**Biopsychosocial model of
Adolescent Gambling**

I. INTRODUCTION
   A. Why Study Adolescent Gambling?

- We begin a discussion of specific risk taking domains: Adolescent gambling.
  - Unlike other risk domains as there is an index or level of risk taking
    - Non-gamblers, Social Gamblers, Problems Gamblers, Pathological Gamblers.
  - But in other way, adolescent gambling can be seen as good example of the general action-decision function that humans constantly perform.
    - Participation in a ritualized risk-taking in which a decision is made in an attempt to achieve benefit in the face of ambiguous information.

I. INTRODUCTION
   A. Why Study Adolescent Gambling?

- According to Volberg (2004), there are five reasons for studying adolescent gambling:
  1. Pathological gambling has its roots in adolescence.
     - Adult pathological gamblers started as teens
  2. Immediate family members introduce gambling to children at a young age.
  3. Gambling is the earliest of a interrelated set of risky behaviors (drinking, drugs, tobacco, and alcohol)
  4. Youth gambling is associated with other mental health issues (suicide, depression, and addictions)
  5. Youth gambling is on the rise
     - Underage high school and college students gamble in casinos, on-line, at the track etc.

I. INTRODUCTION
   A. Why Study Adolescent Gambling?

- According to Volberg, adolescent gamblers prefer different kinds of gambling activities
  1. Cards , dice, board games.
  2. Private wagers on games of skill (betting on golf).
  3. Sports betting with friends and bookies.
  4. Bingo.
- There are gender differences in nature and frequency of gambling activities
  - More male than female adolescents gamble
  - Males prefer games of skill; female games of luck.
- Gambling is affected by parental and social context (although not Nevada youth!?!)

I. INTRODUCTION
   A. Why Study Adolescent Gambling?

- Data from WSU Introductory Psychology students confirm preference differences between types of gambling activities:
  - A small minority (22%) of WSU Intro Psych students reported having engage in formal gambling over the past 6 months.
  - A larger minority (42%) reported having engaged in informal gambling over the same time period.
  - A slight majority (51%) of WSU students have gambled one way or another.

I. INTRODUCTION
   A. Why Study Adolescent Gambling?

- WSU Introductory Psychology students also confirm gender difference:
  - More men (32%) than women (12%) engage in formal gambling
  - More men (58%) than women (28%) engage in informal gambling
  - More men (71%) than women (35%) engage in either form.

I. INTRODUCTION
   A. Why Study Adolescent Gambling?

- Data from WSU Intro Psych students suggest that age may also play a role in the form of gambling students engage.
  - 45% of students 21 and younger have gambled informally (dice, cards, etc.) in the past 6 months whereas 27% of those 22 or older have done so.
  - 15% of students 21 and younger have gambled formally (Casino, Track etc.) in the past 6 months whereas 47% of those 22 or older have done so.

I. INTRODUCTION
   A. Why Study Adolescent Gambling?

- Teens and young adults are vulnerable to gambling problems
  - Problem gambling is 3x higher in teens and youths than the general population.
  - Many gamble in order to earn money, despite the obvious futility of such a goal.
  - Over 60% of male and 40% of female student-athletes in a recent NCAA study have participated in a wide variety of gambling activities.
    - Their participation rate remains high (over 30% for men and 19% for women) for sports betting, an activity that is specifically outlawed by NCAA bylaws,
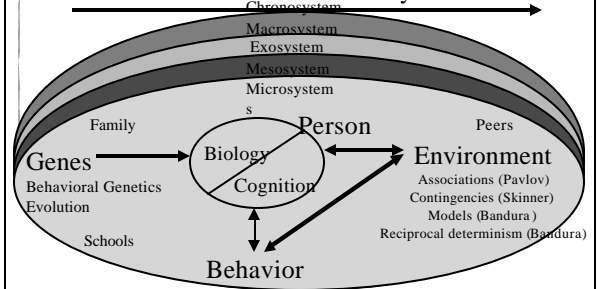
I. INTRODUCTION
   B. A Biopsychosocial Model

- Why are otherwise competent and intelligent young adults vulnerable to forms of irrational decision-making and behavior exposed by their predilections for betting?
  - This presentation will sketch a biopsychosocial model of adolescent gambling by examining
    - Biological factors (impulsivity which has genetic and neurological components)
    - Cognitive factors (analytic processing)
    - Social factors (role of peers, and parents)
- Each level requires *regulatory skills* which may make adolescents lack making them vulnerable to gambling (and other risk taking) problems

