Pathological Gambling and the Space of Psychiatric Disorders

Carlos Blanco, M.D., Ph.D.
Professor of Psychiatry
Columbia University

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Summary

• Context
• Objective
• Design and methods
• Results
• Discussion
• Conclusion
Context

• Current advances in nosology (i.e., DSM-5) brings to the fore interrelationships between disorders
• These interrelationships could inform about commonalities in etiology, clinical course and treatment response
• Two questions:
  – What is the place of PG in the nosology of psychiatric disorders?
  – What are the implications?
Context

• Previous clinical and research evidence suggests that mental disorders have other mental disorders to which they are more closely related to, and other that are less similar
Context

• Symptom presentation (e.g., phenomenology and course) in clinical experience:
  – Major depression is more related with dysthymia or GAD than with substance use disorders
  – PG has many symptoms paralleling substance use disorders
Context

• Structural studies of common mental disorders:
  – Internalizing disorders
  – Externalizing disorders

• Treatment response studies:
  – Response of different anxiety disorders to antidepressants
  – Several addictive disorders respond to CBT or naltrexone
Context

- Structural studies suggest a limited number of common causal pathways
- Disorders more related among each other may express these commonalities:
  - Comorbidity
  - Etiological factors
  - Clinical presentation
  - Clinical course
  - Treatment response
Objective

- To operationalize a formal measure of similarity between disorders
- Measure its validity by examining its prediction of incidence and prevalence prospectively
- Examine the location of PG in this map
How to measure the “distance” between mental disorders?

• Locations of each disorder in a virtual map will allow the calculation of “distances” as a formal measure of similarity.

• The dimensions in the space and the location of disorders in that space can be obtained using factor analysis.
How to develop a map?

- Factor analysis allows:
  - To identify latent dimensions of the disorders: each factor is an axis in the space
  - To use the loadings of each disorder in each latent factor as coordinates in a system
  - The location of each disorder in the virtual space can be used to calculate distances among disorders
Methods

• Sample: NESARC (N=34,653), completed in two Waves (2001-2002 y 2004-2005)
• Representative of the household adult population in the U.S
• Included DSM-IV diagnosis of PG
• 12-month DSM-IV diagnoses at Wave 1 were used to calculate the map
Methods II

• Identification of axes:
  – Exploratory factor analysis (EFA) was preferred over confirmatory factor analysis (CFA) to allow for cross-loadings
  – Criteria to select model: eigenvalues, fit indices, scree test and parallel analysis.
  – Each factor was a latent dimension that represented an axis in the space
Methods III

• Coordinates of the disorders:
  – Loadings of the indicators (i.e., disorders) indicate the strength of the relationship between the factor and the indicator
  – Loadings on the factors were used as coordinates over the axes to determine a position in the space
Methods IV

- Distance between disorders
  - The Euclidean distance between pairs of coordinates in the space (disorders) was obtained applying a generalization of the Pythagorean theorem for higher dimensional spaces
Methods V

• Predictive value of distances between disorders in the map:
  
  – Correlation between the distance between a pair of disorders in Wave 1 and the Adjusted Odds Ratio for their prevalence and incidence at Wave 2
Alternative measures

– The same correlation using a confirmatory (CFA) instead of an exploratory model (EFA)

– Inverse of the Odds Ratio in Wave 1
A map of mental disorders
Results: Dimensions of mental disorders

- A 3 factor model was preferred to calculate the map; however the 4 and 5 dimension models also showed good fit

- Correlation of factors:

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<thead>
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<th>Factor 2</th>
<th>Factor 3</th>
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Fit Indices

- CFI = 0.99
- TLI = 0.98
- RMSEA = 0.008
A map of mental disorders
Results: dimension of mental disorders II

- Factor 1 had highest loadings on substance use disorders, pathological gambling and antisocial personality disorders.
- Factor 2 had highest loadings on bipolar disorder, social anxiety disorder, specific phobia and the rest of personality disorders.
- Factor 3 had highest loadings on major depressive disorder, dysthymia, generalized anxiety disorder and panic disorder.
Results: coordinates and distance between disorders

- Broad variation in the pattern of coordinates and distances in the space between pairs of disorders

- Largest distance was found between dysthymia and drug abuse and shortest between drug abuse and alcohol dependence
Additional analyses

- For the exploratory model (EFA), the correlation between distances in Wave 1 and the AOR at Wave 2 were -0.57 for prevalence and -0.56 for incidence.
- For the confirmatory model (CFA), the correlation between distances in Wave 1 and the AOR at Wave 2 were -0.42 for prevalence and -0.38 for incidence.
- Alternative measures had lower predictive value.
Comments

• A limited number of underlying dimensions explain the comorbidity of mental disorders

• These results agree with previous research that support an externalizing dimension and a variable number of internalizing dimensions
Comments

• Pathological gambling was located close to other addictive disorders

• It had loadings from all dimensions

• This may represent:
  – Lack of chemical addiction
  – Alternative pathways (e.g., escape)
Comments

• Mapping mental disorders provides new pieces of information about the relationship between mental disorders
  – The cross-loadings indicate that disorders are not exclusively aligned with one dimension
  – Distance between pairs of disorders is a multivariate measure of association
  – Conceptualization of mental disorders as continuous instead of discrete entities
Comments

• Disorders included in the same DSM-IV diagnostic category tended to be closer to each other in the map

• It may also give clues as to where to locate some disorders such as PG or borderline PD.

• In addition to face validity, these diagnostic categories also have prognostic validity
Implications

• Nosological:
  – These results raise questions about the distinction between Axis I and II disorders (e.g., there is no “personality disorder” factor)
  – Internalizing and externalizing dimension are positively rather than negatively correlated.
  – Supports PG as an addictive disorder
Implications

• Etiological:
  – Disorders that are closer to each other are more likely to share liabilities

  – PG may share genes or neurocircuitry with SUD

  – Simultaneous loadings in multiple dimensions indicate multiple etiological paths, e.g., impulsivity versus escape
Implications

• Clinical:
  – Differential diagnoses can be narrowed towards diagnoses that are closer
  – In the case of PG, need to screen for substance use disorders, but also for mood and anxiety
Implications

• Therapeutic:
  – Treatment for conditions that are close to each other may overlap (e.g., several anxiety and mood disorders that are close in the map respond to SSRIs)

  – Supports the study of treatments that have been useful for substance use disorders
Summary

• Mapping mental disorders can be used to quantify their distance to each other
• This distance is a formal measure which predicts of incidence and prevalence
• This measurement has nosological, etiological, clinical and therapeutic implications
Thank you