Genes, Environment, and Psychiatric Disorder: The Development of Problem Gambling from ages 18 to 25: A Twin Family Study

Serena M. King, Ph.D., L.P.
Associate Professor of Psychology
skingo2@hamline.edu
Chuck E. Cheese: A Gambling Gateway Restaurant?

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¹Department of Psychology, U of Minnesota, MN Center for Twin and Family Research
²Department of Psychiatry, U of Minnesota
What is Pathological Gambling?

According to the DSM-IV (Amer Psychiatric Assoc), to meet criteria, one must **have 5 or more** of the following symptoms:

- Committing crimes to get money to gamble
- Feeling restless or irritable when trying to cut back or quit gambling
- Gambling to escape problems or feelings of sadness or anxiety
- Gambling larger amounts of money to try to make back previous losses
- Having had many unsuccessful attempts to cut back or quit gambling
- Losing a job, relationship, or educational or career opportunity due to gambling
- Lying about the amount of time or money spent gambling
- Needing to borrow money to get by due to gambling losses
- Needing to gamble larger amounts of money in order to feel excitement
- Spending a lot of time thinking about gambling, such as past experiences or ways to get more money with which to gamble

According to population estimates, 1-2.5% of U.S. adults meet lifetime criteria for DSM Pathological Gambling.
Problem Gambling Quotes (not from this study):
How do we measure youth gambling problems?
Scope of the Problem


<table>
<thead>
<tr>
<th>FREQUENT GAMBLING (at least weekly during the past 12 mos)</th>
<th>1992</th>
<th>1995</th>
<th>1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>9th Grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>21.8%</td>
<td>20.4%</td>
<td>22.9%</td>
</tr>
<tr>
<td>Girls</td>
<td>6.0%</td>
<td>4.5%</td>
<td>4.5%</td>
</tr>
<tr>
<td>12th Grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>23.8%</td>
<td>22.7%</td>
<td>29.0%</td>
</tr>
<tr>
<td>Girls</td>
<td>6.3%</td>
<td>5.0%</td>
<td>7.9%</td>
</tr>
</tbody>
</table>

Scope of the Problem: At Risk Gambling

<table>
<thead>
<tr>
<th>Age</th>
<th>16</th>
<th>18</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Risk Gambling*</td>
<td>14.8%</td>
<td>12.1%</td>
<td>21%</td>
</tr>
</tbody>
</table>

“A Prospective Study of Youth Gambling Behaviors” (Winters, Stinchfield, Botzet, & Anderson, 2002)

*At risk= a score of 2 or 3 on a list of 12 gambling problems (based on DSM (Diagnostic and Statistical Manual of Mental Disorders-IV)
Youth problem gambling and adult outcomes

- Starting gambling earlier = greater gambling problems

- Early identification leads to better prevention and intervention efforts
What factors are associated with risk for problem gambling in youth?

- Family History of Problem Gambling
- Delinquent behaviors in adolescence, childhood
- Depression and Anxiety
- Behavioral impulsivity and undercontrol
  - Childhood and adult externalizing disorders (ASPD, ADHD, CD)
  - Childhood externalizing disorders (ADHD, CD, ODD)
- Early gambling and early problem gambling
- Substance abuse and dependence
- Male gender
Prediction of Youth Gambling

- Prevalence increases during young adulthood
Twin Study Methodology

Use of twin samples allows us to:

Use a natural experiment, compare MZ to DZ twins

Use quantitative methods to examining genetic, shared and non-shared environment.
Estimating Effects of Genes and Environment in a Twin Study

- Twin Studies allow estimation of the proportion of variance in a behavior explained by:
  - Genetics (additive genetic influences)
  - Shared Environment (environments that twins share in common); for example, parenting
  - Non-shared environment (environments that twins do not share); for example peer relationships.
Behavioral Genetic Studies of Gambling

- Only approximately 19 published studies, mostly on adults

- Can locate only one published behavioral genetic study on youth
  - Beaver et al. (2010)
Behavioral Genetic Studies of Gambling

- Mostly on adults, Vietnam Era Twin Registry

- Shared genetic influences on PG and depression, Antisocial Personality and Substance Use Disorder
The Current Studies

Study 1:
Genetic and environmental influences on gambling from age 18 to 25

Study 2:
Underlying factor structure of psychiatric disorders including gambling
Significance and Contributions of the Current Studies