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I. INTRODUCTION
   B. A Biopsychosocial Model

- This characterization of the individual is embedded in Bronfenbrenner systems

Chronosystem
Macrosystem
Exosystem
Mesosystem
Microsystems

Family   Person   Peers
Genes   →   Biology   ←   →   Environment
Behavioral Genetics   Cognition   Associations (Pavlov)
Evolution   Contingencies (Skinner)
                                     Models (Bandura)
Schools   Reciprocal determinism (Bandura)

Behavior

II. BIOPSYCHOSOCIAL MODEL
   A. Biological Factors

- Nower et al, (2004) examined Impulsivity and Sensation Seeking in youth gambling.
  - 1339 (637 Male and 702 female) participants.
  - 17-21 years old, living in Montreal where 18 is the legal age for gambling
  - Categorized into non-, social, problem, and pathological gamblers.
  - Assessed **Impulsivity** with Eysenck Impulsiveness Scale (EIS), which measures the inability to plan, delay, think before acting (disinhibition)
  - Assessed **Sensation Seeking** with Arnett Inventory of Sensation Seeking which measures Intensity (alpha =.5) and Novelty seeking (alpha =.64)

II. BIOPSYCHOSOCIAL MODEL
   A. Biological Factors

Table 1
Level of Gambling Involvement by Gender and Age

Variable	Nongambler	Social gambler	Problem gambler	Pathological gambler	Total
Gender					
Male					
n	102	461	31	43	637
%	16.0	72.3	4.9	6.8	100
Female					
n	150	523	17	12	702
%	21.4	74.5	2.4	1.7	100
Age					
17					
n	72	262	14	13	361
%	19.9	72.6	3.9	3.6	100
18					
n	101	387	22	21	531
%	19.0	72.9	4.1	4.0	100
19					
n	44	238	7	10	299
%	14.7	79.6	2.3	3.3	100
20					
n	20	63	1	8	92
%	21.7	68.5	1.1	8.7	100
21					
n	15	34	4	3	56
%	26.8	60.7	7.1	5.4	100

Gambling groups

Slide 1

II. BIOPSYCHOSOCIAL MODEL
   A. Biological Factors

Table 2

Means and Standard Deviations by Gender and Gambling Category for Impulsivity and Intensity Seeking

Variable	Males			Females		
	n	M	SD	n	M	SD
Impulsivity						
Nongambler	101	4.51	3.42	150	4.85	3.12
Social gambler	462	5.52	3.17	523	5.49	3.12
Problem gambler	31	6.35	3.27	17	7.06	3.68
Pathological gambler	43	7.74	2.57	12	7.33	2.90
Intensity seeking						
Nongambler	101	26.12	4.57	150	23.22	4.08
Social gambler	462	26.87	4.05	523	24.32	3.95
Problem gambler	31	27.68	4.28	17	27.18	2.88
Pathological gambler	43	27.56	3.92	12	27.17	3.97

Slide 2

II. BIOPSYCHOSOCIAL MODEL
   A. Biological Factors

- Separate multiple regressions were run for males and females (w/ & w/o controls removed)

Table 3
Males: Logistic Regression Results (N = 371)

Predictor variable	B	SE	Wald χ^2	df	p	OR
Without control variables						
Substance use	0.12	0.03	12.68	1	.01	1.12
Distraction	0.07	0.02	7.69	1	.01	1.07
Impulsivity	0.47	0.15	10.49	1	.01	1.60
With control variables						
Substance use	0.12	0.03	13.73	1	.01	1.13
Distraction	0.06	0.02	6.48	1	.01	1.06
Impulsivity	0.49	0.15	11.05	1	.01	1.63
Gambling father	1.19	0.49	5.90	1	.02	3.28

Note. OR = odds ratio.

Table 4
Females: Logistic Regression Results (N = 424)

Predictor variable	B	SE	Wald χ^2	df	p	OR
Without control variables						
Intensity seeking	0.19	0.05	12.47	1	.01	1.21
Impulsivity	0.15	0.07	5.42	1	.02	1.17
With control variables						
Intensity seeking	0.18	0.05	11.57	1	.01	1.20
Impulsivity	0.15	0.07	5.15	1	.02	1.16
Substance-abusing father	0.93	0.47	3.81	1	.05	2.53

Note. OR = odds ratio.

