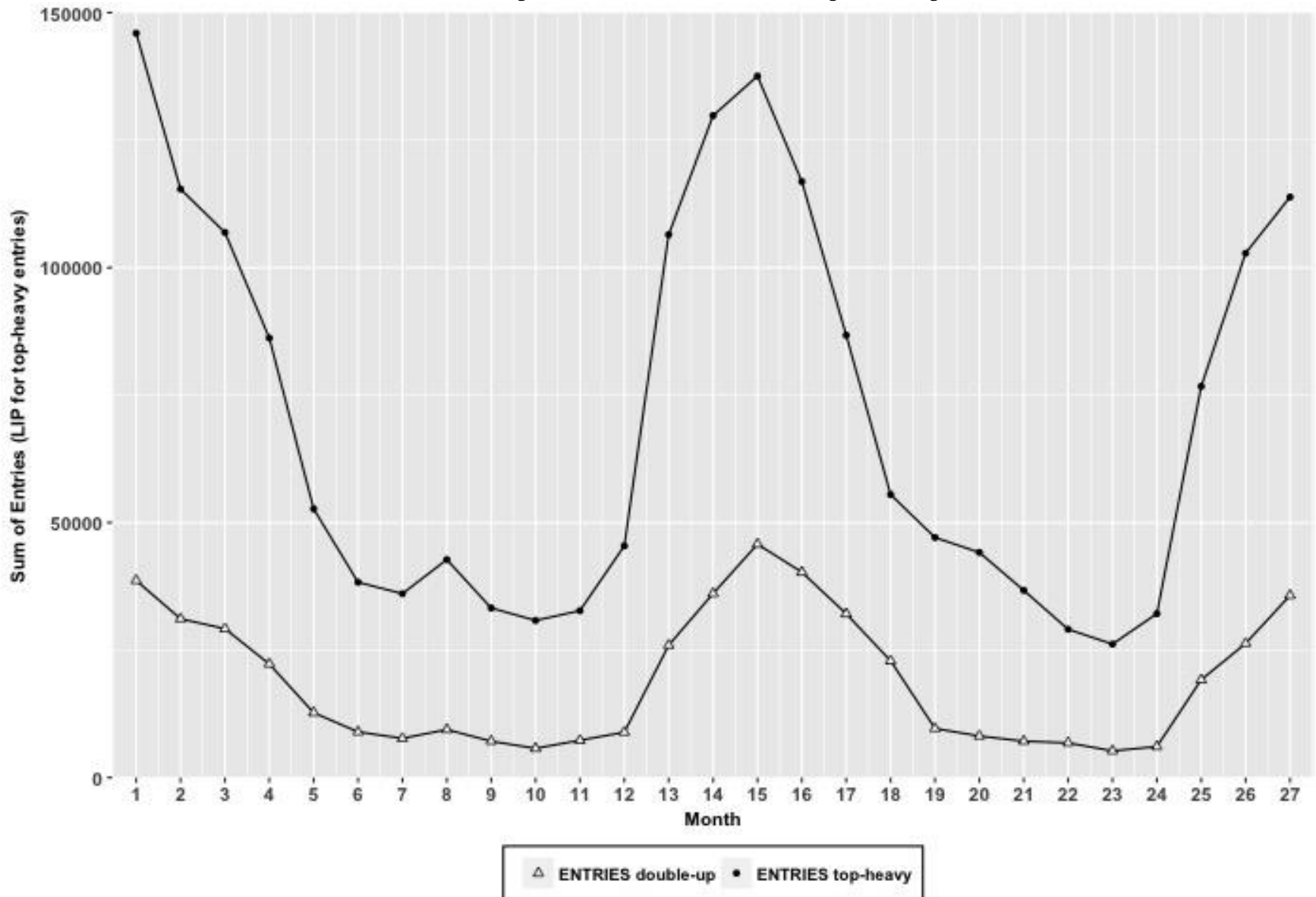
# Does Internet Gambling Stimulate Uncontrolled Escalation?



