Longitudinal Studies of Gambling: Methods, Findings and Planning for the Future

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Using Big Data to Study Development & Social Change

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Utility of Longitudinal Cohort Designs

• Cross-sectional studies permit estimation of number of people who experience gambling problems & identification of factors associated with these problems

• Leaves uncertain the question of temporal sequence of associations between gambling problems & associated factors

• Identified cases include people with recently developed as well as long-term problems
  – Circumstances under which problems arose in the past could well be different from those associated with current problems
  – Recovery could require different intervention strategies
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Utility of Longitudinal Cohort Designs

• Allows you to understand how problem gambling develops (risk and protective factors) and how problem gamblers recover
  – retrospective self-reports are unreliable
  – correlates of problem gambling tell you nothing about whether they caused PG, developed coincident with PG, or are a result of PG

• Allows you to understand the natural course and stability of problem gambling

• Allows you to determine the incidence of problem gambling
Utility of Longitudinal Cohort Designs

• Cohort studies are needed
  – To generate reliable estimates of the incidence (onset) of problems
  – Determine temporal sequence and changes in gambling/problem gambling
  – Identify risk & protective factors for initial onset and other changes over time inc. remission & relapse/recurrence

• This information is highly relevant to the identification of high-risk groups before problems develop & design of preventative interventions
Growing number of longitudinal cohort studies conducted internationally

<table>
<thead>
<tr>
<th>Study Population</th>
<th>Waves</th>
<th>Jurisdiction</th>
<th>Researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children</td>
<td>2</td>
<td>Canada</td>
<td>Pagani, Derevensky &amp; Japel, 2009</td>
</tr>
<tr>
<td>Adolescents &amp; parents</td>
<td>2</td>
<td>Canada</td>
<td>Dane et al, 2008</td>
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<tr>
<td>Adolescents</td>
<td>6</td>
<td>United States</td>
<td>Barnes et al</td>
</tr>
<tr>
<td>Adolescents</td>
<td>6</td>
<td>Montreal</td>
<td>Vitaro et al</td>
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## Study Population Waves Jurisdiction Researchers

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<th>Study Population</th>
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<tbody>
<tr>
<td>Young adults</td>
<td>2</td>
<td>Canada ADHD study</td>
<td>Breyer et al, 2009</td>
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<tr>
<td>Young adults</td>
<td>2</td>
<td>Dunedin cohort</td>
<td>Slutske et al, 2005</td>
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<tr>
<td>Young adults</td>
<td>3</td>
<td>Minnesota</td>
<td>Winters et al, 2002, 2005</td>
</tr>
<tr>
<td>Young adults</td>
<td>4</td>
<td>Australia</td>
<td>Delfabbro, Winefield &amp; Anderson, 2009</td>
</tr>
<tr>
<td>College – young adult</td>
<td>4</td>
<td>Midwest US</td>
<td>Slutske, Jackson &amp; Sher, 2003</td>
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<tr>
<td>College – young adult</td>
<td>4</td>
<td>Midwest US (1 gambling item)</td>
<td>Goudriaan et al, 2009</td>
</tr>
<tr>
<td>Young adults</td>
<td>6</td>
<td>Australia health study</td>
<td>Hayatbakhsh et al, 2006</td>
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## Special populations

<table>
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<tr>
<th>Study Population</th>
<th>Waves</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Regular EGM players</td>
<td>6</td>
<td>Australia</td>
<td>Dickerson, Haw &amp; Shepherd, 2003</td>
</tr>
<tr>
<td></td>
<td>(6 months)</td>
<td></td>
<td></td>
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<tr>
<td>At-risk &amp; help-seeking</td>
<td>6</td>
<td>Canada</td>
<td>Wiebe et al, 2009</td>
</tr>
<tr>
<td>gamblers</td>
<td>(12 months)</td>
<td></td>
<td></td>
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<tr>
<td>Scratchcard players</td>
<td>2</td>
<td>Netherlands</td>
<td>DeFuentes-Merillas et al, 2004</td>
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<tr>
<td>Regular VLT players</td>
<td>2</td>
<td>Nova Scotia</td>
<td>Schrans, Schellinck &amp; Walsh, 2000</td>
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<tr>
<td>Casino employees</td>
<td>3</td>
<td>United States</td>
<td>Shaffer &amp; Hall, 2002</td>
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### Adult studies