Slide 3

II. BIOPSYCHOSOCIAL MODEL
   C. Biological Factors

- Some problems with the study
  - Small sample size for pathological gamblers, particularly for women.
  - Some very weak reliabilities for measures
    - Intensity and Novelty seeking had low reliabilities
  - We know little about the development of pathological gambling.
    - Family issues, peers issues etc.
    - Should we analyze 17 and 22 year-old gamblers differently?
    - By combining age groups do we just add variance which highlights general individual differences (impulsivity) and hides age-related factors.

Slide 4

II. BIOPSYCHOSOCIAL MODEL
   A. Biological Factors

- Chambers & Potenza (2003) discuss the neurological mechanisms mediating the impact of impulsivity on behavior.
  - limited attention spans, impulsive behavior, inability to delay, and insensitivity to punishment linked to deficiencies in serotonin.
    - Serotonin has an inhibitory effect upon the cortex and is associated with more controlled behavior.
    - Decrease in 5-HT levels associated with heavy alcohol consumption, explaining co-morbidity with drinking.
    - Others have argued that serotonin deficit may also play a role in the development of problem gambling.

II. BIOPSYCHOSOCIAL MODEL
   A. Biological Factors

- Chambers & Potenza (2003) also discuss the role of dopamine in regulation of emotional behavior during gambling
  - A variant of the dopamine D2 receptor gene (DRD2) was found in 51% of pathological gamblers compared with only 26% of controls.
    - The effect of this gene was more closely associated with pathological gambling than any other addiction.
    - D2 receptor gene is also associated with other addictions, including alcoholism,
  - Genetic variants of the DRD2 gene may play a significant role in pathological gambling.

II. BIOPSYCHOSOCIAL MODEL
   B. Cognitive Factors

- Amsel et al. (submitted) addresses the cognitive basis of gambling
  - Generally, the cognitive approach focuses on irrational beliefs and judgments in gambling.
  - Amsel et al., adopt a Dual Process account of gambling.
    - Dual Process theory holds that both **Analytic** and **Experiential** processes are simultaneously activated when processing gambling information.
  - The orientation addresses individual, developmental, and situational factors affecting how analytic and experiential processes are cognitively regulated.

II. BIOPSYCHOSOCIAL MODEL
   B. Cognitive Factors

Table 1. Comparison of the Experiential and Rational Systems

Experiential system	Rational system
1. Holistic	1. Analytic
2. Automatic, effortless	2. Intentional, effortful
3. Affective: Pleasure-pain oriented (what feels good)	3. Logical: Reason oriented (what is rational)
4. Associationistic connections	4. Logical connections
5. Behavior mediated by "vibes" from past events	5. Behavior mediated by conscious appraisal of events
6. Encodes reality in concrete images, metaphors, and narratives	6. Encodes reality in abstract symbols, words, and numbers
7. More rapid processing: oriented toward immediate action	7. Slower processing: oriented toward delayed action
8. Slower and more resistant to change: Changes with repetitive or intense experience	8. Changes more rapidly and easily: changes with strength of argument and new evidence
9. More crudely differentiated: Broad generalization gradient; stereo-typical thinking	9. More highly differentiated
10. More crudely integrated: Dissociative, emotional complexes; content-specific processing	10. More highly integrated: Content-general principles
11. Experienced passively and preconsciously: we are seized by our emotions	11. Experienced actively and volitionally: we are in control of our thoughts
12. Self-evidently valid: "Experiencing is believing"	12. Requires justification via logic and evidence

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II. BIOPSYCHOSOCIAL MODEL
   B. Cognitive Factors

- Introductory Psychology students received a Ratio Bias *Judgment* and *Evaluation* task.
  - **RB Judgment task** tests the role of dual processes in making inference about gambling.
    - Students asked to choose between two equal gambles (1/10 vs. 10/100)
    - Evidence of Experiential overriding Analytic processing reflected by 10/100 or 1/10 choice over no preference.
  - **RB Evaluation task** tests students' ability to regulate the dual processes
    - Task is judge certainty of response options as analytic (rational), irrespective of their actual judgments
    - Experiential-based judgments must be represented as such for a person to be considered rational.

II. BIOPSYCHOSOCIAL MODEL
  B. Cognitive Factors

- Evaluation task performance allowed for distinctions between three types of dual process regulators.
  - **Competent**: Certain only that "no preference" was Analytic. Not certain that other options are Analytic.
  - **Flawed**: Not certain that "no preference" is Analytic, but that other response options are so.
    - Reflects a misrepresentation of Analytic as experiential and vise versa.
  - **Conflicted**: Certain that "no preference" and other response options are Analytic.
    - Reflects the potential for competent regulation but some confusion between Analytic and Experiential reasoning.