# Internet Gambling: Findings

- This population of gamblers adapted to the new subscription service rapidly, as evidenced by quickly developing declines in population participation, number of bets, and size of stakes
- Adaptation was not uniformly evident in our population
- Among subgroups of heavily involved bettors, adaptation was generally slower or not apparent

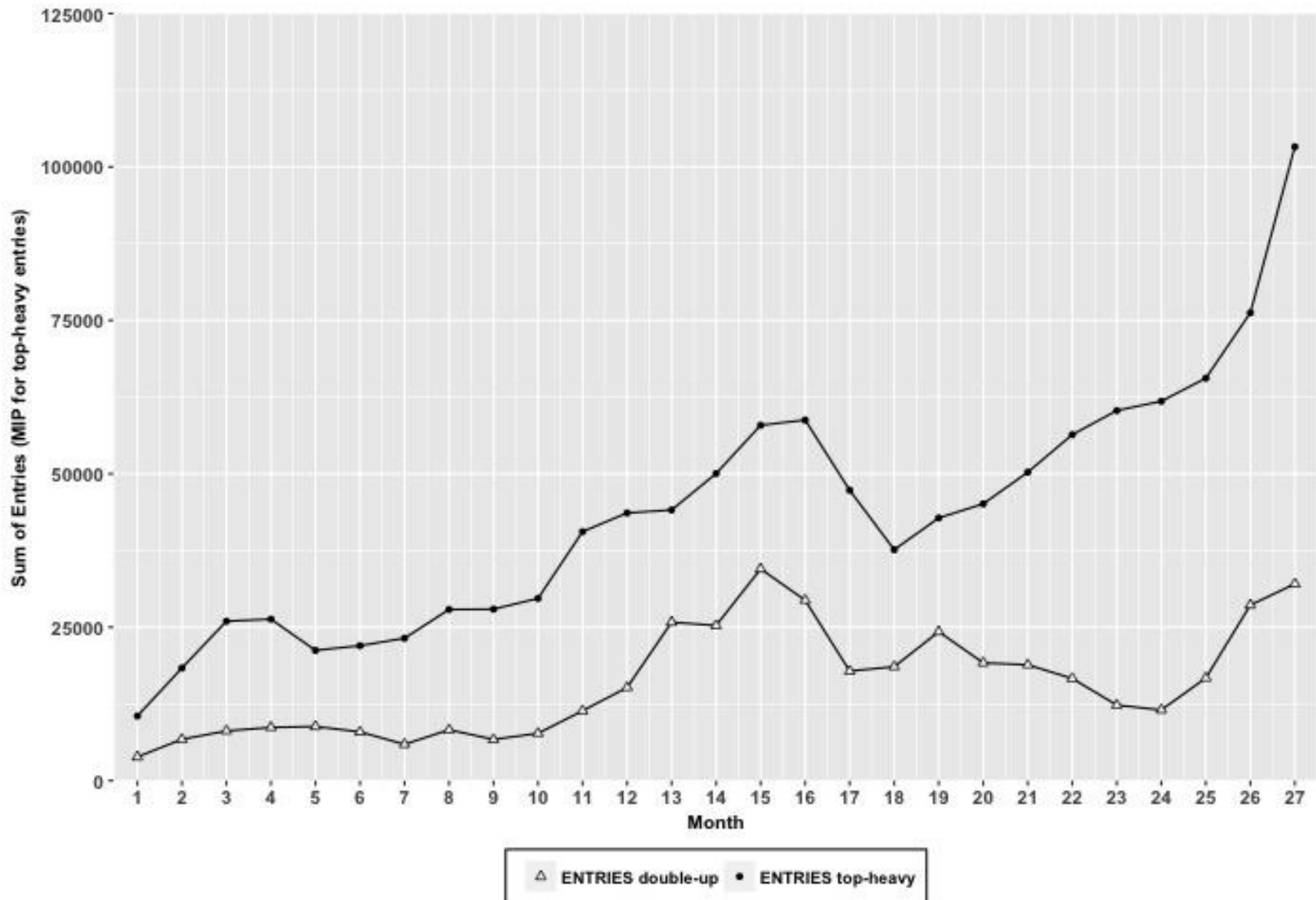
# DFS Play: 99% of players



(Edson et al., in preparation)