- One of the few behavioral genetic studies of youth gambling
- First longitudinal behavioral genetic investigation (none reported in the published literature.)
- Few studies testing the idea of gambling belonging to externalizing or internalizing spectrum in psychopathology.
Study 1:
Genetic and Environmental Origins of Problem Gambling From Age 18 to 25
Scientific Questions

The present study aims to address the following scientific questions:

- Contributions of genetic, shared and non-shared environments from age 18 to 25
- Correlated G and E influences over time?
- Gender differences in underlying G and E influences?
Method

- **Participants:**
  - Participants were 1320 twins (46% male) participating in the Minnesota Twin Family Study
  - Average age = 18.21 at time 1
  - Average age = 25 at time 2
  - Cohort was first assessed at age 11, in the 1980’s
Gambling Measures

At both assessments:

- Frequency of gambling activities in the past 12 months:
  - never to weekly

- Largest amount ever lost in a single day

- Score on a scale of 12 gambling problems
Statistical Analyses

- Used MX statistical modeling program to analyze twin data

  Used a factor model including multiple measures of gambling to minimize method error
Descriptive Stats and Correlations

- Men > women on most gambling variables

- Mean levels of gambling relatively stable between 18 and 25, with some intra-individual change

- No underlying gender differences in the contribution of genetic and environmental factors to problem gambling at either age.
Most Popular Gambling Behaviors, Age 18 (% endorsed past 12 months)

Men
- Cards
- Lottery
- Sports
- Slots

Women
- Slots/Machines
- Lottery
- Pulltabs
- Cards
% Endorsing 1+ Gambling Problem (past 12 months)
Genetic, Shared and Non-Shared Environmental Influences on Gambling

Age 18
- Additive Genetics: 34%
- Shared env: 23%
- Non-shared env: 43%

Age 25
- Additive Genetics: 66%
- Shared env: 33%
- Non-shared env: 6%

Correlated Additive Genetic effect = .76*
Correlated Non-shared environmental effect = .07
Study 1 Findings

- No evidence for gender differences in genetic and environmental influences on problem gambling during this transition.
- Genetic, Shared and Non-Shared Environment influential at both ages.
Findings: Study 1
Effects of Genes and Environment from Ages 18 to 25

- Genetic influences increase over time
- Non-shared environment influential at both time points
- Shared environment influential at age 18 only
Implications of Study 1

Similar etiological influences in men and women during this developmental transition.

Increasing genetic influence over this transition
Study 2:
Comorbidity of Gambling Problems and Adult Psychiatric Disorders at Age 25: A Factor Analytic Approach
Problem Gambling Co-Occurs with other Psychiatric Disorders

- Antisocial Personality Disorder, and Substance Use Disorders in adults and adolescents
- Major Depression
- Anxiety Disorders (OCD; Impulse Control Disorders)
- Sexual Compulsivities
Where is DSM-V heading?

- Dimensional approach

- PG is lumped with other addictions (previously in impulse control disorders)

- DSM changes are based underlying inferences about common causes
Method and Analyses

Same sample, age 25 (last 3 years assessment of the following psychiatric disorders):

- Problem Gambling (defined earlier)
- Internalizing
  - Panic Disorder
  - Generalized Anxiety Disorder
  - Social Phobia
  - Simple Phobia
  - Post-Traumatic Stress Disorder
  - Major Depressive Disorder
- Externalizing
  - Nicotine Dependence
  - Cannabis Dependence
  - Alcohol Dependence
Factor Analytic Approach

- Empirically derives factors from the data
- Determines number of factors needed to explain the data
Results of the Factor Model

**p < .01
Factor Analysis Summary

- 2-factor model fit data best
- Problem gambling loaded on Externalizing Factor
- Supports DSM re-conceptualization of Pathological gambling into other addictions category
- Further extends research into classification and diagnosis in young people.
Conclusions

- Etiological influences on gambling are dynamic across development

- No gender differences in underlying etiology of problem gambling at this age.

- In young people, gambling co-occurs with other addictions and tends to load onto the externalizing spectrum
Implications/Future Research

Future research isolating specific environmental effects in a twin study design

Do similar genes and environments influence problem gambling, antisociality and substance use disorders in young people?

Do different genes and environments explain different forms of gambling?

Isolation of specific genes involved.
Resources

- http://www.gamblingdisorders.org/issues-insights/redefining-pathological-gambling-new-research-highlights
- www.collegegambling.org
THANK YOU!

Questions? Email: skingo2@hamline.edu