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<tr>
<td>Adults</td>
<td>2</td>
<td>Ontario</td>
<td>Wiebe et al, 2003a, 2003b</td>
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<tr>
<td>Adults</td>
<td>2</td>
<td>New Zealand</td>
<td>Abbott, Williams &amp; Volberg, 2004</td>
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<tr>
<td>Older low-income adults</td>
<td>3</td>
<td>United States (1 gambling item)</td>
<td>Vander Bilt et al, 2004</td>
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</thead>
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<tr>
<td>Adults</td>
<td>3</td>
<td>Quebec</td>
<td>Kairouz et al (analysis underway)</td>
</tr>
<tr>
<td>Adults</td>
<td>4</td>
<td>Alberta LLLP</td>
<td>el-Guebaly et al (analysis underway)</td>
</tr>
<tr>
<td>Adults</td>
<td>5</td>
<td>Ontario QERI</td>
<td>Williams et al (analysis underway)</td>
</tr>
<tr>
<td>Adults</td>
<td>4</td>
<td>Victoria</td>
<td>Billi et al (analysis underway)</td>
</tr>
<tr>
<td>Adults</td>
<td>6</td>
<td>Sweden</td>
<td>Romild et al (data collection &amp; analysis underway)</td>
</tr>
</tbody>
</table>
Methodological advances

• Recent studies have included much larger samples
  – Representative of population at baseline
  – Significant resources dedicated to minimizing bias due to attrition

• Recent studies have longer duration
  – More fine-grained picture of transitions
  – Better sense of scope/scale of PG status changes

• Qualitative/in-depth input increasingly incorporated
Methodological advances

• Recent studies have included more sophisticated analytic approaches
  – Logistic regression
  – Multivariate analyses of variance
  – Hierarchical linear modeling
  – Individual & group trajectory analysis
  – Structural equation modeling w/latent variables
  – Latent class analysis & latent transitions btw classes
  – Survival analysis

• Missing data addressed via weighting & imputation

• Attrition analysis & group classification are elements of the best studies
Key findings

• Differentiating between proximal & distal factors
  – Recent gambling behavior/symptoms are better predictors of same behavior in subsequent years than more distant measures

• Most gambling problems tend to resolve over time

• Different groups of gamblers characterized by different trajectories towards problem gambling
  – Different predictors for at-risk & problem gambling
  – Involvement in clusters of different gambling activities associated w/different levels of risk
Risk factors predicting PG development across two cohort studies

- Gambling in the past year on EGMs, casino table games, Internet
- Betting weekly on horse/dog races
- Poor health (physical, mental)
- Smoking
- Risky drinking habits
- Difficulties at work
- Changes in working conditions
- Loss of a close relative
- Changes in personal/HH finances

Swedish National Institute for Public Health, 2012; Victoria Department of Justice, 2011
Some implications for policy & practice

- Some PGs are ‘new’ while others are ‘relapsing’
  - Important when designing treatments
  - Relapsers may have more acute problems, other physical/mental disorders
  - New PGs may be more responsive to brief interventions, less intensive treatments

- Larger % of population has experienced difficulties than prevalence rates suggest
  - ‘Natural selection’ will be high in this group in wake of gambling introductions, expansions
  - Policy, regulatory safeguards needed to minimize ‘natural selection’
  - Prevention, intervention safeguards needed to support PGs in remission or recovery & prevent development of new PGs
Value of a new longitudinal cohort study

• Ability to apply lessons learned from other studies to create even better methodology
  ➢ Greater oversampling to identify prevalence & incidence more accurately
  ➢ Use of techniques to obtain highest possible retention rate

• Ability to provide greater focus on under-investigated areas of other studies
  ➢ More than 5 assessment periods (i.e., 7 or more)
  ➢ Finer-grained chronology (e.g., subsample with twice yearly assessments)
  ➢ More detailed focus on the etiological factors implicated in the other studies
Considerations

**Consideration #1**

- Do we want to just determine incidence, stability, and tentative predictors of PG **OR** do we want to also develop a comprehensive etiological model?

- Etiological model much more scientifically ground-breaking and useful from a prevention/treatment standpoint, however this would mean:
  
  - Supplement baseline sample with large number of high-risk individuals (perhaps using multimodal sampling methods)

  - Assess all participants with comprehensive assessment battery
Consideration #2

- How big should our sample be?

- Incidence of PG could be captured just by following 1,000 baseline participants

- Incidence and stability of PG could be captured by following 3,000 baseline participants

- Incidence, stability and etiology of PG could be captured by following 2,000 randomly selected baseline participants + 3,000 high risk individuals = 5,000
Considerations

Consideration #3

- How frequently should the cohort be assessed?

- Do we want the usual 1-2 year interval or develop a finer-grained chronology?

- The latter would be more scientifically ground-breaking
  - However, too logistically difficult to assess entire sample more than once a year
  - Could assess a subsample (500 – 1,000) of high-risk individuals twice yearly
Consideration #4

- How long do we want the study to continue?

- The longer the better. While some people become PGs within a few years of gambling onset, others report that it took many years. A study of 5 years duration will only reliably identify the etiology for the subset of people who become PGs within a 4 year time period.

- 7 – 10 assessment periods would be a significant improvement over the 4 – 5 assessment periods used in the existing studies.
Lessons learned

• Success at conducting a large-scale longitudinal cohort study is not due to a few critical things, but a thousand little things and the ongoing ability to quickly identify and rectify the many issues that continually arise