# DFS Play: Top 1% Involved Players



(Edson et al., in preparation)

**HOW DO WE IDENTIFY WHO  
WILL PLAY EXCESSIVELY?**

# Behavioral Markers for DFS Problems:

## Considering Biomarkers

Shaffer, H. J., Gray, H. M., Nelson, S. E., & LaPlante, D. A. (in press). [Technology, the Internet, and gambling: How the medium can facilitate addiction, adaptation, and intervention.](#) In D. Faust & M. N. Potenza (Eds.), *The Oxford Handbook of Digital Technologies and Mental Health*: Oxford University Press.

# What are biomarkers?

- Underlying physiological process—which results from a disease state or contributes to a disease state—produces a change in a measurable biological characteristic
- Use biomarkers for early detection, diagnosis, classification of risk, and personalized selection of treatment

# What Are Behavioral Markers?

- Similar to biomarkers, except the underlying process is reflected in observable changes in behavior instead of biology
- For example, markers of alcohol intoxication that might be used at a DUI checkpoint

## Alcohol intoxication

Slurred speech

Unstable walk

Short-term memory loss

Impaired decision making

## Translate into DFS work

- Save time and resources and improve quality of life by intervening before serious problems appear.
- Need to identify the precursors (e.g., markers) to problems with DFS

# Internet: Risk and Resource?

- Unlike land-based gambling or gaming, the very technology that makes DFS a potential risk allows for the study of actual real-time play.

# The Goal

- Use actual DFS behavior to identify, with good reliability and validity, who will experience problems
- Utilize this/these algorithm(s) to set up an early warning system for players at risk of developing problems



**HOW DO WE HELP INDIVIDUALS  
WHO HAVE PROBLEMS W/ DFS?**

# RG Programs and Features

- Universal
  - Target all
- Selected
  - Target at-risk
- Targeted
  - Target those with problems
- Predictive algorithm
  - All three?

# RG Programs and Features - Problems

- Ineffective reach
  - E.g., deposit limits that are reached by only a small minority
- Inaccuracy
  - Probability, not prophecy
  - Sensitivity and specificity
- Messaging
  - Unintended consequences

# Predictive Algorithm –Solutions

- Hybrid Approach
  - Operator-initiated algorithm that provides users with tools to address potential problems.
- Tiered Approach
  - User-initiated interventions at lower levels; operator-interventions at higher levels.

**IS DFS PARTICULARLY  
ADDICTIVE?**

# Game Types and Addiction

LaPlante, D.A., Nelson, S.E., LaBrie, R.A., Shaffer, H.J. (2011). Disordered gambling, type of gambling, and gambling involvement in the British Gambling Prevalence Survey. *European Journal of Public Health*, 21, 532-37.

LaPlante, D.A., Nelson, S.E., Gray, H. (2013). Breadth and depth involvement: Understanding Internet gambling involvement and its relationship to gambling problems. *Psychology of Addictive Behaviors*.

# Conventional Wisdom

- Certain types of games are more addictive than others.
  - Rapid-cycling
  - 24/7 access
  - Intermittent reinforcement, near misses
  - Little social interaction
- Examples:
  - Slot machines
  - Internet Gambling
  - DFS?