II. BIOPSYCHOSOCIAL MODEL
  B. Cognitive Factors

Gambling-Related Decisions and Behaviors	Regulatory Styles		
	Flawed (N=53)	Conflicted (N=59)	Competent (N=59)
Pay for Tray?	36%	17%	8%
Engage in Gambling?			
Formal	26%	25%	12%
Informal	59%	36%	28%
Composite Gambling			
Score (0-2)	.85	.61	.41
Ratio Bias			
Large Tray	62%	48%	54%
Small Tray	38%	52%	46%

II. BIOPSYCHOSOCIAL MODEL
  B. Cognitive Factors

- Some problems with the study
  - Are there confounds between regulatory groups which can explain their gambling judgments?
    - SEX, age, and estimated SAT scores were used as covariates to remove any influence they may have had.
    - Other extraneous variables may remain.
  - Can the results be generalized to other tasks and participants?
    - Will the results be the same using other participants or other measures?

II. BIOPSYCHOSOCIAL MODEL
  C. Social Factors

- Hardoon and Derevensky (2003) examined social factors on gambling
  - 130 4th to 6th graders from various schools were the participants.
  - Participants played a computer-simulated roulette game individually (baseline trial & post-test trial) and in groups (same and mixed gender dyads or triads: group trial).
    - They used fake money, the more of which they won, the more likely they would win a gift drawing at the end.
  - The purpose was to measure children's betting behavior (via average wagers) and to determine if any changes in betting occur as a result of playing in groups of two or three and the same and/or different gender peers.

II.   BIOPSYCHOSOCIAL MODEL
        C. Social Factors

- Results demonstrated the influence of the peer group on children's gambling behavior.
- Males consistently exhibit higher average wagers than females.
  - Compared to all other groups, male dyads (MM) and triads (MMM) changed the least from pre- to group test and from group to post-test
  - They placed higher wagers than female and mixed gender groups involving males.

II.   BIOPSYCHOSOCIAL MODEL
        C. Social Factors

- Average wagers of females and mixed gender groupings appear to be most affected by the group condition.
  - Females were found to increase their average wagers when playing with females and males.
  - Female dyads' wagers increase significantly during group play, indicating they were affected by the group.
  - Although both female dyads (FF) and triads (FFF) responded to peer influences by increasing their average wagers, both groups' average bets decreased during the post-test.

II.   BIOPSYCHOSOCIAL MODEL
        C. Social Factors

- Some problems with the study
  - How realistic was it to gamble with fake money?
    - Does anything from this generalize? Although the effects of peers confirmed by other research.
  - No control group of kids who did not enter into groups.
    - There is probably is tendency to bet more over time, so the increase may not be attributable to the social group arrangements
  - Individual in groups were treated as independent data points.
    - But others' performance may have influenced individuals performance and skewed the results.

III. INTEGRATION
        A. General Model

- Objective models of adolescent gambling are possible
  - There are predictor factors of adolescent gambling
    - biological (impulsivity), cognitive (poor regulation of dual processes) and social (peer gamblers)
  - There are also protector factors which can be gleaned from the data.
    - Non-impulsivity, sophisticated regulation of dual process and non-gambling peers.
    - Living with non-gambling parents
    - Living in a state/culture which does not support gambling (the Nevada case may be due to kids being form LDS families)
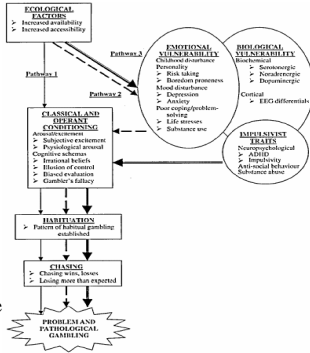
III. INTEGRATION
A. General Model

The BPS model may allow for multiple pathways to pathological gambling

Either directly through a behavioral-cognitive path or indirectly mediated by emotional/ mood and biological vulnerability

I'm not sure these are right vulnerabilities and I'm suspicious of lack of double headed arrows. But, the multiple pathways seems reasonable.

III. INTEGRATION
A. General Model

- Subjective BPS models of adolescent gambling are also possible
  - The sense of poor biological, cognitive, social regulatory skills may make gamblers focused and committed to their actions
    - This focus and certainty may be the source of the "chasing" behavior seen in pathological and problem gamblers.
  - This is particularly true of adolescents.
    - The distinction between *intentional* and *willing* behavior seems particularly relevant to gambling and other risk-taking phenomenology.