# Evidence in Favor

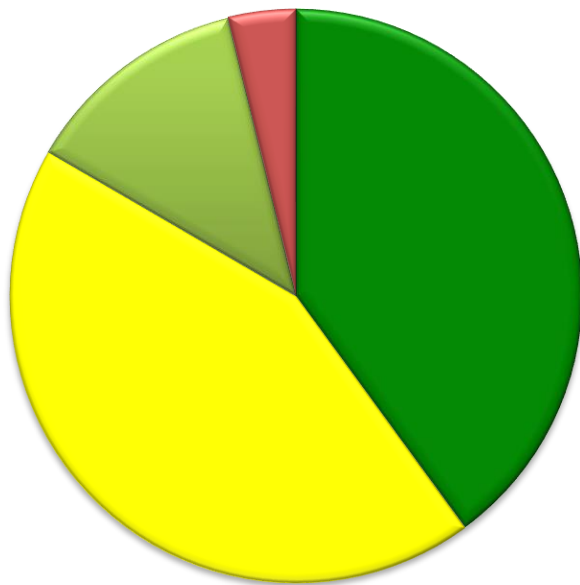
- Multiple studies report that the majority of gamblers in treatment report having had problems with slot machines.
- Recent studies show that people who engage in certain forms of gambling (e.g., Internet gambling) have higher rates of problems than the general population.
- Hotline and support group data: Internet gambling often reported as the “main cause of problems” (Gambling Help Online, 2012; Svensson & Romild, 2011)



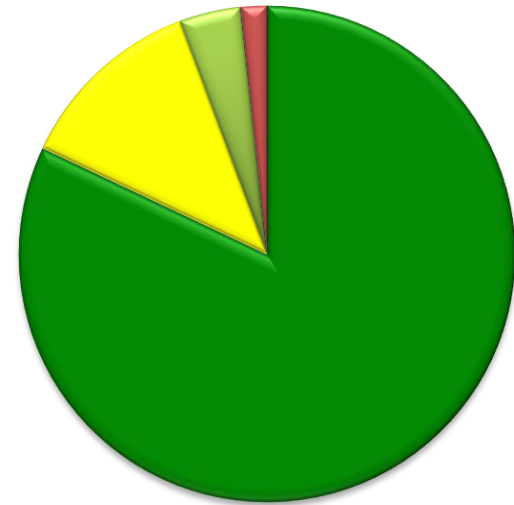
# Evidence in Favor

- Internet gambling: What is the evidence?

**Internet gamblers**



**Non-internet gamblers**



■ Non-problem gambler  
■ At-risk gambler  
■ Moderate problem gambler  
■ Severe problem gambler

# Caveat: Correlation $\neq$ Causality

## Well-established risk factors for gambling disorder

Having other psychiatric/mood disorders ✓

Abusing alcohol or other drugs

✓

Being male ✓

Believing in the ability to control random events

Being young ✓

Thrill seeking / Desire for thrills

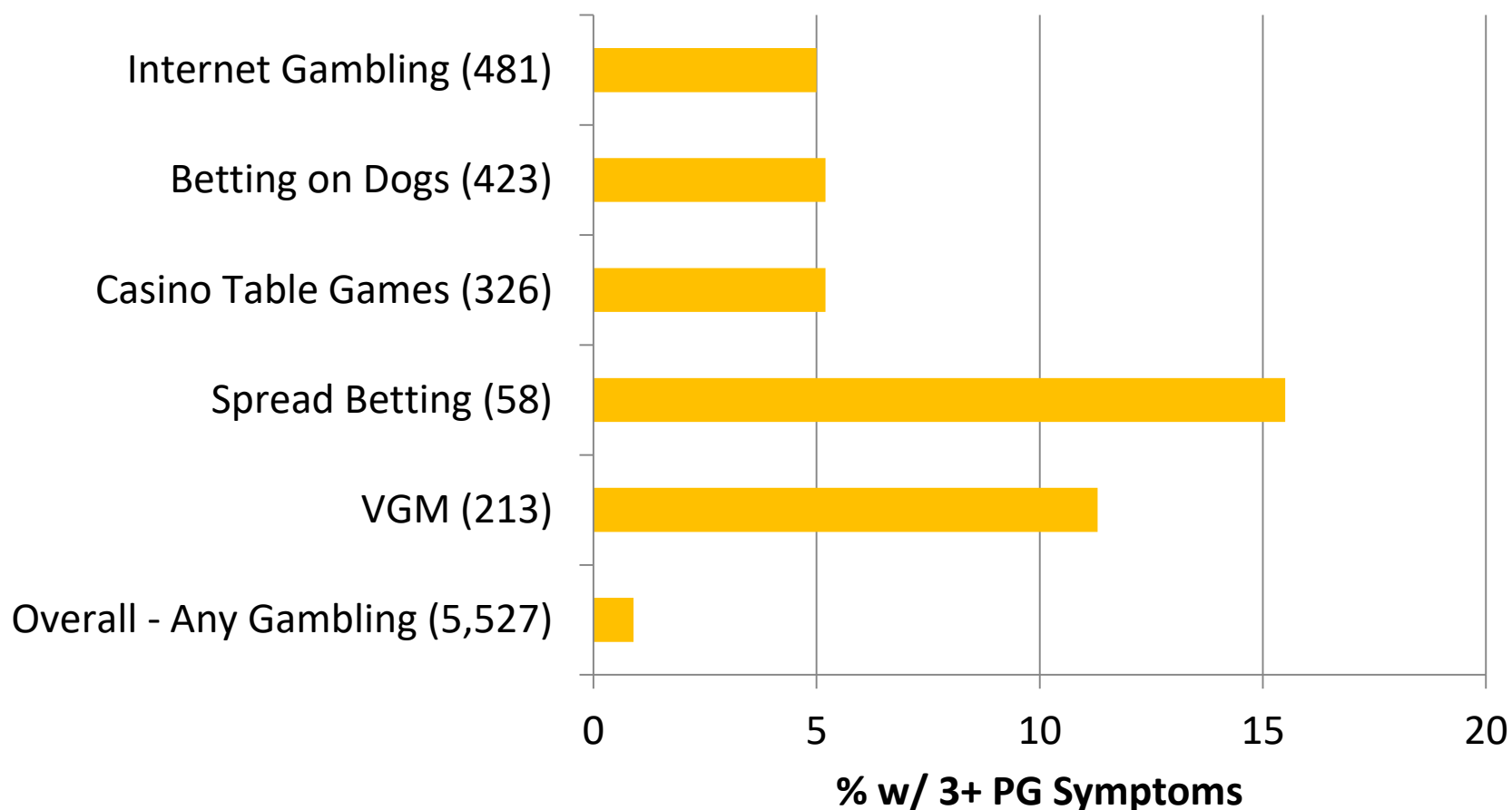
Having easy access to gambling

Starting to gamble at an early age

- People who gamble via the Internet are different from those who don't, and these differences might help account for differences in the prevalence of gambling disorder

# The British Gambling Prevalence Survey

## Gambling Problem Rates by Game



# Reconsidering the Evidence: The British Gambling Prevalence Survey

- People who played the five games in the previous chart also had the highest *involvement* (i.e., they played the most different types of games)
- Involvement was a stronger predictor of problems than playing any specific game type.
- The relationship between game type and gambling problems disappeared for all games except VGM when models were controlled for involvement.

# Take-Home: Games and Involvement

- These findings suggest that some games might be indicators of unhealthy involvement, rather than critical factors for problems
- It is tempting to speculate about what specific games do to people. It is better to consider what specific games do for specific people

# Special Thanks

- Dr. Ryan Martin
- Dr. Timothy Edson
- Dr. Matthew Tom
- Dr. Pradeep Singh
- Dr. Howard Shaffer
- Dr. Debi LaPlante
- Dr. Heather Gray
- Bobby McGeehan
- Jacob Sachs
- Greg Karamitis

# Additional Resources

- [www.divisiononaddiction.org](http://www.divisiononaddiction.org)
  - Division on Addiction's main website
  - Current projects and publications
- [www.basisonline.org](http://www.basisonline.org)
  - Brief science reviews and editorials on current issues in the field of addictions
  - Addiction resources available, including self-help tools
- <https://www.facebook.com/divisiononaddiction>
  - The Division's facebook page
- [@Div Addiction](https://twitter.com/DivAddiction)
  - The Division's twitter account
- [snelson@hms.harvard.edu](mailto:snelson@hms.harvard.edu)
  - Email me with any additional questions

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